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JAPAN'S ECONOMY
IN
WAR AND RECONSTRUCTION

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JAPAN'S ECONOMY IN WAR AND RECONSTRUCTION

BY

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With a Foreword by
SIR GEORGE SANSOM

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To MINA

FOREWORD

Dr. Cohen's substantial monograph might be described as a study in the morbid anatomy of a warlike state, with appropriate clinical records in the form of charts and tables. It is a carefully documented account of the economic development of Japan from 1937 up to 1949, and is therefore of peculiar interest from several points of view. It describes with much statistical evidence a remarkable experiment in planned industrial expansion prior to 1941, and this is a piece of work which will be welcome to students of economic history for purposes of comparison with similar experiments in other countries. It continues with an interesting survey of the war years, showing the successes and failures of Japan in planning, controlling, financing and developing her war industries, meeting emergencies and coping with appalling problems of labor and munitions and food supply as the Allied war effort gradually and relentlessly wore her down. This, together with detailed studies of separate industries, shipping and agriculture, provides material valuable not only to the economic specialist but to the general reader interested in the political aspects of preparing and operating a wartime economy by totalitarian methods.

In pursuing his investigations Dr. Cohen has enjoyed an advantage which does not often fall to the lot of economic writers dealing with Far Eastern problems. Not only has he been able to use a mass of Japanese statistics and to scrutinize them in the light of information subsequently collected by specialists on General MacArthur's staff, but he has also profited by discussion in Japan with officials and industrialists who were themselves active participants in the events which he describes.

He has also made good use of the important documents issued by the United States Strategic Bombing Survey, together with the two volumes of interrogations prepared by the United States Navy. These provide much more than economic data, for they report the views of Japanese naval and military officers and responsible civilians of the causes and conduct of the war.

The reader's attention may be especially drawn to the author's careful discussion of the parts respectively played by air, sea and land operations in the destruction of Japan's power to wage war. His quotations from evidence given upon interrogation by a number of competent witnesses are

also interesting, though he would no doubt agree that their evidence would have been more valuable had it been obtained by skilled cross-examination.

The economic facts as set forth and interpreted by the author need no special comment here. On the whole they speak for themselves, and most readers will agree with his general conclusion that Japan made a cardinal blunder by overestimating her own capacity and underestimating the capacity of her enemy. Dr. Cohen goes further, and observes that "common misunderstanding led to a war which should never have been fought, for one side could not win and the other could not lose; and in such circumstances disagreements rarely culminate in war." This is a proposition which will perhaps be denied by some of his readers, but it raises questions which seem to me to impart a special interest to his book.

Judging by results it is clear that when the Japanese decided to attack a nation with perhaps ten times their own industrial economic and military potential they made an economic miscalculation of the first magnitude. They not only misjudged the strength of the enemy, but they prove to have overestimated their own power. But decisions to make war are based also on political judgments, and the validity of these is much more difficult to assess. As Dr. Cohen notes at the end of his first chapter, the leaders of Japan did not blindly lead their country into war without hope or prospect of success. Examined in retrospect their policy turns out to have been based upon mistaken assumptions and executed with insufficient foresight; but at the time when their decision was taken it was not irrational. They counted upon certain favorable circumstances to offset their own recognized deficiencies—the defeat of Russia and Great Britain and the prospect that, having rapidly conquered great territories in Asia, they could make a compromise peace with the United States which would leave them with a substantial portion of their gains. Of course they were wrong. But the defeated country is always wrong—when it is defeated.

Much that the author has to tell us illuminates the wartime scene in Japan. Naturally he dwells mainly on the fatal economic blunders made in the course of the war. He paints a grim picture of inter-service quarrels, overlapping and inconsistent controls, errors and hesitancies usually ascribed to irresolute democracies. He certainly demonstrates that, despite their reputed gift for careful and strict organization, the Japanese army, navy and civil service were not able in practice to make good use of their unlimited powers. There were many faults in that seemingly solid structure of authority, and it is consoling to think that a monolithic state can hide such grave weaknesses behind a sinister facade. But perhaps it is not wise to count upon the failures of an enemy, for most of the mistakes and shortcomings recorded here of Japan can in greater or less degree be matched in the record of all belligerents at all times.

Dr. Cohen's last chapter deals with Japan's post-war problems and brings the story down to the latter part of 1948, thus covering three years of occu-

pation by the Allied Powers. It is in many respects not an edifying story, but frequently one of miscalculations and setbacks against a background of inherent difficulties, some natural, some artificial. The Japanese economy was always an economy of scarcity, and by the date of the surrender it was not only distorted by war and the preparations for war, but had sustained great physical and moral damage and was almost at a standstill. Confronted with this situation the occupying authority and the governments by which it was directed would, one might suppose, direct their attention at once to the restoration of a tolerable standard of life, as a foundation for their plans of political reform. But with great ideological fervor and a conspicuous lack of wisdom they proclaimed intentions which were quite incompatible one with another and, as a whole, impossible of realization.

The Japanese were at the same time to be kept on short commons—whether as a punishment or a precaution is not clear—and to be persuaded, cajoled or even forced to adopt democratic principles in their social and political life. Their commercial and industrial organization—or what was left of it—was to be radically altered because it was held to be the root and cause of Japanese belligerency; but it was not decided nor has it yet been decided what should be put in its place. The Japanese were to pay thumping reparations—first a lot, then a little, and then scarcely any. Their foreign trade was first to be limited, on a mixture of grounds, partly political, partly strategic and partly competitive; then it was to be expanded for a set of different reasons. It took a long time for the occupying authority to accept the patent fact that, as all previous history shows, Japan could not support her population without imports which she could scarcely pay for by exports.

Recovery was impeded, it is true, by wrong-headedness, apathy, and probably fatigue on the part of the Japanese themselves, but also by divided counsel and conflicting purposes among the Allies, to say nothing of more than average incompetence in some branches of the Allied military government. One must make allowance for the great difficulty, one might almost say the virtual impossibility, of the tasks which confronted these officials. It is doubtful whether even a headquarters staff composed entirely of archangels could have solved Japan's problems in short order, given the conditions in which the Supreme Commander exercised his authority by passing directives to the Japanese Government, which they sometimes could not, sometimes would not, fulfill. This kind of undefined and undefinable dual authority does not make for sound administration or even for sensible planning; and it is not to be wondered at that the record shows failures which are not entirely offset by successes. This may seem a harsh judgment, but the fact remains that there has been much vacillation, much inconsistency in the economic policy pursued by the Allies in Japan. No lack of earnest and zealous labor, indeed, but incommensurate results.

This is not the place for a discussion of the policy of democratization which has been energetically, if at times unrealistically, pursued; but it is pertinent to observe that parliamentary democracy was born and nourished in the West in relatively favorable economic conditions. It may be that hungry, ill-clothed and worried men in some countries will pour their energies into a struggle for political freedoms; but it is extremely doubtful whether Japan is one of those countries. Dr. Cohen's concluding passage points out that the key to the recovery of Japan is her foreign trade, and I suspect that it is also the key to her domestic policies. Even granted the wisest planning and execution, the outlook is discouraging, for until, as Dr. Cohen notes, there is stability in the rest of Eastern Asia, the Japanese economy cannot be restored to a point where it can support a growing population of eighty million on even a modest standard.

Dr. Cohen's book is a major contribution to the series of studies on the problems of postwar Japan being prepared as part of the international research program of the Institute of Pacific Relations. Volumes already published in this series include *New Paths for Japan* by Harold Wakefield, *The Allied Occupation of Japan* by Edwin M. Martin, *Prospects for Democracy in Japan* by T. A. Bisson, and a brief monograph, *Japan's Textile Industry* by John R. Stewart. Forthcoming studies include "Japan — Enemy or Ally?" by W. Macmahon Ball, "Labor Problems in Japan" by Miriam S. Farley, and "Japan's Agricultural Problems" by Andrew J. Grad.

Although this study is issued under the auspices of the International Secretariat of the Institute of Pacific Relations, it should be noted that the author is solely responsible for all statements of fact or opinion presented in the book.

G. B. SANSOM
International Research Chairman,
Institute of Pacific Relations

New York
December, 1948

AUTHOR'S PREFACE

One of the main theses of six-sevenths of this volume is that the ever-enveloping American blockade of Japan, by shutting off essential supplies of industrial raw materials, brought Japanese war production to a virtual standstill before the main weight of the strategic air attack was delivered, and thereby made it impossible for Japan to continue the war. I first became convinced of this view when, as one of the Navy's Japanese Language Officers, I was assigned to the United States Strategic Bombing Survey in Japan and was instructed to delve into the files of the former Japanese Munitions Ministry, particularly its mobilization plans. They told an amazing story, which I have attempted to summarize in the pages that follow.

The last chapter surveys Japan's economy in the three postwar years under the Occupation. The three key economic facts have been the basic reforms, the rapidly mounting inflation and the slowly increasing, but still low level of production. Basically Japan's recovery remains dependent upon a very considerable expansion of her foreign trade and this awaits stability and recovery in all Asia. Japan cannot recover in a Far Eastern vacuum.

In the early days of the Occupation, Japanese statistics were with complete justification denounced as roundly as war criminals. One of the most restrained and carefully considered comments is to be found in the "Preliminary Report on Japanese Statistical Organization by the Statistical Mission to SCAP of the Division of Statistical Standards of the U.S. Bureau of the Budget":

> Japanese official statistics are plentiful, upon a wide variety of subjects. A large proportion of these have been characterized as inferior in quality by American statisticians employed by SCAP. When examined below the "face of returns," they have not satisfied accepted technical standards of objectivity, accuracy and adequacy. . . . Japanese statistics appear to the foreign critic as immature and naive . . . it is also probable that these statistics have been employed more often as weapons than as tools.

For the almost inevitable errors to be found in the mass of statistical data in this volume, the indulgence of the reader is asked in advance. He should imagine himself at a desk in the Meiji Building with several conflicting sets of data on a given economic factor. Naturally, the first step is to summon the compilers of each series and interrogate them, but un-

fortunately the No. 1, No. 2 and No. 3 men have been swallowed up in the Japanese hinterland and the always-endeavoring-to-be-obliging No. 4 assistant obviously doesn't know the answer. "Besides, basic records all burnt—so sorry." One can only plead that an occasional inexact statistic cannot negate the broad logic of apparent economic trends.

The preparation of this volume over a period of three years would not have been possible but for the aid and kindness of a surprisingly large number of people in Japan, in Washington and in New York. Space permits proper acknowledgement to only a few. In Japan, H. Irie, formerly of the Munitions Ministry, Saburo Ohkita of the Research Bureau of the Foreign Ministry, Shigeto Tsuru, formerly of the Foreign Ministry, later of the Economic Stabilization Board, Chigoro Sugiyama of the Ministry of Finance, Yuso Morita, formerly adviser to the Bank of Japan, more recently chief of the Prime Minister's Statistics Bureau, Yoshimitsu Asano, formerly of the Planning Bureau of the Finance Ministry, Iwao Ayusawa, formerly labor adviser to the *Oriental Economist*, and M. Hattori, formerly chief of the Mitsubishi Economic Research Bureau, were particularly helpful.

To Mr. Franklin D'Olier, Chairman, Paul H. Nitze, Vice-Chairman, Milton Gilbert, Paul Baran, Richard Ruggles, W. Park Armstrong, T. A. Bisson, Russell Dorr, Laurence Bridge, Gerald Stoner and Leonard Tyson, and to all my other colleagues of the Bombing Survey, must go the humble acknowledgment that without their combined efforts the basic facts in this volume could not have been gathered. The excellent work of the Survey in unearthing and evaluating so vast a collection of data on Japan in so brief a time was little short of phenomenal.

In Washington I have had the aid and counsel of Dr. Warren Hunsberger, chief, Jack Lydman, William G. Jones, Martin Hirabayashi and Stanley Nehmer, all of the Japan Branch, Division of Research for Far East, U.S. Department of State. Dr. Hunsberger read the manuscript most carefully and made numerous helpful suggestions. Professor Corwin D. Edwards, now of Northwestern University, and Raymond Vernon of the International Resources Division of the Department of State were kind enough to answer questions. I am particularly indebted to Ralph Hirschtritt, now with the Office of International Finance, U. S. Treasury Department.

Whatever merit this volume may have is in great part due to the guidance of Professor Carter Goodrich, Chairman of the Department of Economics of Columbia University, who sponsored and read the manuscript. Thanks are also due Professors Arthur R. Burns, John Orchard and Nathaniel Peffer of Columbia University, and to Mrs. Gertrude Stewart, Secretary of the Department of Economics.

For their judgment that this study warranted publication by the Institute of Pacific Relations and for subsequent advice and assistance, I am very much indebted to Mr. William Holland, Secretary-General, and to Sir

George Sansom, International Research Chairman of the Institute. My warmest thanks are also due to Miss Mary Healy and Mrs. Helen Schneider of the Institute who so carefully and painstakingly handled the publication arrangements.

It should be noted that though the book is issued under the auspices of the International Secretariat of the Institute of Pacific Relations, I am solely responsible for all views expressed in it, except Sir George Sansom's introduction. The volume was written after my separation from naval service and completed prior to my appointment as consultant to the Division of Research for Far East, U. S. Department of State. It is, therefore, not to be regarded as necessarily reflecting either the views of the Navy or of the State Department.

Finally, my deepest appreciation to my mother and father whose early sacrifices started me on this academic road, and to my wife for her constant and understanding encouragement and able assistance.

JEROME B. COHEN

New York
December, 1948

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CHAPTER ONE

A DECADE OF PREPARATION

Make our country secure by military preparations—encourage and protect the people at home, and then wait for the time of confusion of Europe which must come eventually sooner or later, and although we have no immediate concern with it ourselves we must feel it, for such an event will agitate the nations of the Orient as well, and hence although our country is not mixed up in the matter so far as Europe is concerned, we must become the chief of the Orient.—VISCOUNT TANI,[1] 1877.

By the end of 1941 Japan had completed a decade of planned industrial expansion and could look back upon a period of considerable achievement. Industrial output had risen from six billion yen in 1930 to thirty billion in 1941.

The early predominance of light industry over heavy had been completely reversed. Heavy industry, which had constituted 38 percent of total industrial output in 1930, had by 1942 reached 73 percent of the total.[2] (See the following table.)

COMPARATIVE INDUSTRIAL DEVELOPMENT, 1930-42

Category	*1930*		*1937*		*1942*		*Index of Production Change 1930-42 1930=100*
	Yen mil.	*%*	*Yen mil.*	*%*	*Yen mil.*	*%*	
Heavy Industry*	2,283	38.2	9,452	57.8	23,335	72.7	1020
Light Industry** ...	3.680	61.8	6.904	42.2	8,795	27.3	240
Total	5,963	100.0	16,356	100.0	32,130	100.0	540

* Heavy industry includes metal and metal refining, machinery, tools, shipbuilding, aircraft, ordnance, chemical, construction materials, etc.

** Light industry includes textiles, foodstuffs, printing and binding, clothing, toys, etc.

Source: Kokunai Keizai Shiryo No. 31, *op. cit.*, p. 5.

Without adjustment for price change it appears that heavy industry expanded tenfold over the period while light industry increased two and a half

[1] Quoted in Dulles, Foster Rhea. *Forty Years of American Japanese Relations*, New York and London, 1937, pp. 13-14.

[2] Kokunai Keizai Shiryo No. 31, *The Domestic Conversion to Heavy Industry in Recent Years*, Research Bureau, Foreign Ministry (Gaimusho), Tokyo, 1945.

times. However, interrogation of Ministry of Commerce and Industry statisticians revealed that the value of output of certain textile mills, which had converted to war production prior to December 1941, was, nevertheless, added to the annual output figures of the textile industry. Therefore the total of light industry for 1942 should probably be decreased by about 10 percent and the total for heavy industry correspondingly increased.

If the data above, disregarding this correction, are adjusted for price change (deflated by an index of wholesale prices), it will be seen (in the following table) that heavy industry expanded fivefold while light industry showed relatively little change.[3]

COMPARATIVE INDUSTRIAL DEVELOPMENT, 1930-42

(in 1930 prices) *

Category	1930		1937		1942		Index of Production Change, 1930-42 1930 = 100
	Yen mil.	%	Yen mil.	%	Yen mil.	%	
Heavy Industry	2,283	38.2	7,160	57.8	11,845	72.7	519
Light Industry	3,680	61.8	5,230	42.2	4,464	27.3	121
Total	5,963	100.0	12,390	100.0	16,309	100.0	273

* Adjusted by an index of wholesale prices for Tokyo, 1930 = 100, 1937 = 132, 1942 = 197. This is somewhat lower than the Ministry of Commerce & Industry index of wholesale prices for the entire country (1930 = 100, 1937 = 141, 1942 = 218). This is, of course, due to the greater competition in Tokyo. Mr. Ohkita of the Research Bureau of the Foreign Ministry argued that since most of the products of industry are first sold at wholesale in one of the four large urban centers of Japan, it was more realistic to use this index in deflating.

Source: Kokunai Keizai Shiryo No. 31, *op. cit.*, p. 7.

Uyeda, writing in the mid-thirties, and utilizing the data of the 1930 census, was led to observe, "Thus the outstanding features of Japanese industry are the prominent part played by the textile group and the relatively unimportant position of metal and engineering industries."[4] In 1930 the textile industry accounted for 34 percent of industrial production but by the end of the decade this had dropped to 19 percent and by 1942 to 12 percent.

Some of the basic heavy industries were built from the ground up in the thirties and by 1941, in terms of the Japanese perspective, had achieved significant proportions. The motor vehicle industry, for example, which in 1930 produced only 500 units (cars, trucks, busses, etc.) reached a production level of 48,000 units annually during 1941. Only 400 planes of all types were produced in 1930. By 1941 the newly-created Japanese aircraft in-

[3] See also *The Future of Japan's Heavy Industries*, by Goko, Kiyoshi, Chairman of the Board of Mitsubishi Heavy Industries, in *Kaizo* for March 1942.

[4] Uyeda, Teijiro, *The Small Industries of Japan—Their Growth and Development*, Institute of Pacific Relations, New York, 1938. This is a compilation of a series of studies of various small industries made by Uyeda and different associates in Japan, over the previous five years.

dustry was turning out over 5,000 planes a year. Domestic output of aluminum ingot had risen from 19 tons in 1933 to 71,740 tons in 1941.[5] Other basic heavy industries were expanded in substantial degree. Ingot steel production in Japan proper rose from 1.8 million tons in 1931 to 6 8 million tons by 1941. Over the same decade coal production increased from 27.9 million tons to 55 6 million tons. Electric generating capacity in the home islands, which was 4.3 million kilowatts in 1930, reached 9.4 million kilowatts in 1941. By 1940 the production of organic high explosives in Japan was greater than in the United States. Merchant ship production rose from 92,093 gross tons in 1931 to 405,195 gross tons in 1937, the peak shipbuilding year of the decade. Naval shipbuilding rose from 15,050 gross tons in 1931 to 231,990 gross tons in 1941.

The progressive industrial expansion of Japan during the thirties, largely as a result of government stimulation of heavy industries,[6] provides an interesting contrast with industrial production in the United States over the same period, as seen in Table 1.

TABLE 1

INDICES OF INDUSTRIAL PRODUCTION FOR JAPAN AND U S, 1929-39

(1929 = 100)

Year	*Japan*	*United States*
1929	100 0	100 0
1930	94 8	82.7
1931	92 1	68.2
1932	97 8	52 7
1933	113 0	62.7
1934	127.4	68.2
1935	140.6	79.1
1936	150 2	93.6
1937	168 9	102.7
1938	174 7	80 0
1939	182 5	98 2

Source. *Statistical Bulletin of the League of Nations*, quoted in *Japan-Manchukuo Year Book, 1941*, p 359

[5] Metric tons will be used throughout this study unless otherwise specified

[6] Japanese industry from its very outset was nurtured in a virtual state incubator. E H. Norman (see his *Japan's Emergence as a Modern State*, Institute of Pacific Relations. New York, 1940, especially the section beginning on p 117, entitled "The History and Influence of Strategic Industries") points out that industrial development in Japan rose out of military necessity—not to plan for foreign conquest but to prevent Japan from suffering the same fate, at the hands of western powers, as China In brief, he argues, Japanese industry was a state-sponsored defense against western imperialism. Since Japan did not want outside capital and there was insufficient private capital at home, the government utilized its own resources and also encouraged the centralization of private capital in the hands of a financial oligarchy for more efficient use See also Mori, Kuchi, *Nihon Shihonshugi Hattatsu Shi Josetsu* (Introduction to the History of the Development of Japanese Capitalism), Tokyo 1934, Kobayashi, Ushisaburo, *Military Industries of Japan*, Tokyo, 1922, Blattei, Herbert M, "Subsidies in Japan,"

Although both countries underwent great economic expansion during the first World War, Japan witnessed relative economic stagnation during the twenties. Over the six years from 1914 to 1920, Japan had enjoyed unprecedented prosperity. Imports of manufactured goods from the western nations had been cut off; industry at home expanded to fill the gap.

When the period of war prosperity ended in a severe worldwide reaction, Japan was plunged into acute competition with other countries. Industrial development slowed.[7] Over the decade 1920-30 there was only a 10 percent increase in the number of workers engaged in industry.[8] The index of industrial production previously cited (see Table 1), with 1929 as the base, stood at 69.1 in 1924. Exports, which totaled 1.9 billion yen in 1920, were only slightly larger (2.1 billion) in 1929. Total governmental expenditures showed virtually no change (1.4 billion yen in 1920, 1.6 billion yen in 1930) although the percentage of armament to total expenditures fell from 47.8 percent in 1920 to 28.4 percent in 1930.[9]

The decade began with a stock-market panic in March 1920. Then followed a series of bank failures in November and December of 1922 and then the earthquake of September 1923. Japan returned to the gold standard in 1926 but encountered a financial panic in February and March of 1927. The government declared a moratorium, and although the Bank of Japan guaranteed bank payments, fifty banks failed and the gold reserve of the Bank of Japan fell from 800 million to 425 million yen. It may be said that the crisis in Japan preceded the world panic of 1929 by two full years and there was little recovery in the interim. Thus a comparative stock-price index, using 1921 as a base (100), showed stock prices in Japan in 1929 at 71.4, while the figure for Great Britain was 147.1 and for the United States 301.3. The average rate of dividends of industrial firms, which was as high as 33.2 percent in 1918, was reduced to 12.7 percent in 1921, to 8.8 percent in 1928 and to 5 percent by 1931.[10]

The nadir of the depression in Japan was reached in the last quarter of 1931 and thereafter the economy expanded. September 18, 1931, marked the beginning of the Japanese occupation of Manchuria. In December the

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in *Pacific Affairs*, Vol. III, May 1931; Yokoi, Tokifuyu, *Nihon Kogyo Shi* (History of Japanese Industry), Tokyo, 1927, and Takao, Tsuchiya, "War and Japanese Capitalism," in *Kaizo*, Vol. XX, No. 1, Tokyo, January 1938.

[7] Takao, Tsuchiya, *The History of Japanese Industry*. This is Volume 8 of a series in the history of modern Japan entitled "Gendai Nippon Bunmei Shi" published by Toyo Keizai Shimpo Sha, and is devoted to the development of industry from the Meiji era down to the beginning of Showa (1925).

[8] See Uyeda, T., *The Growth of Population and Occupational Changes in Japan, 1920-35*, Japanese Council, Institute of Pacific Relations, Tokyo, 1936, pp. 15-16.

[9] *Okurasho Nempo* (Annual Report of the Finance Ministry), Okurasho (Finance Ministry), Tokyo, respective years.

[10] *The Depression of 1930 As It Affected Japan*, by Shidachi, Tetsujiro, Japanese Council, Institute of Pacific Relations, Tokyo, 1931.

gold embargo was restored, marking the final abandonment of the gold standard by Japan, and thereafter the depreciation of the yen gave Japan an added advantage in expanding her foreign trade.[11] Total trade rose from 2.3 billion yen in 1931 to 7.1 billion in 1940. Furthermore, the sharp growth in military expenditures provided an inflationary fillip which greatly stimulated the economy. The total Army and Navy budget rose from 434 million yen in 1931 to 7,266 million yen in 1940. Army construction funds alone in 1937 were one and a half times the entire 1931 Army budget. The military budget, which was 29 percent of total expenditures in 1931, rose to 75 percent of total expenditures in 1938, as the following table indicates.

MILITARY BUDGET AND TOTAL EXPENDITURES, 1931-40

(in millions of yen)

Fiscal Year	*Military Budget*	*Total Expenditures*	*Military Budget as % of Total Expenditures*
1931	434	1,477	29.4
1932	733	1,950	37.6
1933	873	2,225	39.2
1934	955	2,163	44.2
1935	1,032	2,206	46.8
1936	1,105	2,282	48.4
1937	3,953	5,521	71.6
1938	6,097	8,084	75.4
1939	6,417	8,952	71.7
1940	7,266	11,033	65.9

Source: War, Navy and Finance Ministries.

Naturally military expenditures on this scale could not be financed out of current tax revenues. As a result deficit financing had to be employed and the total national debt outstanding rose from 6,819 million yen (domestic bonds outstanding = 4,476 million yen) on March 31, 1931, to 31,078 million yen (domestic bonds = 28,611 million yen) on March 31, 1941.[12] The necessity for absorbing this expansion of the public debt, as well as meeting the capital demands of the expanding munitions industries, led to a material increase in the expansion of bank credit despite a sharp decrease in the number of banks. While the number of ordinary commercial banks declined from 782 to 186 between December 31, 1930 and December 31, 1941, deposits rose from 8.7 billion yen to 29.8 billion, loans expanded from 7.0 billion yen to 16.0 billion, security holdings from 3.1 billion to 12.7 billion yen. Over the same period the number of savings banks were reduced from 90 to 69 but deposits rose from 1.5 billion yen to 5.5 billion while securities held jumped from 949 million yen to 5.0 billion.

[11] The external value of the yen depreciated within a year by nearly two-thirds of its former gold value and about 40 percent in terms of the pound sterling. After the U.S. dollar depreciated in 1933-34 the value of the yen was equal to about 30 cents as against its 1930 value of 50 cents in terms of U.S. gold dollars.

[12] For a discussion of Japanese public finance during the thirties see *Zaisei Shi* (A History of Public Finance) by Hijikata, Seibi, Tokyo, 1941.

Perhaps the best summary picture of composite economic series over the decade may be obtained from the statistics of national income. Various estimates for the 1930-40 period are available. Table 2 presents all of them.

TABLE 2

SUMMARY OF ESTIMATES OF NATIONAL INCOME OF JAPAN PROPER, 1930-41

(in millions of current yen)

Estimate / Year	*Cabinet Bureau of Statistics*	*Takahashi*	*Oriental Economist*	*Hijikata*	*Mitsubishi Economic Research Bureau*	*Shibata*	*Japan Economic Federation*	*U.S. State Dept.*	*Japanese Ministry of Finance*
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1930 ..	10,635	10,635	10,276	10,470	10,470		10,635	10,224	
1931 ..		9,473	9,909	10,133	9,421		9,185	9,148	
1932 ..		10,118	10,257	10,221	10,080		9,958	10,338	
1933 ..		12,045	10,859	11,261	11,776		12,063	12,117	
1934 ..		13,268	11,741	12,738	12,351		13,044	13,019	
1935 ..		14,794	12,544	13,599	12,817		14,865	14,242	
1936 ..		16,568	13,378	16,137	15,800	15,100	16,319	15,779	
1937 ..		18,800	15,410	19,203	20,000	17,600	20,475	18,419	
1938 ..					23,000	21,300	22,518	20,682	23,200
1939 ..							24,519	25,910	28,300
1940 ..								29,606	32,000
1941 ..								34,781	36,800

Sources:

(a) Naikaku Tokei Kyoku (Cabinet Bureau of Statistics), *Showa Go Nen Kokumin Shotoku Chosa Hokoku* (Report of the Survey of National Income, 1930), Tokyo, 1934, p. 84.

(b) Takahashi, Kamekichi, *Senso To Nippon Keizai Ryoku* (War and Japan's Economic Strength), Tokyo, 1937, p. 293 and pp. 6-7 of Appendix.

(c) *Toyo Keizai Shimpo* (Oriental Economist). Tokyo, June 1939, p. 383.

(d) Hijikata, Shigeyoshi, *Kokumin Shotoku No Kosei* (The Component Factors of the National Income), Tokyo, 1933, p. 391. See also *Keizaigaku Ronshu* (The Journal of Economics) published by the Tokyo Imperial University Economics Society, Tokyo, Vol. 4, No. 2 for 1930; Vol. 6, No. 8 for 1931, 1932 and 1933; Vol. 7, No. 11 for 1934 and 1935.

(e) *Trade and Industry; Present and Future*, Mitsubishi Economic Research Bureau, London, 1936, p. 82, and (g) for 1936, 1937 and 1938.

(f) *Keizai Ronso* (The Economic Journal) published by the Kyoto University Economics Society, Kyoto, May 1939, pp. 21-22.

(g) Nippon Keizai Remmei Kai (Japan Economic Federation), *An Inquiry into the National Income of Japan*, East Asia Economic Intelligence Series, No. 1, Tokyo, October 1939, p. 48.

(h) *National Income of Japan*, U S. Department of State, Research and Intelligence Branch, R & A 2636, Washington, October 1, 1945, pp. 84-87.

(i) *Kokumin Shotoku* (National Income), Ministry of Finance, Tokyo, respective years.

The best, conceptually, is that of the U.S. State Department though there is sufficient agreement in trend to permit generalized conclusions. On the basis of current prices, most of the gain came during the last half of the twelve-year period. This is due to the stepping up of government expenditures for war purposes and to the sharper rise in prices during the latter half of the period. Wholesale prices, according to the official index, doubled

over the twelve years, but only 15 percent of the increase occurred during the first six years; the remaining 85 percent occurred in the last half.

If the index of national income is adjusted for price changes (1930 prices), it now appears that the gain in national income was evenly distributed over the decade. The index of wholesale prices, however, does not cover the prices of services such as transportation, communication, finance, government, etc. Furthermore, the index is an average and conceals divergent levels for agriculture as against industry. As will be shown later, the index underestimates the extent of the price advance. More important, an index of "real" national income does not reflect the climate or tempo of the period in Japan It does not point up the inflationary expansion of the last half of the decade. The Japan Economic Federation study was widely publicized and those Japanese who read of the final figures (released without the benefit of price adjustments) were impressed by their expanding economy.

Probing further into the composition of the national income, two interesting facts emerge. First, the percentage of output of home to factory industry fell from 27 percent in 1930 to 18 percent in 1939. Secondly, agriculture's share of the national income fell from 17 percent in 1930 to 12 percent in 1941, while manufacturing rose from 27 percent in 1930 to 41 percent in 1941.

Both observations square with other known facts. Home industry flourished in the light industries. The relative decline of the light industries would cause a corresponding diminution of the proportion of home output to total output. Uyeda's studies led him to conclude that in 1930, 53 percent of the total of those industrially occupied were working in small workshops of under five persons.[13] By 1942 this percentage had declined to 20.

With respect to agriculture, despite an increase of 6,945,567 in the Japanese population over the decade from October 1, 1930 to October 1, 1940, the agricultural labor force declined from 14,131,025 to 13,841,576.[14] In 1930, 48.1 percent of the total civilian labor force was engaged in agriculture. By 1940 this had declined to 42.6 percent. Moreover, the total figure does not reveal the growing shift from male to female labor. Males constituted 55 percent of the agricultural labor force in 1930 but diminished to 47 percent in 1940. In addition, the male segment of the agricultural labor force in 1940 comprised a greater proportion of older men than in 1930. It is not unnatural, therefore, that the position of agriculture relative to an expanding industrial plant should have declined.

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[13] See also Otsuka, I., "The Survival of Small Undertakings in Japanese Industry", *Kyoto University Economic Review*, Vol. IX, No. 2.

[14] Naikaku Tokei Kyoku (Cabinet Bureau of Statistics), *Kokusei Chosa Saishu Hokoku* (Final Report of the 1930 Census), Tokyo; 1938; 1940 figures from census data of Rodo Kyoku (Labor Bureau), Koseisho (Ministry of Welfare).

During the first half of the decade depressed conditions in Japanese agriculture, caused by a glut in the rice and silk markets, led peasant families to send younger members to the cities where wages were above those which could be earned on the farms. This kept expanding industry supplied with labor and held urban wages to a low level. Real earnings declined, the index falling from 127 in 1930 to 115 in 1936. Takahashi declared: "The rise in wages and other improvements in labor conditions which ought otherwise to have accompanied industrial development did not occur in Japan."[15]

Profits, in contrast to wages, rose sharply during the first half of the decade. The index of corporate profits (1929 = 100) rose from 51 in 1930 to 157 in 1936. For a representative sample of companies in manufacturing and mining, listed by one Japanese source, net profits as a percentage of capital rose from 5.2 percent in 1930 to 16.1 percent in 1936.[16]

The military uprising of the "younger officers" in February 1936 appears to have marked a definite turning point in economic affairs. Takahashi (Finance Minister from May 26, 1932, to February 26, 1936), who had initiated the "reflation" policy in 1932 whereby mild deficits were incurred to stimulate the economy, announced early in 1936 that recovery had been achieved and that the time had come to call a halt to inflation. He had also previously refused to grant rural relief funds to the Agriculture or Home Ministries and had rejected proposals to raise taxes on business. He was assassinated on February 26 and his successor proved more amenable to theories of military economics. The Hirota cabinet was installed on March 5, the German-Japanese "anti-comintern" pact was signed on November 25. The previous indulgent policy of the government toward economic affairs was changed to more strict regimentation. The mild "reflation" of the earlier period gave way to greater military expenditures, more rapid expansion of armament industries and a sharper inflationary spurt. The Manchurian Affairs Bureau, which had been established earlier, announced the beginning of the first Manchurian Five-Year Industrial Plan on January 1, 1937. The Cabinet Planning Board was established on May 14[17] and the open war against China began on July 7 with the Marco Polo bridge clash outside Peiping.

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[15] Takahashi, Kamekichi, *Factors in Japan's Recent Industrial Development*, Japanese Council, Institute of Pacific Relations, Tokyo, 1936, p. 5. On this point see also Uyeda, Teijiro, and Inokuchi, Tosuke, *Cost of Living and Real Wages in Japan, 1914-1936*, Japanese Council, Institute of Pacific Relations, Tokyo, 1936, pp. 19-21.

[16] *Hompo Zaikai Josei* (Monthly Review of Economic Conditions), Mitsubishi Keizai Kenkyu Kyoku, Tokyo, March 1937, p. 8.

[17] Imperial Ordinance No. 192, promulgated May 14, 1937, provided for the organization of a Planning Office (Kikaku-Cho). Ordinance No. 605, promulgated October 23, 1937, was a revision of 192 and provided for a Planning Board (Kikaku-In).

During this period the Japanese economy began to show signs of strain. Industrial demand for raw materials proved a severe drain on Japanese foreign balances. Reinvestment of profits was no longer adequate for the accelerated industrial expansion and further resort was had to the capital market. At the same time, government demands were increasing and since the private banks were reluctant to purchase more government bonds, reliance upon the Bank of Japan began to increase, with the new indebtedness swelling the Bank's note issue.

Takahashi had kept the budget within 1,950-2,200 million yen. After his death it was doubled and then rose even more sharply to 18,700 million yen in 1941-42. He had considered 600 million yen a safe limit for government deficits, but the deficit was increased to 1,500 million yen in 1937-38 and to 6,900 million yen in 1941-42. While he was Finance Minister, government deficits absorbed only one-twentieth of the national income but in the years of the China War (1937-41) they rose to between one-fifth and one-fourth. He had believed that the inflationary influence of government deficits could be minimized if banks and investment institutions invested the liquid funds they created in government bonds. This "capital circuit," he believed, would result in easy money and declining interest rates but would check an increase in Bank of Japan note issue. During the new era in Japanese fiscal policy, which his murder inaugurated, the note issue of the Bank of Japan rose from 1,767 million yen (December 31, 1935) to 5,979 million yen (December 31, 1941).

Bottlenecks of material and labor developed. Both prices and wages began an inflationary spiral, with the former leading. From July 1936 to June 1937, the Bank of Japan's index of actual monthly earnings of industrial workers rose by about 6 percent. This was brought about in part by fairly extensive strikes but was also the result of the Army's action in increasing wages of workers employed in its arsenals by 8 percent. In 1936 an improvement of agricultural conditions carried the total value of Japan's agricultural production to twice the 1931 level, resulting in a temporary drying up of this source of manpower. An editorial in the *Oriental Economist* in September 1937 noted: ". . . as we have repeatedly pointed out since last year, Japan's productive power at the present time is being employed to the maximum extent. This is especially the case with the metal and machinery industries, where operation is at capacity in nearly all departments, and in many sections complaints of a labor shortage are already being made. . . ." [18]

The Japanese call the period, February 1936-June 1937, by the term "Junsenji Keizai" or "quasi-wartime economy." In modern economic terminology it might be termed a period of full employment induced by deficit financing.

[18] *Oriental Economist*, September 1927, p. 510.

THE PATTERN OF CONTROL

The advent of war naturally brought with it the tightening of existing controls and the imposition of many new ones. Although there was some attempt, under Army pressure, to imitate the developing German control pattern,[19] and the controls which were adopted were basically common to all countries at war, they evolved by trial and error and were conditioned and molded by the interplay of broad pressure groups and economic limitations peculiar to Japan.

The Army's views on economic control in wartime were explicitly stated as follows:

> In order to meet the needs of the defense services in wartime and to enable them to devote the whole national strength to war operations, while at the same time keeping the national life untouched, it is of paramount importance to adapt all national activities to war conditions, to place manpower, material, and all other visible and invisible resources at the disposal of the government, and, thereby, to utilize them rationally and economically for war purposes. This is general mobilization. . . . The scope of general mobilization is far reaching. It includes guidance of national morale in time of war, supplementation of insufficient resources, realignment of financial organs, control and allocation of war materials, and other appertaining measures.
>
> In time of war, industries should be brought under national control with a view, first to supplying war materials, and then, to meeting the needs of the people at large. Unless industries are readily integrated into the wartime structure, it is inevitable that the nation's economy will be overwhelmed, the supply of materials will become uneven and scarce, and, as a result, the determination to fight out the war will be seriously impaired.[20]

Business, however, preferred autonomous control. This was a historic device. Japanese merchants early established a guild system (Kabunakama) for self-regulation. Price fixing and allocation of material became matters of course. In the 1880's these guilds under a new name (Kumiai) were given legislative protection. Cartelization was encouraged as a means of rapid industrial development.[21] In 1931 a Major Industries Control Law was passed, which gave governmental authority to industrial agreements that limited production and provided for the apportioning of orders among large-scale firms; for dividing production by quotas or areas; for the fixing of prices and control of distribution. Thus private cartel agree-

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[19] See Bloch, Kurt, *German Interest and Policies in the Far East*, Institute of Pacific Relations, New York, 1940; also Tanaka, Mitsugu, "Japan Must Learn from Nazis on Economic Control" in *Keizai Zasshi Diamond*, Tokyo, December 1, 1940.

[20] "Contemporary Opinions on Current Topics," Tokyo Information Bureau, No. 189, August 12, 1937, translated from the Japanese Army publication, *Armies of Japan and Foreign Powers*, 1937 edition. Excerpts from pp. 53-54, 60-62, and 65.

[21] See Honjo, Eijiro, *Social and Economic History of Japan*, Kyoto, 1935; also Uychara, S., *The Industry and Trade of Japan*, London (revised), 1936.

ments under this law became legally enforceable. Cabinet ordinances issued by the appropriate Ministry, following consultation with a Control Committee, designated the industries to which the law might apply.[22] The law was renewed for a second five-year term in 1936 and by July 1937 Cabinet ordinances had designated over 100 branches of industry to which the control law was applicable. In August 1937, the law was revised to permit the formation of associations in any branch of industry with the approval of the prefectural governor. In addition, the Minister of Commerce and Industry was now allowed to require both members and non-members of associations to abide by agreements, on application from more than two-thirds of the participants in an agreement, or from participants whose output or sales represented more than two-thirds of total production or sales. By the end of 1937 there were 1,172 industrial associations operating under this law.[23]

As a result of Army pressure, the Armament Industry Mobilization Law of 1918 was made applicable to the China War, but since it provided only for control of munitions industries, the militarists kept pressing for the passage of a complete mobilization law. The Konoye Cabinet, by the peculiar Japanese expedient of assuring the Diet that the law would not be applied during the China War, secured the passage of the National General Mobilization Law, over considerable business opposition.[24] This law provided the basis for unlimited government control of industry. It was an enabling act which could only be enforced by Imperial Ordinance, but under its authority a great variety of ordinances were issued regulating all phases of economic life. The law, which consisted of fifty articles and was twice revised in 1939 and in 1941, empowered the government to regulate production, distribution, prices, wages, exports and imports, pay subsidies, build stockpiles, control capital issues, etc.[25]

From the standpoint of war controls, probably the most important ordinance passed under this law prior to 1942 was the Major Industries Control Ordinance of September 1941. Before examining the reasons for the adoption of this ordinance, its purpose and content, it would be well, however, to sketch very briefly the nature of a few of the other multitudinous and piecemeal control measures that were adopted prior to this Ordinance to indicate the nature of the mushroom growth of controls in the fields of foreign trade,

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[22] Fujita, K., "Cartels and Their Conflicts in Japan," *Journal of the Osaka University of Commerce,* Vol. 3, December 1935.

[23] For a discussion of the growth of these associations, see *General Conditions of Kogyo Kumiai,* Bureau of Industrial Affairs, Ministry of Commerce and Industry, Tokyo, January 1936.

[24] Law No. 55, effective April 1, 1938.

[25] For details, see "Wartime Legislation in Japan," *Nippon Shogyo Tsushin Sha,* Tokyo, 1941, pp. 30-62.

finance, production and distribution, which led the Japanese to attempt to centralize and pull together the control measures in a coordinated "new economic structure" in the year prior to Pearl Harbor.[26]

Control of Foreign Exchange and Foreign Trade

Japan found it necessary in 1937 to take realistic steps to control her foreign trade. By the end of 1936 a sharp upward movement in wholesale prices had set in which was accentuated by speculative hoarding after the outbreak of the war against China in June 1937. As a result, her export expansion began to slow down. The yen began to show signs of weakness. A falling yen would have raised the price to Japan of imported raw materials, which she now set out in earnest to acquire. World raw material prices in 1937 were already booming. The development of Japan's heavy industries brought greater dependence upon foreign raw materials. Being unable to borrow abroad, Japan could meet her unfavorable trade balance in only three ways: by increasing utilization of foreign-exchange reserves, cuts in non-essential imports, or greater gold production. All three methods were utilized but the almost insatiable demand for raw materials, which were not only being utilized currently but which were also being stockpiled in large quantities, required drastic measures.

The trade balance was more adverse in 1937 than in any other year of the decade 1930-40.[27] If we consider, as did the Japanese, trade with the "yen-bloc," in this period, as part of the foreign trade of Japan, the adverse balance for 1937 amounts to 608 million yen. (See Table 3 which does not include exports to or imports from Korea and Formosa.) If the trade of the Japanese Empire (Japan proper, Korea and Formosa) with the rest of the world (including Manchuria, North China and Kwantung Leased Territory) is analyzed, the adverse balance for 1937 is found to be 635 million yen. If the most favorable possible view is taken and the trade of Japan proper with Korea, Formosa and the yen-bloc is considered "foreign trade," the adverse balance is still the relatively high figure of 579 million yen.

[26] Control of manpower and wages is considered in Chapter 5, price control and rationing in Chapter 6.

[27] It has been demonstrated that this adverse balance was due to the price structure. When the yen values of 1937 exports and imports are deflated by 1930 prices it becomes apparent that Japan actually exported more goods in 1937 than she imported. By 1937 import prices had risen sharply but export prices were still close to those of 1930. See *The Place of Foreign Trade in the Japanese Economy*, Intelligence Research Report, U. S. Department of State, August 29, 1946. OCL-2815, Vol. 1, Pt. 1, p. 26. An analysis of this type in terms of deflated values may be of use for some purposes but it does not aid in an understanding of the motivation for the various trade-control measures the Japanese instituted because of the very real exchange and payment problems they faced in view of their objectives. It hinders an attempt to understand the problem as the Japanese then saw it.

TABLE 3

FOREIGN TRADE OF JAPAN PROPER,[a] 1930-41

(in millions of yen)

Year	*Exports* [b]	*Imports* [b]	*Balance*
1930	1469.9	1546.0	— 76.1
1931	1147.0	1235.7	— 88.7
1932	1410.0	1431.5	— 21.5
1933	1861.0	1917.2	— 56.2
1934	2171.9	2282.6	—110.7
1935	2499.0	2472.2	+ 26.8
1936	2692.9	2763.6	— 70.7
1937	3175.4	3783.1	—607.7
1938	2689.6	2663.3	+ 26.3
1939	3576.3	2917.6	+658.7
1940	3655.8	3452.7	+203.1
1941	2650.8	2898.5	—247.7

[a] Includes Sakhalin. Includes exports to and imports from the "yen-bloc" (Manchuria, North China and Kwantung Leased Territory).

[b] Does not include exports to or imports from Korea and Formosa.

Sources: 1930-1937, *Nippon Gaikoku Boeki Nempo* (Annual Returns of the Foreign Trade of Japan), Okurasho (Ministry of Finance), Tokyo, 1930-1938.
1938-1941, *Hompo Keizai Toket* (Economic Statistics of Japan), Tokei Kyoku, Nippon Ginko, Vol. II. Tokyo, January 1947. p. 20.

In addition to the unfavorable trade balance Japan experienced heavy outshipments of gold in 1930, 1931, and 1932 and as a result an Exchange Control Law (Gaikoku Kawase Kanri Ho) was promulgated on March 29, 1933. This gave the Minister of Finance broad and extensive powers over all foreign-exchange transactions but only moderate use was made of these powers prior to 1937. To prevent speculation in foreign exchange and the flight of capital, only foreign remittances, transactions in foreign securities, and exports without payment were subject to regulation. Foreign trade was not controlled and no restriction was placed on the purchase or sale of foreign exchange to finance foreign trade.

With the weakening of the yen toward the end of 1936, a new measure called Order Relating to Payments for Imported Commodities and to Restrictions on Payments by Foreign Exchange Banks on Foreign Order (Gaikoku Kawase Kanri Ho Kaisei), based on the Exchange Control Act, was issued in January 1937. This order, the first in Japan for general import control, provided that payments for all imported commodities would have to be approved by the Minister of Finance, unless the transaction amounted to less than 30,000 yen per month. It was intended that the measure would expire at the end of seven months, but the sharp increase in the import balance during the following six months resulted in its extension and the lowering on July 7, 1937, of the maximum limit from 30,000 yen per month to 1,000. In December this was again reduced to 100 yen per month. The law was also revised in September to permit the government to acquire or control privately-owned foreign assets.

At the 71st session of the Diet in July-August 1937, two new laws were passed. The Law Relating to Adjustment of Foreign Trade and Related Industries (Boeki Oyobi Kankei Sangyo Chosei Ho) empowered the government to restrict or prohibit the export or import of any commodity upon consent of the Foreign Trade Council. The Foreign Trade Association Law provided that the government might compel the establishment of exporters' and importers' associations, which later were used in administering distribution quotas.

The 72nd session of the Diet, held in September to consider problems arising from the inauguration of the war against China, passed the Law Relating to Temporary Measures for Export and Import Control (Yushutsunyuhin Rinji Sochi Ho). The consent of the Foreign Trade Council now became unnecessary and the government's absolute power over exports and imports was reaffirmed. The first order under this new law was issued on October 11, 1937, and provided for prohibition of importation of 269 listed commodities ranging from cotton rags to luxury goods. In addition, certain other commodities, such as raw cotton and wool, could be imported only with permission of the Minister of Commerce and Industry. These lists were subsequently extended.

With the enforcement of complete exchange control and selective prohibition of import, the adverse balance was converted into an export surplus in 1938. But as imports fell, exports fell, and the net result was an actual decline in capacity to import essential commodities.

When this was perceived several things were done.[28] In July 1938 a Foreign Exchange Revolving Fund of 300 million yen was set aside from the specie reserve of the Bank of Japan to finance importation of essential raw materials. Further, a loss indemnification law for bank advances to exporters and to producers of export goods was also adopted. The dual control in foreign trade, that is, the licensing of imports by the Minister of Commerce and Industry and the permit system for transactions in foreign exchange under the Minister of Finance, was eliminated.

In addition, the so-called "link" system of foreign trade was adopted. This was a scheme in which the volume of export goods was linked with the volume of imported raw material going into the manufacture of the export goods. A designated volume of import was permitted on the condition that a designated volume of goods was exported. The system did not permit the import of raw materials for domestic consumption. It authorized only the import of materials which when processed were to be exported as finished products.

The link system was at first adopted according to categories of commodities. The initial plan linked the export of soap with the import of fats and perfume. Export of woolen goods was linked with import of raw wool.

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[28] See Harada, Takeo, "Preparations for International Trade Warfare" in *Zaisei*, Tokyo, January 1940.

The same was true of cotton goods and cotton, of rayon textiles and pulp, etc. The link system was adopted for cotton in July 1938. No cotton, except for special purposes, was to be used in goods for the domestic market. Because of difficulties encountered in linking cotton imports and exports on a quantity basis, the link system was changed to a value basis early in 1939. The impact of the system may be seen in Table 4.

TABLE 4

THE COTTON LINK SYSTEM
ESTIMATED NET EXPORT AND IMPORT BALANCE FOR JAPAN, 1936-39
(in millions of yen)

Item	*1936*	*1937*	*1938*	*1939*
Net Exports				
Cotton Yarn	41.2	56.3	41.6	70.9
Cotton Cloth	513.5	599.7	425.3	404.4
Cotton Mfgs.	147.6	168.8	104.8	113.3
Total	702.3	824.8	571.7	586.6
Net Imports				
Raw Cotton (ginned)	861.1	858.0	444.3	473.5
Export Balance	....	....	127.4	113.1
Import Balance	*158.8*	*33.2*	....	....

Source: Japanese Trade Studies, Special Industry Analysis No. 34, *Cotton Textiles*, United States Tariff Commission, Washington, September 1945, p. 2.

Exports to the yen-bloc did not come under the link system because they provided no foreign exchange. Since price levels in Manchuria and North China were, however, higher than in Japan itself, it was more profitable to sell in yen-bloc areas.[29] For example, the disparity between export prices for cotton piece goods shipped to the yen-bloc and regular prices for cotton piece goods may be seen in the following table,[30] giving the average for the first half of the calendar year:

	"Free Markets"		*Yen Bloc*	
	Value per sq. yard in sen	*Index 1936 = 100*	*Value per sq. yard in sen*	*Index 1936 = 100*
1936	16.8	100	19.5	100
1937	19.9	119	32.4	166
1938	18.6	111	24.6	146
1939	15.8	94	45.9	235
1940	21.0	125	32.1	165

In order to correct this situation, the government enacted the Yen-Bloc Export and Import Commodities Control Law, in September 1939, which enabled it to restrict the volume of commodities exported. These restrictions, however, brought about a sharp price advance in yen-bloc areas which in turn brought about a further outflow of Japanese commodities to the yen-bloc, through smuggling, bribery, etc. Thereupon the Yen-Bloc Export and

[29] See "Changes in Yen-bloc and China Trade under Wartime Conditions," *Toa*, Vol. XII, No. 2, Tokyo, March 1939.

[30] *Oriental Economist*, September 1940, p. 549.

Import Price Control Law was enacted in September 1940. The Japan Federation of East Asia Export and Import Associations was established in October to enforce price control and to regulate trade with the yen-bloc.[31] Due to the outbreak of the war in Europe and to the embargoes placed against Japan, exports to the yen-bloc grew proportionately and in 1941 constituted more than 60 percent of Japan's total exports. (See Table 5.)

TABLE 5

TRADE OF JAPAN PROPER WITH THE YEN-BLOC, 1937-41

(Values in millions of yen)

Year	*Exports to Yen-Bloc*	*Percent of Total Exports*	*Imports from Yen-Bloc*	*Percent of Total Imports*	*Balance*
1937	791	25	438	12	+ 353
1938	1,157	43	564	21	+ 593
1939	1,747	49	683	23	+1,064
1940	1,867	51	855	25	+1,012
1941	1,656	62	756	26	+ 900

Sources: 1937-38, *Japan Yearbook 1940-41.*
1939-41, furnished by Mr. Sugiyama of the Ministry of Finance, Tokyo.

On the whole, Japanese foreign trade control measures prior to Pearl Harbor were reasonably effective. They curtailed the importation of commodities which the Japanese government did not want, such as luxury goods, textiles, etc., and expanded the importation of essential raw materials. For example, textile cloth imports fell from 2,250,591,000 square yards in 1936 to 777,314,000 square yards in 1941. Wool imports dropped from 257,045,000 pounds in 1937 to 101,652,000 in 1940; cotton from 2,033,000,000 pounds in 1936 to 651,000,000 in 1941. On the other hand, bauxite imports rose from 24,762 metric tons in 1936 to 280,189 metric tons in 1940. Nickel imports rose from 1,850 metric tons in 1936 to 27,674 metric tons in 1941. Imports of iron ore rose from 4,646,000 metric tons in 1936 to 6,625.000 metric tons in 1941.

CONTROL OF CAPITAL AND CREDIT

Unable to borrow on long term abroad and having to pay cash for virtually all her imports, it was not unnatural that Japan, shortly after the outbreak of the war against China, should have been led to ration capital and to channel credit. Not only did Japanese capital have to finance her own internal expansion but it had to finance the exploitation of the resources of the "yen-bloc" area as well. Again by trial and error, a variety of measures were adopted, beginning with the Temporary Funds Adjustment Law (Rinji Shikin Chosei Ho) of September 1937, to funnel capital and credit into the war industries and dry up the flow to the non-essential industries.

[31] See "European War and Japan's Foreign Trade" by Yamamoto, Yuichi, Director of East Asia Bureau of the Foreign Ministry, in *Kokusai Chishiki Oyobi Hyoron*, Tokyo, November 1940.

A capital market, in the Anglo-American sense of the term, never really developed in Japan and as a result bank credit has been the principal source of capital for Japanese industry. As Edwards states:

Since Japan became westernized, the banks and the government have been the only important sources of external capital available to the Japanese business man. Until recent years, savings by individuals in Japan had been scant and badly distributed. To the extent that such savings existed outside the commercial banks, they were usually in the form of hoarded currency, or were otherwise unavailable to industry. There has been no Japanese tradition of personal ownership of corporate securities.[32]

The older Zaibatsu depended upon their banks, insurance and trust companies. The new (Shinko) Zaibatsu, in their development from 1937 on, came to depend on the Industrial Bank of Japan and upon the government for their capital requirements.

The Industrial Bank of Japan had been organized in 1900 to meet industry's demands for long-term capital in the absence of a developed and widely-based capital market. During the thirties it came to serve particularly for financing government-sponsored munitions and overseas projects. It appears to have been a device by which Zaibatsu banks removed themselves one step from the hazards of new munitions company and dubious overseas financing. The Bank headed syndicates distributing and absorbing issues of the South Manchurian Railway Company, the Manchuria Heavy Industries Development Company, and of such new "national policy" companies as Nippon Iron Manufacturing Company, Nippon Coal Company, Nippon Transportation Company, and Imperial Fuel Development Company. After 1937 the Bank handled a large part of the financing of the new Zaibatsu.

The Temporary Funds Adjustment Law permitted the Industrial Bank to issue bonds to a maximum of 500 million yen over the limit set in its basic law. Later, in March 1939, this limit was raised to one billion yen over the statutory figure. The profits of the Bank rose 230 percent in five years, from 3,446,000 yen during the first half of 1937 to 8,036,000 yen for the first half of 1942. Its profit rate rose from 13.8 percent in 1937 to 18.4 percent in 1942. Total loans rose from 391 million yen in 1937 to 3 billion yen by the beginning of 1942.

In addition to this expansion of the Industrial Bank, the Temporary Funds Adjustment Law provided that financial institutions and security underwriters must obtain permission from the Minister of Finance (who in turn set up a Funds Utilization Committee) when either making long-term loans, or subscribing to or underwriting securities, in an amount exceeding 100,000 yen. In August 1938 this limit was reduced to 50,000 yen.

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[32] *Report of the Mission on Japanese Combines*, Part I, "Analytical and Technical Data," Department of State Publication 2628, Far Eastern Series 14, Washington, 1946, p. 36.

It was further provided that companies to be established with a capitalization of 500,000 yen or more, or companies with a capitalization of 500,000 yen or more which desire to amalgamate, change purpose, obtain new capital, or increase paid-up capital, must obtain permission from the Minister of Finance. In August 1938 this limit was reduced to companies capitalized at 200,000 yen or more.[33] Companies were divided into categories of essentiality, and luxury goods companies were flatly forbidden to borrow.

To round out this basic control a variety of other measures were adopted as the need arose. The National General Mobilization Law was invoked in April 1939 to provide the basis for the Companies' Profits, Dividends and Accommodations Order (Kaisha Rieki Haito Oyobi Shikin Yuttsu Rei).[34] The Order provided that companies with a capitalization of more than 200,000 yen could not distribute dividends of more than 6 percent annually, or of more than the last dividend paid before November 30, 1938. The Order also provided that the Minister of Finance might order the Industrial Bank of Japan to advance funds, or subscribe, underwrite, or buy securities to further essential industrial production. The government, as it did all through this period, agreed to make good any losses which such advances might cause the Industrial Bank. Aside from the Army's demand that profits from armament expansion be controlled, the purpose of dividend limitation was to cause reinvestment of funds and to further production expansion.

Over the following year, however, it became apparent that funds retained were being utilized as circulating capital to increase turnover and profit, rather than for purposes of plant expansion. Therefore, in October 1940, the Ordinance for Control of Corporate Finance and Accounting was adopted. Dividends above 8 percent had now to receive official approval and the government was empowered to prescribe the internal disposition of funds if it felt it was necessary. For example, it could order a company to use part of its earned surplus to buy government bonds. It might also prescribe rates of depreciation on fixed assets, control operating expenses, prescribe items of accounts and forms of books. This ordinance naturally raised a storm of business protest and was applied only to flagrant cases.[35]

In the same month the Bank Funds Utilization Order was issued. It authorized the Finance Minister to compel banks to lend to a specific company, or to subscribe, underwrite, or purchase securities. Any loss suffered by banks in such loans would be indemnified by the government, which

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[33] See Ryu, Shintaro. "The Reorganization of the Japanese Economy," *Chuo Koron* (Central Review), Vol. 53. No. 12, Tokyo, December 1938, p. 32.

[34] "Regulations for Control of Accounting of Corporations," by Bamba, Kaichiro, in *Keizai Zasshi Diamond*, Tokyo, November 1, 1940.

[35] See "Significance of the Regulation for Control of Corporate Accounts," by Cho, Fumitsure, in *Keizai Chishiki* for November 1940.

might pay in government securities. Thus short-term credit came under control.[36]

In 1941 the government moved to achieve long-term utilization of funds available in the short-term market and to tap more fully the resources of the provincial banks. In August the Finance Ministry issued the Obligation Acceptance Order which provided for the Munitions Bill Acceptance System. Under it, armament companies, when awarded munitions contracts, could draw bills on the Industrial Bank of Japan for amounts not exceeding the values of the orders involved. These bills were then "accepted" by the Industrial Bank after having been certified and stamped by the Army or Navy cashier. The company could then take such bills to its own bank, which was required to discount them. The bank in turn might rediscount the bill at the Bank of Japan. This "advance payment" system opened the way for greater utilization of provincial bank resources which were also being tapped by having provincial banks participate in corporate debenture subscription allocations.

During 1941 the money market grew tight. Stock prices fell. In March the United Security Company was established with the Industrial Bank as its nucleus, with a capital of 50 million yen, half of which was paid up. Its purpose was to support stock prices by buying shares in large quantities. A stock-market panic would have disrupted all financing operations. By the middle of the year private banking institutions were beginning to show signs of reaching the limit of their ability to expand credit further. Lack of funds forced a number of the banks to resort to the Bank of Japan for help and even several of the "Big Six" Banks, which had traditionally abstained from contact with the Bank of Japan, broke their custom and resorted to it. In July, with the American freezing of Japanese assets, the stock market deteriorated and as a result the government extended unlimited financial support to the United Security Company and in August it issued the Stock Price Control Ordinance,[37] which enabled it to set minimum security prices. Trading was prohibited in those shares for which official minimum prices were set, until the market recovered. In addition, in August commercial banks formed the Emergency Accommodation Syndicate, under the leadership of the Industrial Bank. Throughout the period of stringency, loans were made on joint account to tide essential companies over until balance was restored. For example, a 20 million yen loan was granted to

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[36] "Development of Financial Control and Its Significance," by Yamamoto, Shigeru, in *Tosei Keizai*, Tokyo, December 1940.

[37] In December this was revised to permit the government to set maximum prices. Whereas prior to December 7 the problem had been to bolster falling stock prices, the enthusiasm displayed by the market after December 7 was so great that booming stock prices threatened to be as disruptive as falling ones had been previously and the government had to take steps to limit the advance.

the Tachikawa Aircraft Company. The government agreed to underwrite such loans.

To what extent did the avowed intent of the government, to channel capital and credit into essential industries and cut it off from non-essential uses, bear fruit? To what degree was the government successful in mobilizing available capital resources? According to statistics compiled by the Industrial Bank of Japan, promotions, capital increases and debentures which totaled 457 million yen in 1930 rose to 4,469 million in 1940, a tenfold increase, and the latter figure is not a cumulative one attained by 1940 but rather represents capital expansion in the year 1940 alone. Of the 10,514 million yen invested in manufacturing over the decade 1931-40, 86 percent went to the producer-goods industries, only 14 percent to the consumer-goods field. Particularly after 1937, the decline of the light industries and the rise of the heavy, as capital control became effective, is noticeable.

The Role of the Bank of Japan, 1937-41

In the fifty-five years of its existence prior to 1937, the Bank of Japan had adhered to what was considered orthodox central banking practices. In the ensuing five years, culminating with the new Bank of Japan Act of 1942, every orthodox tenet of central banking had been violated and the Bank had taken on every conceivable financial chore, including long-term industrial financing.

To accelerate government bond absorption by commercial banks and to enable money-market institutions to obtain a greater volume of credit at lower cost, the Bank pursued an " easy money " policy during the period of the China War. Various rediscount rates were progressively lowered. To increase the supply of short-term funds, the Bank relaxed its rediscounting eligibility requirements, permitting a wide variety of additional types of bills to be rediscounted. For example, special drafts, issued by essential wartime corporations and accepted by the Industrial Bank, were made eligible. The list of securities eligible as collateral was revised to include second-grade debentures, whereas previously the eligible list consisted solely of high-grade bonds.

During the six months' period, June 30, 1939, to December 31, 1939, bills discounted by the Central Bank [38] rose from 89 million to 478 million yen, a 437 percent increase, and by the end of 1941 aggregated 603 million yen, a 578 percent increase over June 30, 1939.

The character of the Bank's note issue went the full cycle from gold to paper backing during this period. At no time was the futility of the orthodox device of fiduciary issue with penalty tax on any issue in excess of the fiduciary limit, as a restraining device, more clearly demonstrated.

[38] Exclusive of advances on foreign bills and bills discounted under the 1927 law.

The basic factor in the expansion of the note issue and the transformation to a managed currency was the sharp growth of government deficits and the monetization of these deficits via Bank of Japan absorption of national bonds. The trend of government financing may be seen in the following table:

JAPANESE GOVERNMENT FINANCE, 1936-41

(in billions of yen)

*Fiscal Year**	*Total Revenue*	*Total Expenditure*	*Total Deficit*	*Proportion of Revenue to Expenditure*
1936-37	1.7	2.3	0.6	74%
1937-38	2.3	5.5	3.2	41%
1938-39	2.8	8.0	5.2	31%
1939-40	3.5	8.9	5.4	39%
1940-41	4.2	11.0	6.8	38%

* Fiscal year runs from April 1 through March 31.
Source: Ministry of Finance, Tokyo, 1945.

Total national debt at the end of 1941 amounted to 37,322,030,000 yen compared with 10,580,000,000 yen as of June 30, 1937.[39] Between July 1, 1937, and December 31, 1941, the Bank of Japan served as underwriter for more than three-fourths of the total amount of government bonds issued. The theory of distribution was clear. The government would be paid by a deposit credit. Government disbursement of such funds increased the Central Bank note issue and added to the volume of currency in circulation. It was expected that a large portion of the funds so expended would find their way into private banking and other financial institutions and thus increase the supply of funds in the money market. The Bank of Japan would then resell its government bond holdings on the open market, thereby contracting the expanded note issue by an amount equal to the bonds marketed.

In practice, however, the Bank was forced to retain 22 percent of the bonds underwritten during the four and one-half years from July 1937 through December 1941. This amounted to 4.5 billion yen and it is extremely significant that this is almost exactly the sum by which the note issue expanded from July 1937 through December 1941.

The outbreak of the war in Europe pushed up prices of commodities throughout the world and, coupled with a decline in the external value of the yen, forced Japanese importers to pay higher prices for materials. Thereafter, the rapid depletion of foreign-exchange resources caused by heavy imports of raw materials and equipment, from the United States particularly, forced Japan to ship gold at a faster rate than then current production.[40] Heavy government expenditures, rising prices and an increase

[39] *Hompo Keizai Tokei* for 1941.

[40] Between 1937 and 1940, inclusive, net imports of gold into the U.S. from Japan aggregated $692,000,000 (see *Federal Reserve Bulletin*, April 1942). Japanese gold production reached a peak of 25,926 kg. in 1939, corresponding approximately to $29,000,000 if $35 a troy ounce is used as gold value. The extent of the drain is therefore apparent.

in the volume of cash transactions brought note issue by the end of 1940 to 4,777,000,000 yen, of which 2,076,000,000 yen, or 43.5 percent, constituted excess and, therefore, taxable fiduciary issue. On March 1, 1941, the Temporary Law Concerning Special Cases Relating to Convertible Bank Note Regulations was promulgated, suspending rules regarding specie reserve. In place of gold, government bonds, treasury bills, debentures and other commercial bills and securities were made eligible as reserve for the note issue. The distinction between specie reserve (convertible portion) and security reserve (against maximum legal fiduciary issue) was abolished and the total amount of notes issued could thenceforth have a full paper backing. Authority was given to the Finance Minister to fix the maximum amount of note issue. The Bank could issue notes in excess of the fixed limit when approved and deemed necessary by the Finance Minister, but, amusingly enough, the excess was subject to the 3 percent per annum tax. On April 1, 1941, the maximum note issue limit was set at 4,700,000,000 by the Finance Minister. By December 31, 1941, note issue had risen to 5,979,000,000 yen. Over the entire four-and-a-half-year period, note issue had risen 4,338,000,000 yen or 264 percent.[41]

By the end of 1941, total assets of the Bank, which had stood at 2.4 billion yen on June 30, 1937, had reached a new high of 7.7 billion, an increase of 5.3 billion or 219 percent. This expansion was attributable, for the most part, to the growth in government bond holdings, which rose, over the same period, from 880 million yen to 5.3 billion yen, an increase of 507 percent. By the end of 1941 the Bank had been almost completely converted into a tool for government war finance.

Production and Distribution Control

An almost bewildering variety of special laws were adopted and national "policy" companies established during the China War period to stimulate production of war material and to direct limited supplies into essential channels. Oil, iron and steel, electric power, machine tools, light metals, aircraft, synthetic oil, ships, minerals, textiles, foodstuffs, fertilizers, all were subject to new control measures. "Policy" Companies[42] were formed to handle rice, synthetic fuel, minerals, coal, lumber, fertilizer, silk, power, iron, gold, overseas development, etc.[43] Though the government attempted to coordinate this complex control structure through the Cabinet Planning

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[41] See *Kinyu Tokei*, (Monetary Statistics), Bank of Japan, June 1942.

[42] Known as Tokushu Kaisha or Kokusaku Kaisha, these companies were government instrumentalities designed to carry out national policy. They were usually jointly financed by the government and by the industry but the broad directives for their operations came from the respective Ministries.

[43] See Ohara, Tadashi, "National Policy Companies Inundate Japan," in *Kaizo*, Vol. XXI, No. 4, Tokyo, April 1939.

Board and its material mobilization plans,[44] the web of rules, regulations and controls grew so complex by 1940 that demands began to be made for drastic reorganization. Two examples of this incredible pattern must suffice as a general indication of the growth of control in the 1937-40 period.[45]

Oil

Lack of oil resources was perhaps the most vulnerable aspect of Japan's economy and steps were taken very early to attempt to overcome this handicap. In 1934 the government adopted the Petroleum Industry Law which placed the industry under governmental control. Amounts to be imported and refined and maximum prices were set by the government. Importers and refiners were licensed and required to keep on hand a six months' supply. The foreign companies—the Rising Sun Petroleum Company (Royal Dutch-Shell) and Socony Vacuum Corporation (Standard Oil of New York)—objected to constructing additional storage space but this

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[44] For a discussion of the Material Mobilization (Production Expansion) Plan as originally announced, see *Japan Weekly Chronicle*, March 16, 1939, also the *Japan-Manchukuo Year Book* for 1941, pp. 367-68. A discussion will also be found in the *Oriental Economist*, July 1943, pp. 328-31. The volumes of the Material Mobilization Plans for the years 1939-44 were examined in Tokyo during the USSBS investigation. Pertinent statistics were extracted and the volumes then returned to Mr. Irie of the Ministry of Commerce and Industry upon his plea that they would prove valuable source material for Japanese economists.

[45] For a description of the controls which developed in other industries during this period, see *Keizai Toseiho Nempo* (Annual Report on Economic Control Laws) for 1941, Tokyo, 1942, Part I, and *Nippon Keizai Gakkai Nempo* (Japan Economic Society Yearbook), Tokyo 1942, pp. 73-104. For the legislative history of control of automobile production in Japan, see "Laws on the Automobile Manufacturing Business," *Jidosha Nenkan* for 1943, Tokyo, pp. 1-156. On electric power, see "Reconsideration of Electric Power Control," by Sato, Masahiko, in *Tosei Keizai* for December 1940. On aircraft, *The Development of the Aircraft Industry in Japan*, Special Study No. 11, Koku Heiki Sokyoku (Air Ordinance Bureau), Gunjusho (Ministry of Munitions), Tokyo, 1944. On machine tools, "On Reorganization of the Machinery Industry," by Akita, Masaichi, in *Kogyo Kokusaku*, Tokyo, December 1940. On light metals, Iwado, Zenchi, "Japanese Wartime Legislation, 1939," *Japan Times and Mail*, Tokyo, 1940, pp. 172-95. On shipping, *The Shipping Industry of Japan*, Nippon Keizai Remmei Kai, Intelligence Series No. 6, Tokyo, October 1940, and "Development in Shipping Control Legislation," by Takei, Yasushi, in *Tosei Keizai*, Tokyo, December 1940. On coal, see Kanae, Hatano, "Coal Control," Chapter V, in *Keizai Tosei* (Economic Control), Vol. III of Wartime and Semi-Wartime Economy Series, Tokyo, October 1938; also "Establishment and Management of the Nippon Coal Company," by Furuta, Keizo, President of the Showa Coal Co., in *Keizai Joho Sangyo Hen*, Tokyo, July 1940. On chemicals, see "Drastic Reorganization of Chemical and Ceramic Industries," by Masuda, Zenjiro, in *Kogyo Kokusaku* for December 1940, and "Reorganization of the Chemical Industries," by Kuga, Teisaburo, in *Tosei Keizai* for December 1940. On cement, "Reorganization of the Cement Industry," by Moroi Kanichi, in *Kogyo Kokusaku* for December 1940, Tokyo, and on lumber, "Procedures for Timber Control," by Matsuida, Seishin, in *Keizai Toseiho Nempo*, 1942, Tokyo, p. 197 *et. seq.*

was settled in 1936 when Mitsui Bussan Kaisha agreed to construct the storage facilities and lease them to the foreign companies. By the end of 1941 storage capacity was available for 60 million barrels—30 times the annual domestic production. The Act also provided that refiners were to construct plants according to government specifications. Refinery capacity increased from 32,800 barrels per day in 1933 to 89,300 barrels per day in 1941. The latter was 17 times what was needed to process indigenous production. At the same time the number of refinery companies was reduced from 30 to 8. High prices were set for refinery products to stimulate expansion of capacity.

In 1937 the Fuel Bureau was established to administer the Petroleum Industry Law. In addition, a variety of measures were adopted by means of which Japan hoped to follow Germany in establishing a synthetic fuel industry. The Synthetic Petroleum Production Law, the Imperial Fuel Development Company Law, the Petroleum Excise Law, the Alcohol Monopoly and Compulsory Alcohol Admixture Laws were passed. The first law was designed to encourage and subsidize synthetic oil production under government control and supervision. All firms in the field had to be licensed by the government and control of more than half of the capital stock had to be in Japanese hands. The second law provided for the establishment of a "national policy company," the Imperial (Teikoku) Fuel Development Company, capitalized at 100 million yen, half of which was to be provided by the government, which also guaranteed dividends of 6 percent to private shareholders until 1943. The company, which was permitted to issue debentures up to three times its paid-up capital, was not organized until January 1938. It was to invest in and grant financial accommodation to the various synthetic oil companies. A seven-year plan was adopted which was expected to cost 770 million yen. Under the aegis of the company ten additional synthetic oil companies were established by 1940, bringing the total number in existence at that time to eighteen companies.[46] Still the industry had not gone beyond the low-temperature carbonization process stage. As the *Oriental Economist* remarked, "speaking as a whole, the industry was still in the making."[47] In 1941, at the 79th Session of the Diet, the capital of the company was doubled and its margin for debenture issue was extended. The industry's development during the war years will be discussed later.[48] Suffice it to say here that during 1941, while the plan called for production of 7,816,000 barrels of oil, actual production was 1,222,000, or only 15 percent of the goal for the year.

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[46] "Present Problems Confronting Oil Control," by Wakisaka, Yasuhiko, in *Tosei Keizai* for November 1940.

[47] "The Synthetic Oil Industry," *Oriental Economist*, August 1944, p. 357. See also, "On the Manufacture of Machinery for Artificial Oil," in *Kogyo Kokusaku*, October 1940, by Oshima, Yoshikiyo, director of the Imperial Fuel Development Company.

[48] See chapter 3, pp. 133-47.

The Petrol Excise Law exempted all synthetic oil from tax, while the Alcohol Monopoly and Compulsory Alcohol Admixture Laws made production of alcohol a government monopoly and made the mixing of alcohol with gasoline mandatory, at first only to the extent of 5 percent, but later this was progressively extended. In March 1938, the 73rd Diet passed the Petroleum Resources Development Law, which provided for government supervision and control of drilling operations. The drilling of new wells was to be subsidized to the extent of two-thirds the cost and the companies were to return 2 percent of the annual value of oil produced to the government for five years. In March 1938, there was also issued a "Gasoline and Heavy Oil Sales Regulation" setting up a voucher (rationing) system. This did not work well, however, and, in September 1939, a Petroleum Distribution Control Ordinance was promulgated and thereafter sales control was vested in a Petroleum Distribution Company (Sekiyu Haikyu Tosei KK.), which handled the rationing system. Drastic civilian economies in the use of motor gasoline cut consumption from 6.3 million barrels in 1940 to 1.5 million barrels in 1941. This was done to meet the Anglo-American-Dutch embargo and to permit greater military stockpiling. In 1941 the Imperial Oil Company (Teikoku Sekiyu KK.) was established, with a capital of 100 million yen, half of which was subscribed by the government and the other half by private interests (Mitsui, Mitsubishi, Sumitomo, Nippon Oil, Nippon Mining and Asahi Oil), to control the entire petroleum industry in Japan. Within a very short time it obtained control of 95 percent of domestic crude oil production which it then supplied to another control company, the Toa Oil Company, on an exclusive basis. Toa then distributed the crude to different oil refiners. The government pressed the eight refining companies to merge into one but they were powerful enough to resist the pressure. Shortly after Pearl Harbor they decided to pool profits and losses. All refined products were sold to the Sekiyu Sembai (Petroleum Monopoly) at fixed prices. The Sembai was in effect the purchasing branch of the Fuel Bureau of the Ministry of Commerce and Industry (later Munitions Ministry) and administered the subsidy by paying high prices to refineries and reselling at lower prices to the Petroleum Distribution Company which then allocated to consumers.

Iron and Steel

Even prior to the Meiji Restoration the State had attempted to encourage and stimulate iron and steel production.[49] A variety of devices had been employed—tariffs, subsidies and tax exemptions—but in the early thirties the decline in production which set in stimulated demands for a consolidation of all iron and steel enterprises under State control. By 1934 the State acted, though by this time rising demand had stiffened resistance

[49] See Norman, *op. cit.*, pp. 119-20.

of private producers and the consolidation was less complete than it might have been had the government moved earlier. In January of 1934 Nippon Seitetsu Kaisha (Japan Iron Manufacturing Company) was formed, in which the government held 70 percent of the capital. This company was an amalgamation of six private concerns and the State's Yawata works.

In the latter half of 1936 and early 1937 a marked shortage of pig iron and steel developed and in an effort to meet this situation several control measures were adopted. These were modified several times prior to December 1941, and a fixed pattern of control did not materialize until the establishment of the Iron and Steel Control Association in November 1941. The first step taken in 1937 to meet the shortage was the granting of a two-year exemption from import duties to iron and steel products. In addition, the Ministry of Commerce and Industry issued a decree to control speculative cornering of iron and steel products but this had little or no effect.

In July 1937 the Iron and Steel Industry Control Law came into existence. It provided for government control of output, prices, sales and consumption. To facilitate the installation of new equipment, the government might grant exemption from income and business taxes as well as subsidies. The government might order installation of certain specified equipment, storage of raw materials, organization of research on manufacturing techniques. Throughout 1938 emphasis was placed on control of distribution and consumption.[50] In February an Iron and Steel Control Council was established in the Ministry of Commerce and Industry, to draw up a production and distribution plan. In the spring, regulations were issued restricting the use of iron and steel in construction. Joint sales unions for various product categories, which had sprung up, were coordinated by the Japan Steel Materials Association. In June 1938, the Iron and Steel Distribution Control Regulations were adopted under which a ticket system of allotting products was established. Distribution by the ration system was begun through distribution control councils organized in each specialized branch of industry needing large supplies. The rationing was limited to pig iron and steel (it did not include ferro-alloys and scrap).[51] The amount of supplies allotted to each factory was to be determined on the basis of its past consumption, its capacity and the relative importance of its products. The Iron and Steel Control Council determined allocations to each distribution control council. This Council was headed by the Director of the Iron and Steel Bureau of the Ministry of Commerce and Industry. It was a large group consisting of representatives of the government, the

[50] See Kanae, Hatano, "Iron and Steel Control," Chapter II of *Keizai Tosei* (Economic Control), Vol. III of Wartime and Semi-Wartime Economy Series, Tokyo, October 1938.

[51] Scrap came under regulation in November with the promulgation of the Iron and Steel Scrap Distribution Control Ordinance.

Planning Board, of Nippon Seitetsu, of joint sales unions and the Steel Materials Association, and of distribution control councils representing industrial consumers. Iron and steel manufacturers or distributors could sell only upon receipt of a ration certificate. Along with rationing of pig iron and steel, price control was established, with power vested in the Ministry of Commerce and Industry.[52] The joint sales unions of producers of similar products gave up their sales control in 1939 to three exclusive purchase and sales corporations, which in turn merged into the Iron and Steel Sales Control Company (Tekko Hambai), in November 1941. In 1940 the Cabinet Planning Board took over the functions of the Iron and Steel Control Council and disestablished the Council. Also, in March 1940 the Ordinance Relating to the Control of Iron and Steel Supplies replaced the Distribution Control Regulations of the previous year. The new ordinance was designed both to simplify control and to plug evasion possibilities which had developed over the previous year. It provided: (1) That the Iron and Steel Association which was designated as the production control organ for the industry, by the Ministry of Commerce and Industry, was to fix output quotas by categories for each producer. When these were approved by the Ministry of Commerce and Industry all producers had to adhere to their quotas. (2) Producers could sell only to distribution control organs designated by the Minister of Commerce and Industry, excepting specified cases. The Japan-Manchukuo Iron Sales Company, the Japan Steel Sales Company, the Second Steel Sales Company and the Japan Steel Tube Manufacturing Company were designated as distribution control organs. These distributors could not use iron and steel for any purpose other than sales. (3) No one could sell or purchase iron or steel without vouchers issued by either the government or by the control organs in the various industries which consumed steel. These control organs could not issue ration tickets or vouchers in excess of the volume set by the Minister of Commerce and Industry. Vouchers could not be transferred to a third party, nor could iron or steel purchased with vouchers be transferred to a third party, or at least so the regulations provided.[53]

In July 1940 an Imperial Ordinance, issued under authority of the Mobilization Law, established a special control company to handle distribution of imported raw materials for the iron and steel industry. Losses of the control company incurred from the difference between import costs and domestic resale prices were to be made up by the government.

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[52] See USSBS (U.S. Strategic Bombing Survey) Interrogation No. 38, *Iron and Steel Allocating and Distributing Agencies*, Tokyo, October 11, 1945 (now available in the Library of Congress, P.B. 23315).

[53] *Hompo Zaikai Josei*, Mitsubishi Keizai Kenkyu Kyoku, Tokyo, May 1940, pp. 22-23. Also August 1940, pp. 8-11.

It was essentially this system, tightened by formation of one control association and one sales control company, which formed the pattern for the wartime allocation of most basic materials.

The "New Economic Structure"

By 1940 a bewildering variety of government controls had been added to the already complex "autonomous" controls and cartel arrangements in all fields of industry. Small business was being squeezed out but big business had not achieved complete control. The government, despite its numerous powers on the statute books, was not a cohesive, unifying directive force in the economic sphere. It was subject to pressures from the military for more control, from business for more autonomy or more power to do its own controlling. Within the government there was no overall coordination; the administration of such controls as existed were splintered among the various ministries, each jealous of its own prerogatives. The economy was partly controlled, partly free. Wages had been frozen but price controls were more nominal than real.[54] Materials were allocated but black-market transactions rose. With influence one could do business, without influence it was well nigh impossible. Even with influence, high prices, shortages and delays by a government not adequately geared to handle its control responsibilities created conditions not to the liking of industry. The Japan Economic Federation expressed industry's view:

> Bureaucratic economic control of today is liable to cause conflict between the government and the people. . . . The industrial expansion plan is enforced without regard to actualities in the business world and has no composite basis. Hence comes the unsmooth distribution of necessary materials and equipment, red tape procedure, and the duplication of and conflict between various control institutions.

It then proposed:

> In order to liquidate all these defects of bureaucratic control, the existing private economic bodies should be unified and adjusted so that they may be reorganized into powerful cartels in the major industrial branches. And these cartels should be granted a wide scope of authority for control purposes so that private interests may be encouraged to display their creative initiative and to enforce autonomous control on their own responsibility.[55]

A considerable falling off of economic activity in Japan during the summer of 1940, carrying production to levels below 1939, accentuated business discontent. One business spokesman declared:

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[54] For a discussion of wage and labor control during the period 1937-45, see Chapter 5; for price control and rationing, Chapter 6. Control of agriculture is also covered in Chapter 6.

[55] Quoted in "Industry and the New Structure," by Kitamura, Saburo, *The Japan Weekly Chronicle*, Kobe, September 12, 1940, p. 330.

The recessionary tendency is not confined to the chemical industry but pervades all the industrial branches. Many reasons can be mentioned such as the increasing difficulties in securing the supplies of requisite materials either through importation or expansion in home production, unfavorable effects of various wartime control measures, and over-importance of inefficient minor enterprises in the local industrial structure.[56]

The military, on the other hand, was clamoring for greater regimentation and more centralized control. Their view was perhaps best expressed by Lt. Gen. Ishikawa, speaking for War Minister Tojo:

> This new economic structure of the high degree national defense state aims at the completion of military preparations, expansion of productivity, and . . . mobilization of the entire personnel and material resources of the country. This means an epoch-making development not only in the munitions industry but also in the basic heavy, chemical, and mechanical industries. Such a rapid and large-scale reorganization of the industrial structure is practically impossible under the old liberal economic structure without causing disturbances to the entire national economic structure. Therefore it is essential first of all to intensify thoroughly planned economic control.[57]

The substantial profits made by industrialists during the course of production expansion and armament particularly aroused the dissident army group, drawn principally from the agrarian sector of the population. At a conference in April 1940 the Army called for intensification of profit control and closer inspection of cost calculation, and issued a set of instructions for calculating "fair" profits in armament factories.[58] The Ordinance for Control of Corporate Finance and Accounting[59] was adopted at the behest of the military, and basic tax reform was carried out in 1940 at their instigation. The rates of the Extraordinary Profits Tax, first adopted in 1934, were raised. A special tax on dividends and interest was adopted, and a tax upon "Special Corporations" was imposed for the first time.[60]

Continued Army dissatisfaction resulted in the resignation of the War Minister in July 1940, thus precipitating the fall of the Yonai Cabinet. Its successor, the second Konoye Cabinet, with Tojo as War Minister and Hoshino as Minister-without-portfolio and chief of the Cabinet Planning Board, and Ohashi as Vice-Minister of Foreign Affairs, assumed office, pledged to a highly-organized "National Defense State" and to the theme

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[56] From "Drastic Reorganization of Chemical and Ceramic Industries," by Masuda, Zenjiro, Managing Director of Rikagaku Kogyo KK., in *Kogyo Kokusaku*, December 1940.

[57] *The Trans-Pacific*, September 26, 1940, p. 13.

[58] *Hompo Zaikai Josei*, Mitsubishi Keizai Kenkyu Kyoku, Tokyo, June 1940, p. 30.

[59] See p. 18.

[60] For additional details, see Shiomi, S., "The Reform of the Tax System," *Kyoto University Economic Review*, XV, April 1940, pp. 34-70.

of a "Greater East Asia Co-Prosperity Sphere."[61] This marked the active entrance of the Kwantung Army influence in the direction of home affairs.[62] A year-long struggle began over the structure which revised economic controls should assume. Hoshino set to work to fashion a plan which would, as he testified before USSBS interrogators, preserve the existing structural features of control but firmly rest power in the government. He produced a plan calling for reorganizing and strengthening the cartels. Their structure and policies would be made uniform from industry to industry. The key, and basically controversial, point of his plan was that the government was to appoint the director of each cartel who would have virtually dictatorial authority to carry out government policies under the supervision of a Supreme Economic Council. Business and financial interests, led by the Japan Economic Federation, fought the plan, charging that inexperienced bureaucrats could not run industry and that only in Russia was capital separated from management. They concentrated their opposition, of course, upon the idea of having the government appoint the all-powerful director. The controversy absorbed all of Japan and was waged in the press, in the Diet, behind the scenes of government, etc.[63] Even the *Econo-*

[61] Hoshino and Ohashi had been leading figures in the carrying out of the Kwantung Army's development of Manchukuo's state-controlled industrial structure. Hoshino had been Director of the General Affairs Bureau of the Manchukuo government and a confidant of Tojo and Umezu at the time that one was Commander-in-Chief and the other Chief-of-Staff of the Kwantung Army. From Vice-Director of the Finance Office at Hsinking in 1932 Hoshino had risen to the highest administrative post a Japanese could hold in the Manchukuo government. As Pu-Yi testified:

"There was a weekly Tuesday meeting composed of the Japanese Director of the General Affairs Bureau, the various vice-ministers and the chief of the Fourth Section of the Kwantung Army. In this meeting all rescripts or other ordinances or enactments which were to be promulgated by the various ministries would be passed on. The Director of the General Affairs Bureau was the Chairman and the Head of the Fourth Section of the Kwantung Army was the vice-chairman." (From testimony of Henry Pu-Yi at Tokyo War Crimes Trials, August 16-27, 1946, in *SCAP Summation No. 11*, August 1946, pp. 55-56.)

[62] It is interesting that the previous turning point in February 1936 was marked by the assassination of Finance Minister Takahashi shortly after he had made a dramatic blast against the size of investment in Manchuria. Immediately upon establishment of the second Konoye Cabinet, political parties were dissolved, the Imperial Rule Assistance Society (Taisei Yokusan Kai) was established, and the Triple Alliance (Japan, Germany and Italy) was signed in Berlin. Shortly thereafter all trade unions were dissolved and one "service-to-the-nation-through-industry" association was formed.

[63] Periodicals overflowed with discussions of the issue. To mention but a few: "Separation of Management from Capital Opposed," by Morikawa, Kakuzo, of Mitsubishi Shoji Kaisha, in *Diamond* for December 21, 1940; "On Separation of Management from Capital," by Tomooka, Hisao, professor at Hosei University, in *Keizai Joho Seikeihen* for January 1941; "New Economic Policy," by Shimada, Koichi, professor at Waseda University, in *Zaisei* for October 1940; "Establishment of a New Economic Structure," by Hiraoka, Toshio, in *Jigyoku Joho*, No. 10, October 10, 1940; "New Eco-

mist was surprised at the extent of business opposition. It stated:

What interests us more is the changed attitude assumed by business leaders implied by the protest rather than its contents. For the past several years they have been singularly close-tongued, these businessmen, and, no matter what policy the government was enforcing, they have hardly stirred, much less offered, any protest. This was scarcely a healthy state of affairs. But they now seem to have recovered their senses and to have gotten up enough courage again to dare to criticize the government.[64]

The Army and Navy came to Hoshino's support but the basic issue appears to have been resolved in favor of the industrial interests.

In a move aimed at achieving unity and healing the breach which had developed, Ogura, Director-General of Sumitomo Honsha, was appointed to the Cabinet as Minister-without-portfolio to handle economic problems. Hoshino was replaced as Chairman of the Planning Board by Lt. Gen. Suzuki, and Admiral Toyoda[65] succeeded Kobayashi as Minister of Commerce and Industry. Finally, on August 29, 1941, the much disputed, hotly discussed and long awaited new control measure was promulgated. The Major (or Key) Industries Association Ordinance, as it was called, became effective on September 1, 1941.

The basic original purpose of the proposed reform had been to unify and coordinate the control pattern. In August 1941 the Osaka Chamber of Commerce and Industry had estimated that there were more than 20,000 industrial, mercantile and other associations or guilds in Japan that were engaged in some kind of controlling activity.[66] The measure adopted was a compromise, with industrial interests giving less ground than the concessions they received.

The ordinance provided for two types of control organizations: Tosei Kai and Tosei Kumiai. The Tosei Kai were the national industry-wide control associations and the Kumiai represented smaller business organized on a local territorial basis. The broad powers of the Tosei Kai included planning

with the government the national program for production and distribution in the industry concerned; the means of supplying the labor, raw material, capital, and other demands of the industry concerned . . . control and

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nomic Structure and Capital," by Sato, Yoshio, professor at Doshisha University, in *Kokumin Hyoron*, January 1941; "Reorganization of Economic Organizations," by Honiden, Yoshio, in *Jikkyoku Geppo*, January 1941.

[64] *Oriental Economist*, January 1941, p. 6.

[65] Admiral Teijiro Toyoda, not to be confused with Admiral Soemu Toyoda who was successively C. in C. Combined Fleet, C. in C. Overall Naval Command and Chief of Naval General Staff. Teijiro Toyoda, who was linked by family ties with the Mitsubishi interest, was later president of the Iron and Steel Control Association and Head of the Munitions Ministry.

[66] *Japan Weekly Chronicle*, Commercial Supplement, September 18, 1941, p. 93.

guide production and distribution in the industry . . . provide for the complete equipping of the industry . . . develop techniques, increase efficiency, unify the regulations, and reform the management of the industry.[67]

The control associations were not centralized under any one agency of the government but each association came under the jurisdiction of the Ministry having cognizance of the field. A Cabinet Ordinance had to be issued to designate each industry in which a control association was to be established. Significantly, all firms in the industry had to become members of the association, a feature which the cartels had been urging for some time. The by-laws of the association had to be approved by the competent Ministry before they could become effective. The president of each association was to be appointed by the competent Minister from among those nominated by a nominating committee. Members of the nominating committee were to be appointed " from among those who have had experience with or have made special studies of the industry concerned." The president was given very large powers over the association, and the association, in turn, over member firms.

The first Ministerial Ordinance providing for the designation of industries in which control associations were to be formed was not issued until after Tojo became Prime Minister in October 1941. It covered iron and steel, coal, mining, cement, electrical and industrial machinery, precision instruments, automobiles and other vehicles, foreign trade, shipbuilding and rolling stock. A second decree in August 1942 added light metals, chemicals, rubber, leather and hides, oils and fats, staple fiber, rayon and hemp. The control associations soon began to compete among themselves for scarce materials and labor. Nor was there any coordination of control within the government. Control remained splintered among Ministries and Bureaus, the Cabinet Planning Board lacking effective jurisdiction. Prior to the establishment of the Munitions Ministry in November 1943 there were 345 control associations under jurisdiction of the Minister of Commerce and Industry alone.[68] Basically the establishment of the control associations was neither an innovation nor a break with the past. It followed much along the lines of the pattern laid down by the Major Industries Control Law of 1931. Cartel control over industry was tightened and government control over the cartels was set out more explicitly. For the most part the same men who dominated the cartels ran the control associations. To cite but two examples, Kenjiro Matsumoto, former president of the Japan Coal Company and a Mitsui director, became president of the Coal Control Association, while Koshiro Shiba, managing director of

[67] For complete text of the Ordinance, see *Horei Zensho*, Tokyo, 1941, pp. 612-20.

[68] The way in which control associations operated during the Pacific War period and the various changes in the control structure will be discussed in the following chapter.

Mitsubishi Heavy Industries, became president of the Shipbuilding Control Association.

The "Co-Prosperity" Sphere

Japanese policy in the thirties was designed not only to organize production for self-sufficiency and to strengthen the military within her sphere of influence, but also to extend that sphere to take in areas rich in vital materials which Japan lacked. No review of the Japanese economy in the thirties would be complete without a brief survey of her aims in such areas and the means used to accomplish the purpose. Subsequent chapters will indicate the degree of success or failure.

Japan's overseas expansion was a drive compounded of many elements, military ambition, agrarian unrest, desire for acquisition of strategic materials and economic self-sufficiency, pure national vanity and greed. It was a consistent movement and did not begin with the march into Manchuria. It started, as did modern industrialization in Japan, by an imitation of the West. When Japan saw how easy it was to take territory from weak and defenseless peoples and proved it to her own satisfaction by wresting Formosa from China, the formation of the "co-prosperity" sphere got under way.[69] Kwantung Leased Territory, South Manchurian R.R., Korea, the Mandated Islands, all fed the flames. The relative ease with which the march into Manchuria was accomplished made it certain that more would be attempted.

The economic phase of the motivation was clear. Japan lacked certain basic materials without which no modern nation could be regarded as strong and powerful. An abundance of these materials was to be found all around her, some nearby in weak areas, others somewhat more distant but perhaps ultimately not unobtainable. With a plethora of labor and a paucity of resources it seemed not illogical to Japanese leaders to sacrifice some manpower to obtain essential resources. With these materials in her grasp, Japan would be self-sufficient and unchallengeable in the East. There would be colonial posts for her young men, commands for her militarists, markets for her manufactured goods, raw materials for her industries. So reasoned the economic thinkers, such as Aikawa, Kishi, Hoshino, and others of the expansionist group.

Formosa had provided sugar and rice; Korea rice, electric power, light metals and ferro-alloys; Manchuria offered iron ore, coal, soy beans; North China coking coal, aluminous shale, cotton, salt; the Mandated Islands phosphorite and phosphate. Later there was the oil and bauxite of the Netherlands East Indies, tin and rubber of Malaya, etc. Such riches so near at hand! Two basic problems confronted the Japanese during the thirties

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[69] For a Japanese view, see Watanabe, Kijiro, *Nissei Nichiro Senso Shiwa* (History of the Sino-Japanese and Russo-Japanese Wars), Tokyo, August 1937.

in molding their "co-prosperity" sphere: how to exploit resources in areas already secured and how to acquire the remaining areas with impunity.

The earlier acquisitions, Formosa and Korea, were hailed for their contribution to Japan's agricultural deficiencies. Formosa supplied sugar and Korea rice. It was not until the thirties that any real attempt at development of industrial resources was undertaken. In the ten years from 1930 through 1939 industrial production in Formosa rose from 247 million yen to 574 million yen, a 2.3-fold increase, while Korean production rose from 280 million in 1930 to 1,498 million yen in 1939, increasing 5.5 times. However, the part played by Korea and Formosa in Japan's industrial production was comparatively insignificant. In 1939 Japan proper accounted for 91.2 percent of the total industrial production of Japan, Korea and Formosa, while Korea was responsible for 5.7 percent and Formosa 3.1 percent. Moreover, of the industrial production totals, the foodstuffs industry accounted for 67 percent of the total in Formosa and 22 percent in Korea.[70]

The Oriental Development Company, established in 1908, was the forerunner and set the pattern for a large number of other development companies established in the thirties for the exploitation of various areas. Its capital, originally 10 million yen, rose to 100 million yen by the outbreak of the Pacific War, of which 62.5 million was paid-up. Though it confined its activities to Chosen at first, and indeed at the end of 1941 more than 50 percent of its investments and 70 percent of its loans were in Korea, it began to go further afield. In 1919 it established the Dutch East Indies Colonization Company for the development of rice and coconuts at first, later rubber. It financed the Hainan Development Company, which became very active in Mindanao, and the South Seas Development Company for exploitation of sugar in the Mandated Islands. Its investments in China were principally in cotton production[71] and in Manchuria in electric power. In Chosen its principal investments were in real estate and one source notes:

> . . . the farm lands owned by this company in Chosen at present amount to 42 million yen. The lands have been leased out to tenants and the proceeds from the rent are enormous. The biggest profit of the company is derived from this source, its intake for a half period being 5,800,000 yen or a profit rate of a little less than 30 percent on the principal.[72]

Since the company virtually monopolized the good farm land, it was able, in conjunction with the Government-General, to force exports of rice at the expense of reducing the per-capita food consumption of the native popula-

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[70] *Oriental Economist*, July-August 1945, p. 251.

[71] 15,840,000 yen or 87 percent of the total investment of 18,520,000 yen in China was in cotton production.

[72] *Oriental Economist*, June 1942. p. 281. H. K. Lee, in his *Land Utilization and Rural Economy in Korea* (1936), notes that Korean tenants paid the highest rents for leased land in the world, the maximum amount of rent totaling as much as nine-tenths of the crop with the minimum at one-fifth (p. 163).

tion. According to an official report, nearly 2½ million families or 80 percent of Korea's farm families "in the spring every year have been short of food and had to maintain life by searching for edible weeds, roots, and bark on the hillsides. . . ."[73]

In the late thirties, at the government's prompting, the company directed its capital toward steel and power development, making substantial investments in Chosen Hydroelectric, Kokai Hydroelectric, Chosen Steel, Southern Chosen Hydroelectric, etc. The major share of the industrial development of Korea in the thirties, particularly in electric power, was, however, undertaken by private Japanese concerns. The most important, from the standpoint of its impact on the Korean economy, was Nippon Chisso Hiryo (Japan Nitrogenous Fertilizer Manufacturing Company). Ninety percent of the electric power development of Korea was accomplished under its auspices. It was also responsible for the development of the chemical industry which by 1941 was the most important in Korea.[74] The company also worked closely with the military in an attempt to establish synthetic oil production in Korea.[75] Its largest subsidiary was Chosen Dengyo (the Electric Power Corporation of Korea) capitalized at 341 million yen. It also owned the Oryokko Hydro-Electric Company of Korea, which was jointly responsible with the Oryokko Hydro-Electric Company of Manchuria for the Suiho Power development on the Yalu River.[76] The power station began operations in August 1941, after four years of construction at a cost of 100 million yen. The project has the second largest reservoir in the world, surpassed only by the one at Grand Coulee. Its generating capacity was 3.8 billion kwh. per year, though it was planned to raise this to 4.2 billion.

Nippon Chisso's Korean namesake and subsidiary, Korea Nitrogenous Fertilizer Manufacturing Company, was established in 1927; its main plant at Konan (a suburb of Kanko) started operations in January 1930. At that time Konan was a small hamlet but by 1940 it had 60,000 inhabitants. Other subsidiaries were established in rapid succession,[77] Chosen Magnesium Company, Chosen Coal Company, Chosen Explosives Company, Soy Bean

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[73] *Annual Report on the Administration of Chosen,* Chosen Sotokufu, 1937-38, p. 218.

[74] *Chosen Sotokufu Tokei Nempo,* 1942, p. 483.

[75] The material results of Japan's efforts in all of the occupied areas will not be discussed in this chapter but will be found in Chapter 3, tied in with the detailed discussion of Japan's requirements and output of basic raw materials. The purpose here is merely to sketch the picture of what Japan was trying to do and how she hoped to achieve her purposes in the "co-prosperity" sphere.

[76] This river forms the boundary between Korea and Manchuria.

[77] For details of activities to 1937 see Miyake, Seiki, *Shinko Kontsuerun Tokuhon* (New Concerns Register), Tokyo, 1937, pp. 118 *et seq.*

Chemical Industry, Inc., Chosen Aluminum Manufacturing Company, Chosen Synthetic Oil Company, Chosen Zinc Products Manufacturing Company. Funds were invested in Chosen Oil, Chosen Lumber, Chosen Phosphate, etc.

The motive which led Nippon Chisso to invest so heavily in Korea is well expressed by Grajdanzev:

> The chief reason for their extensive activities in Korea, apart from their 'breadth of vision' and 'ability' . . . is the fact that in Japan their Japan Nitrogen Corporation was making only 11-13 percent net profit, while in Korea the net profit of Chosen Chisso Hiryo was 31-33 percent. . . .[78]

It led to increased participation in Korean industrial development in the thirties by other large Japanese combines. Sumitomo invested in light metals, Mitsubishi in railways, mines, blast furnaces, Mitsui in cement, fats and oils, chemicals. Its Kanegafuchi Spinning and Weaving Company set up a Kanegafuchi Chemical Company in Korea. Its Oji Paper went into paper production. Japan Mining Company, a Nissan subsidiary, went into tungsten, copper and gold mining.

In 1940 the total population of Korea was 24,326,000, of which 23.6 million were Koreans. Less than 3 percent of the population was Japanese.[79] Despite the fact that the density of population in Japan was 495 persons per square mile compared with 285 for Korea, and that one of the excuses constantly given for Japanese expansion was overpopulation at home, very few Japanese, other than the managerial group, had ever migrated to Korea. While Japanese did not go to Korea, Koreans went to Japan by conscription and were forced to work in Japanese coal mines. But the outstanding fact of Korea's economic situation was Japanese ownership of more than 80 percent of real and industrial property. A survey published in the spring of 1940 showed Japanese ownership of 81.7 percent of the paid-up capital of all industrial enterprises in Korea. Japanese ownership ranged from an unusual low of 36 percent in medicines and drugs to a high of 97 percent in the chemical industry. Even in textiles, the Japanese owned 80 percent of the industry. They owned 93 percent of the metal and machinery industry, 80 percent of the flour and rice mills, 97 percent of the cement plants, 94 percent of the lumber industry, etc.[80] Of all companies with head offices in Korea, in all fields—agriculture, commerce, manufacturing, mining, fishing, finance, etc.—88 percent of paid-up capital was Japanese-owned. It should

[78] Grajdanzev, Andrew J., *Modern Korea*, Institute of Pacific Relations, New York, 1944, p. 161.

[79] *Chosen Keizai Nempo*, 1940 (Korean Economic Yearbook), Tokyo, September 1940. Also for an interesting analysis in English of the population of Korea, see Taeuber, Irene B., "Population Potential of Postwar Korea," in the *Far Eastern Quarterly*, Special Number on Korea, Vol. V, No. 3, New York, May 1946.

[80] *Kokusei Gurafu*, Tokyo, April 1940.

be noted that no electric power plants were under Korean control. Such was the "co-prosperity" sphere in Korea! Korean participation in their own industrialization was limited, for the most part, to day labor in Japanese-financed and managed plants.

Japan heavily subsidized output of those industries in Korea which it wished to encourage. For example, in 1939 subsidies ranging from 19 to 77 yen per kiloliter were paid producers of synthetic petroleum. In 1941 subsidies were granted on per ton of production above the 1937 level, at the rate of 20-30 yen on fluorspar of 93 percent, 250-300 yen on tungsten of 65 percent, and 1,000-2,000 yen on mica. Producers of alumina from domestic alum-bearing materials, instead of from imported bauxite, were paid 150 yen per ton of 97 percent alumina to compensate for increased costs of production.[81] The growth of industry in Korea during the decade prior to Pearl Harbor is indicated by the fact that in 1931 the value of manufactured goods to total gross value of Korean production was 21 percent and the value of agricultural goods 64 percent, but by 1941 both manufactured and agricultural products each accounted for 40 percent of total value.[82] It was estimated that total Japanese investments in Korea by 1942 amounted to 7,330 million yen.[83]

Manchuria was a predominantly agricultural area when the Kwantung Army marched in, determined to establish a self-sufficient continental base of operations, free from the influence of Japanese industrial combines. It remained predominantly agricultural until the Army was forced to admit that it could not industrialize Manchuria by itself and would have to utilize industrial aid, however reluctant it was to do so. As late as 1936 little Kwantung Leased Territory was more important industrially than Manchuria. Value of industrial production of Kwantung in that year amounted to 470.5 million yen while the corresponding figure for Manchuria was 335.4 million yen. In a declaration of economic policy on Manchuria, announced on March 1, 1933, it was stated that the Economic Construction Program was designed "to avoid the baneful effects of unbridled capitalism through the application of a certain measure of national control so that a sound development in all branches of the people's economy may be realized."[84] A strictly controlled economy, such as business interests fought to prevent in

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[81] *Domei Jiji Nenkan*, Tokyo, 1943, p. 213.

[82] *Statistical Monthly of the Government-General of Chosen*, November 1941, p. 38. For detailed statistics on the development of mineral production in Korea, see *Korean Mineral Industry Statistics*, Natural Resources Section, SCAP-GHQ, Report No. 23, Tokyo, March 18, 1946.

[83] *Oriental Economist*, August 3, 1946, pp. 506-07, based on studies by the Industrial Bank of Japan and the National Federation of Economic Organizations.

[84] *Fifth Report on Progress in Manchuria to 1936*, Hsinking, 1936, p. 98.

the late thirties in Japan proper, was established, with the Army firmly in control. Pu-Yi testified at the Tokyo war crimes trials that

On paper, in order to fool the people of the world, Manchukuo was made to look like an independent state but in fact it was administered by the Kwantung Army. Nominally there were Ministers and Vice-Ministers in charge of the various departments of the government. Practically every one of the Vice-Ministers was a Japanese. Ministers were Chinese. On the surface the Chinese were put in charge, but underneath the Japanese ran the show. There was a Fourth Section in the Kwantung Army in control of Manchurian affairs. All ordinances and enactments would be proffered by the Vice-Ministers who were all Japanese, and then all had to be approved by the Kwantung Army.[85]

Economic development was at first entrusted to the South Manchuria Railway Company.[86] For this purpose its capital was raised in 1933 to 800 million yen (half of which had been supplied by the Japanese government). The Company established, jointly with the Manchukuo government, a number of special companies for economic development—the Manchuria Petroleum Company, the Manchuria Gold Mining Company, the Manchuria Coal Mining Company, the Manchuria Mining Development Company, etc. Such companies were jointly financed by the Railway Company and the Manchukuo government.[87]

Under the Economic Construction Program for Manchukuo (March 1933) a ten-year plan for the construction of 4,000 kilometers of new railroad lines, which would bring the total network up to 10,000 kilometers, had been set, and it was charged that the South Manchuria Railway Company was preoccupied, at the expense of other economic projects, in attaining this goal, which it did, in less than seven years, by October 1939.[88] In the mid-thirties the Company found it difficult to float bonds in sufficient quantities to finance its various interests and was forced to resort to temporary borrowing from banks and from the Deposit Bureau of the Japanese Finance Ministry. It was at this time that the Army decided that it needed more active industrial assistance and attempted to attain it, and yet retain a

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[85] *Summation*, No. 11, *op. cit.*, pp. 55-56.

[86] The company had been organized in 1907 to take over the military line which the Japanese had built during the Russo-Japanese War from Antung to Mukden as well as the southern branch of the Chinese Eastern Railway from Changchun to Port Arthur which Russia ceded to Japan. The company's original capitalization of 200 million yen was increased to 440 million in 1920.

[87] The Railway Company had previously been responsible for the establishment of both the Anshan Iron Works (March 1917) and the Showa Steel Works (July 1929). See *The South Manchuria Railway Company's Part in the Economic Development of Manchukuo*, by Kanai, Kiyoshi, Japanese Council, Institute of Pacific Relations, Tokyo, 1936.

[88] *The Heavy Industry of Manchukuo*, Intelligence Series No. 3, Nippon Keizai Remmei Kai, Tokyo, 1940.

large degree of control, by working out a deal with Aikawa, one of the newer industrial figures. In his own words:

The seeds of the present project were sown about a year ago in the early autumn of 1936, when at the invitation of the Hsinking authorities I made a tour in Manchukuo to inspect all phases of the region's industrial opportunities. Sometime later, I was appointed a sort of adviser to the Kwantung Army, which subsequently asked my opinions and suggestions on various pertinent subjects from time to time. The seeds thus sown have now borne fruit. Under the guidance of the Army, Manchukuo has been making a series of experiments to determine what course its industrial development should follow, and many test tubes have been broken in the process. The sum total of these experiments has been the conclusion that it would be advantageous to leave industrial affairs to the care of industrialists.[89]

The deal which Aikawa worked out with the Army involved his incorporating in Manchuria the Manchurian Industrial Development Corporation ("Mangyo" for "Manshu Jukogyo Kaihatsu KK.") into which his Nissan Company was changed. Mangyo was established by a special ordinance on December 27, 1937, and became operative on March 1, 1938. Aikawa became president and remained such until December 1942. The Manchukuo government invested 200 million yen to match the capital of Nissan which went into the Manchurian Industrial Development Company, the total capital of which was 450 million yen (397 million paid-up).

Total loans and investments of Mangyo in Manchuria rose from 174 million yen during the first half of 1938 to a cumulative total of 1,498 million yen at the end of 1941. A number of existing companies, such as Showa Steel Works, Penhsihu Colliery and Iron Works, Manchuria Light Metals (est. 1936), Dowa Automobile Company (est. 1934), were taken over by Mangyo, while others, such as Tungpientao Development Company (to mine iron ore and coal and produce steel in the southeastern frontier region), Manchuria Aircraft, Manchuria Automobile, Manchuria Mining, Manchuria Machine Tools, Manchuria Special Steel, etc., were established by Mangyo. The Company was authorized to invest in iron and steel, light metals, coal, automobiles and aircraft, and in the mining of gold, zinc, lead, and copper. By the end of 1941 the Company had controlling investments in 32 companies. The Manchukuo government guaranteed a return of 6 percent on capital but by 1940 the company was earning 13.6 percent and 10-percent dividends were being paid on non-government shares. The government also guaranteed the principal of all funds brought into Manchuria and employed in the operations of the company and its subsidiaries.

Despite such inducements, however, the older financial and industrial combines held back, and even Hoshino was constrained to announce publicly:

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[89] *Nippon Industrial Company's Entry into Manchukuo. My Views on the Development of Manchurian Industries*, by Aikawa, Yoshisuke, in a pamphlet published by the Oriental Economist Company, Tokyo, March 1938, p. 8.

More industrialists from Japan are therefore requested to come forward and take part in the operations of the organization. What I especially wish to emphasize in this connection is that even in the case of fundamental industries, the government control does not go beyond making it clear who is ultimately responsible for each undertaking.[90]

The idea of an Army-dominated, self-sufficient economy still did not appeal to business groups interested in selling manufactured products and purchasing raw materials cheaply. The first five-year development plan for Manchuria, adopted in 1937, was a grandiose scheme for all-round development of Manchuria with special emphasis upon exploitation of natural resources and utilization of them in Manchuria in new war industries. The key features were again stated by Hoshino:

The heavy industry is intended to materialize the production of five million metric tons of iron, two million tons of steel, and two million tons of liquid fuel, the creation of aluminum and magnesium industries using entirely native materials; the establishment of the motor car, machine tool and aeroplane industries; and as auxiliary operations, the complete exploitation of coal deposits, and the large-scale extension of hydroelectric power and plants.[91]

The agricultural phase of the plan contemplated sending 100,000 Japanese families to Manchuria. By the end of the first five-year plan in 1941, about 42,000 families had emigrated.[92] As Pu-Yi pointed out, "when the Japanese immigrants arrived they moved onto the tilled land and the Chinese were moved to undeveloped lands."

While significant gains were made under the plan it was too ambitious a program requiring too large a volume of capital from Japan's resources, particularly in view of the fact that no funds could be obtained from abroad. The plan had to be scaled down repeatedly and each year "drastic" revisions were announced at the end of the glowing accounts of how well the plan was succeeding. For example, one magazine, after recounting in very general terms the great achievements under the plan, added,

It is evident, however, that the execution of the plan was hampered by the extreme difficulty of carrying on economic construction in the midst of a large-scale armed conflict. Interference with the execution of the program took the form of inability to obtain materials, scarcity of labor and lack of sufficient transportation facilities.[93]

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[90] "The Industrial Progress of Manchukuo," an address given by Hoshino, Naoki, Director-General of the General Affairs Board of the State Council of Manchukuo, at the general meeting of the Japan-Manchukuo Industrial Association held in Hsinking on May 18, 1939.

[91] Hoshino, *op. cit.* A detailed account of the results of the plan will be found in Chapter 3.

[92] *Manshu Nenkan*, 1941, p. 332.

[93] "Industrial Development Program in Manchukuo," *Toa* (East Asia), Tokyo, March 1940.

Scheduled production of steel ingots was to rise to one million metric tons in 1940 and to two million tons in 1942. When production held at a little over 500,000 tons the planned goal for 1942 was reduced to 850,000 tons.

In 1939 Manchukuo bonds and debentures floated in the Japanese capital market amounted to 59 percent of the domestic (Japanese) bonds and debentures issued.[94] At the joint Japan-Manchukuo Economic Conference in May 1940, the vice-president of the Bank of Japan denounced this excessive drain on Japan's capital and declared that Manchukuo should reduce its borrowings in Japan so that more Japanese capital might be available for investment in Japanese government bonds. The Five-Year plan was revised to shift emphasis to production of coal, iron and steel and light metals and away from self-sufficiency, which involved fabrication of these materials. Tokyo banks refused a loan of only 30 million yen to the South Manchurian Railway Company and the Japan Iron and Steel Manufacturing Company refused to purchase 900,000 shares of Showa Steel which had been planned. Toward the end of the year inability to obtain equipment led Manchuria Automobile to suspend operations, Manchuria Light Metals to abandon construction of its half-finished plant at Antung, and Showa Steel to postpone its fifth and sixth expansion plans.

There was a tightening of the belt all along the line in Manchuria. Companies were ordered to abandon unreal paper plans in favor of immediate returns; overhead was to be cut; companies were not allowed to hire any more workers for the entire year. Although capital investment in Manchuria reached its peak in the following year, the original ambitious plan was considerably reduced in favor of attaining more limited and more immediately realizable objectives. Japanese capital investment in Manchuria, which had totaled 1.2 billion yen during the five years 1932-36, amounted to 4.3 billion yen during the five years 1937-41. By the end of 1941 the Japanese had poured 7.2 billion yen into Manchuria in an unparalleled decade-long attempt to transform an agricultural land into an industrial arsenal.

Evidence is now available to indicate that long before Manchuria had even begun to be digested, plans were being laid for the acquisition and use of the economic resources of North China. A series of documents have

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[94] "Japanese Investments in Manchukuo," by Suga, Takeo, in *Keizai Manshu* (Economic Manchuria), Vol. 9, No. 1, January 15, 1940. The Manchukuo government financed its investments in various development companies by issuing bonds to the Central Bank of Manchou which, in turn, paid the government in fiat money for the bonds which it could not resell. As the government turned cash or deposit credits over to companies, Manchukuo prices began to rise rapidly and at a pace quicker than in Japan. Between July 1937 and July 1941 the note issue of the Central Bank of Manchou rose by 550 million yuan. Over the same period the budget of Manchukuo tripled and loans of the Central Bank also tripled. For a good discussion of the developing situation, see "Financial Problems of Manchukuo," by Sakomizu, Hisatsune, of the Japanese Finance Ministry, in *Keizai Manshu*, January 1941.

come to light which indicate that as far back as 1934 the Japanese were taking detailed inventories of China's resources and determining the best method of exploitation.[95]

The documents indicate that there was a close alliance between the Army and the South Manchurian Railway Company first in cataloguing and taking inventory of North China's resources and later in planning for their exploitation.[96] Possibly it was these studies which gave rise to repeated reiteration in Japanese literature of the time of the enormous resources of North China and their value in supplementing the deficient Japanese economy. For example:

> A brief survey of the economic position of North China . . . reveals that the area abounds in coal and iron ores—the raw materials most essential to heavy industry. . . . Thus the role which North China will play in contributing to the solution of Japan's raw materials problem cannot be overemphasized, especially from the standpoint of a wartime economy. . . . Moreover, development of those rich resources in North China has just begun; their importance lies mostly in their vast potentialities.[97]

The fact that the occupation of North China and its ensuing economic exploitation occurred after the Army had discovered the need for industrial assistance in Manchuria led to closer cooperation between the military and the business interests. When the Army marched in, some of the plants owned by China were seized as enemy property. Some plants had been abandoned, others had been damaged. In some instances Chinese owners remained on the scene, hoping, through bribery, to salvage what they could. The actual operation of all of these plants was entrusted to Japanese or Manchurian companies. They remained under army control but were operated by private interests.[98] Expenses involved in repair work were borne

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[95] "Some Economic Documents Relating to the Genesis of the Japanese-Sponsored Regime in North China," by T. K. Hoo, in the *Far Eastern Quarterly*, November 1946, Vol. VI, No. 1, p. 66.

[96] The earliest document was dated October 25, 1934, and was an outline of an economic investigation of North China prepared for the Army by the Committee on Economic Research of the South Manchurian R.R. Company. It was entitled *Hokushi Keizai Chosa Yoko Ausha*, by Mantetsu Keizai Chosakai. The Railway Company had established a China Committee and its work was summarized in a report of February 1935, entitled *Shina Keizai Chosa Iinkai Ni Kansuru Ken* (Gensho Hokoku). The Army also established a North China Economic Research Unit and its work was outlined in a pamphlet on July 3, 1935, entitled *Hokushi Chosa Han No Keigyo Kachi Wo Shu To Suru Kenkyu Oyobi Chosa Komoku Ichiran Hyo.*

[97] The iron ore reserves of Manchukuo were estimated at 763 million tons, over five times those of North China, whereas the former's coal deposits are placed at only 4,700 million tons, far below the figures for North China. *Kitashina Keizai Sokan* (Economic Handbook of North China), Section 1, Chapter 3, "Economic Relations with Japan," Industrial Department, South Manchuria Railway Company, Tokyo, 1938.

[98] See "Regulations for the Supervision of Military Controlled Enterprises," in *Tairiku Nenkan* for 1943, Tokyo, pp. 246-48.

by the designated concern to be recouped out of subsequent profits. In some cases such plants were later turned over to the North China or Central China Development Companies, or placed under joint management with the Chinese owners in an effort to encourage participation of Chinese capital, or simply handed over to the Japanese operating concern upon payment of a nominal purchase price.

Cotton mills, coal mines, flour mills, electric power plants, paper mills, match, cement, chemical, tobacco plants, etc. were treated in this fashion. Japanese companies participating included Kanegafuchi Spinning Company, Toyo Cotton Mills, Nitto Flour Mills, Daido Electric Power, the Okura Company, Chosen Godo Electric Power Company, Asano Cement, Chunghua Match Company, Japan Explosives Manufacturing Company, Toa Tobacco Company, Oji Paper, Toyoda Motor Car Company, etc.[99] While this device served to continue existing industry it did not provide for basic expansion. To accomplish this a familiar pattern was followed. Two development companies were established, one for North China and one for Central China. Both were established in November 1938. The North China Development Company was capitalized at 350 million yen and the Central China Development Company at 100 million yen. The Japanese government supplied half the capital in both cases.

By 1941, approximately 73 percent of the North China Company's investments had gone into transportation, communications, and harbor enterprises. Mining enterprises were the next largest category, 9 percent, followed by electric power, 3 percent. The Company had invested in or established 21 companies, 8 associations and one bureau. Its subsidiary affiliated companies included North China Transportation Company, Taku Transportation Company, Tsingtao Wharf, North China Telegraph and Telephone, Chefoo Electric Power, Inner Mongolia Electric Company, Tientsin Electric Power, North China Electric Company Ltd., North China Salt, North China Cotton Company, North China Mining, North China Gold Production Company, Lungyen Iron Mining Company, etc.

The Central China Development Corporation concentrated mainly upon repairing the damage done by Japanese armies, upon development of communication and transport facilities as an aid to Army operations, and upon the exploitation of existing resources and businesses. Its investments included the Central China Water Works and Electric Power Company to restore water and electric services, the Shanghai Inland Water Steamship Company, the Central China Tele-Communication Company, the Shanghai Realty Company, the Central China Motor Bus Company, the Greater Shanghai Gas Company, the Central China Railway Company, Central China Raw Silk Company, Central China Fishing Company, etc.

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[99] "Japanese Capital in China," *Toyo*, Vol. 32, No. 5, Tokyo, March 1939.

Lest the impression be gained here that all plans were carried to fruition, it may be well to present an interesting evaluation by the President of the North China Development Company, obtained by interrogation after the war:

Q. What materials did Japan get from North China?

A. Some coal, iron-ore, and aluminous shale.

Q. Did you get significant quantities of these materials?

A. No, not much. Transportation difficulties reduced the amounts, especially during the war. We tried to re-route into Manchukuo, but this only made the congestion worse. . . .

Q. What exports were sent from Japan to balance the goods taken from North China?

A. Early in the war such items as textiles.

Q. Why did you have to occupy North China militarily to get this trade?

A. I'm not sure—I cannot reply exactly, but I understand that to settle the Manchurian Affair, it was necessary for North China to be occupied.

Q. But why did you have to occupy it to get a large trade?

A. The military people thought this was necessary.

Q. Why did the business people support this?

A. China was in disorder. The military felt it necessary to occupy the country but the other Japanese leaders did not think so. When the Army carried through this program, the people came around to accept it.

Q. Did the business leaders influence the formulation of this policy?

A. The business leaders had no direct influence on this policy. Once it was set they had to follow it.

Q. Who made the policy?

A. From the time of the Manchurian Incident, the military took charge of policy. A momentum was set up which carried their policy through. The business leaders had to follow. At best they could retard it.

Q. But who made the decisions?

A. The Army. But who is the center of the Army? Nobody knows. It was like a current flowing through a large number of young officers in the Army.[100]

Goko, President of Mitsubishi Heavy Industries, testified in the same vein:

Q. What is your feeling as to reasons for the outbreak of the Chinese campaign? Was the campaign considered by the economic leaders?

A. I believe that the China Incident was a direct result of the initial Manchurian movement. I do not believe that the economic leaders of Japan had anything to do with it. It was a trial move on the part of the militarists.

Q. What is your opinion as to the time Japan reached the apex of her economic capabilities? When was her potential biggest since 1931?

A. At the time of the fall of Hankow.

Q. In other words, do you believe that the addition of North China to the Japanese Empire did not add anything to Japan's potential?

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[100] Both Hatta, President of the North China Development Company, and Goko, President of Mitsubishi Heavy Industries, were subjected to the economic purge in early 1947.

A. The resources of the lands taken did not help to increase Japan's strength.

Q. How does your answer jibe with major economic developments which actually took place after 1938?

A. I agree that the industries of Manchuria and North China were starting to develop at that time, 1938. I do not believe that either of these districts yielded much in recent years.[101]

This was the more realistic afterview of the contributions of Manchuria and North China. At the time the Japanese had reason to feel that their economy was being bolstered by the contributions of these areas. The Japanese steel industry had come to depend on North China for coking coal. Production of such coal in North China and Mongolia rose from 10 million tons in 1938 to 24 million in 1941. Manchurian coal production rose from 16 to 24 million tons over the same period. China supplied 14 percent of Japan's iron ore imports in 1937; by 1941 it furnished 49 percent. Pig iron production in Manchuria increased from 476,000 tons in 1934 to 1,400,000 tons in 1941 and ingot steel production rose from 137,000 tons in 1935 to 573,000 tons in 1941. Exports of Manchurian pig iron to Japan rose from 383,000 tons in 1935 to 548,000 tons in 1941. By the end of the decade Japan's salt requirements were met largely from North China and Manchuria, while an increasing variety of non-ferrous metals and ferro-alloys began to flow from Manchuria and Korea.

Japanese speculation in 1940-41 turned to those aspects of the co-prosperity sphere and the drive for self-sufficiency which were still lacking. Discussions of the need for those materials which were still beyond Japan's grasp, and ways in which they could be obtained, began to flood the then-controlled press. Titles such as: "Japan Vitally Interested in Oil Fields in South Seas," [102] "Southward Push Traditional Policy of Imperial Japanese Navy," [103] "Strategic Importance of Netherlands East Indies to Japan," [104] "Definite Southward Program Essential for Economic Expansion," [105] filled the press.

Oil, bauxite, tin, rubber, nickel, etc. were just beyond the current perimeter of expansion. Accustomed by now to walking in and taking over areas rich in materials they needed, and with major powers occupied in a second World War, Japanese writers (and leaders) seemed to take it for granted that Japan had only to reach out once again and take what she needed. For example:

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[101] Tokyo, October 29, 1945.

[102] By Omura, Ichizo (Nippon Petroleum Co.), in *Bungei Shunji*, Tokyo, October 1940.

[103] By Admiral Takahashi, Sankichi (Former Commander of Combined Fleet), in *Kaizo*, No. 11, Tokyo, October 2, 1940.

[104] By Saito, Chu, in *Taiyo*, October 1940.

[105] By Ishihara, Koichiro, in *Kaizo*, November 1940.

Now everyone will immediately think of the oil supply that Japan will need in such a case. But that is quite a simple matter. The Dutch East Indies has the oil we need . . . for this purpose the Dutch East Indies must be asked to join the sphere. We have a right to ask them to cooperate with us for the sake of building up an autarchic sphere, to ask them for the supply of materials needed for our common prosperity and existence. . . . There is no cause for hesitation. It will all depend on Japan's own determination, as in the case of invoking the right of a belligerent against the Chiang Kai-Shek regime.[106]

A similar but more scientific view much to the same point:

Our oil production in 1936 accounted for only 10 percent of our total needs. Thus some 90 percent of our demand had to be imported, of which 66 percent came from the United States. If account is taken of government purchases, the supply from that country would be more than 80 percent. Can shipments from interbloc countries take the place of the American supply? The Netherlands East Indies produced 7,262,000 and 7,949,000 metric tons of oil in 1937 and 1939 respectively. Of the annual production over 90 percent is exported to the mother country, the United States, Britain and Japan. If proper approaches are made, it may be easy for Japan to import one-third of that, or about 2,700,000 metric tons. In the case of the actual formation of the East Asia economic bloc, shipments to Japan of the entire oil output in the Dutch colony can be asssured.[107]

A study of the Cabinet Planning Board, dated December 1941, states " in the greatly changing world situation, the Empire is compelled to adopt a policy whose objective is the establishment of a self-sufficient position based upon its own strength," and then points out four things " which make up the bottleneck of Japan's self-sufficiency." It lists " rice, fuel, important war materials and transport capacity." [108] Under measures to obtain essential materials, it is indicated that rice must be secured from French Indochina and Thailand, oil from the Netherlands East Indies, tin from French Indochina and Thailand, copper from the Philippines, rubber and nickel from " the south," etc.

The Opportunity

Though the Japanese leaders were impressed by their decade of economic growth, it was clear that, despite the greater degree of economic autonomy achieved with the consolidation of the Inner Zone, Japan was still too exposed and too vulnerable because of continued dependence upon basic raw materials derived principally from the southern areas. Without crude oil, bauxite, rubber, tin, nickel and copper, the pomp and power of empire were pretense and sham. With the regions from which these industrial essentials

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[106] From " Strong Defense Is the Best Way to Avert Conflict in the Pacific Area," by Admiral Suyetsugu, Nobumasa, in *Keizai Joho Seikeihen*, Tokyo, January 1941.

[107] By Yamada, Fumio, in *Tosei Keizai*, Tokyo, October 1940.

[108] *Estimation of Japanese Strength Before and After the Outbreak of the Greater East Asia War*, Cabinet Planning Board, Tokyo, December 1941.

flowed in the hands of potential enemies, Japan's economic machine could be brought to a halt at their will. Accordingly when a favorable confluence of international events made it likely that Japan could escape the growing economic pressure being exerted upon her, could acquire the sources of these essentials with impunity and without serious fear of effective retaliation, she moved. Viscount Tani's "time of confusion in Europe" had come again.[109] Germany was planning to administer the coup de grâce to Russia; the Dutch and French were beaten and negligible factors; England, fighting for her existence in the West, was impotent in the Orient, and was expected to follow Russia to defeat. The United States, unmobilized, was completely absorbed in using its then current resources in the seemingly futile attempt to keep Russia and Britain propped up against Germany. A six months' delay might find Germany an unchallenged victor in Europe, exercising a conqueror's right over the Far Eastern possessions of the powers she had broken. Japan could not afford to hesitate longer. To strike a paralyzing blow, wage a short defense, then negotiate a peace in which she would give up the farthest corners to which the surge of empire had carried her, but not yield the basic essentials, was Japan's plan of action. The United States, faced by the futility of trying to beat back victorious Germany in the West and stopped in its retaliatory drive on Japan by a tenacious defense of the many well-fortified islands of the Pacific which barred the way, would, it was hoped, realize the senselessness of its efforts and come to terms.[110]

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[109] See quotation which introduced this chapter.

[110] For a strong confirmation of this view, which has been questioned by Harold Wakefield in his *New Paths for Japan* (Royal Institute of International Affairs, London, 1948, p. 110) see Chapter 4, especially pages 63 and 70 of "The Rising Sun in the Pacific, 1931-April 1942," Vol. III of *History of United States Naval Operations in World War II*, by Samuel Eliot Morison, Little, Brown & Co., Boston, 1948.

CHAPTER TWO

WAR YEARS—OVERVIEW

After the first year or two of hostilities economic causes would become the determining factor. —FRANKLIN D. ROOSEVELT, July 1, 1923, "Shall We Trust Japan?"[1]

Common misunderstanding led to a war which should never have been fought, for one side could not win and the other could not lose and under such circumstances disagreements rarely culminate in war. Poor intelligence and bad estimates of psychology, capacity and potential led Japan to underestimate the United States and the United States to overestimate Japan.

In 1941 we mistook Japan's completed preparations for minimum war potential. Japan's stockpiles of raw materials were generally overestimated.[2] Most U.S. agencies placed her oil reserves at the end of 1941 at 75 to 80 million barrels, enough to sustain a two years' war. The lowest estimate was that of Military Intelligence Service, Joint Far East Oil Committee—57 million barrels.[3] The actual figure was 43 million barrels. Bauxite reserves were assumed to be 500,000 tons, when they totaled only 254,740 tons, or a nine months' supply at the 1941 rate of utilization. Instead of building up her stocks of iron ore through 1941 as supposed, Japan had been forced to draw upon them from 1938 on to the extent of 1,623,000 tons, leaving only a four months' reserve at the end of 1941. The stockpile of scrap iron had reached a peak of 5,791,000 metric tons in 1939 and then declined to 4,468,000 tons in 1941. Generally, we failed to appreciate Japan's vulnerability to blockade and the extreme degree of her dependence on imported raw materials. Our margin of error grew greater as the war progressed, in many instances. In May 1943 the Board of Economic Warfare held that "The primary limitation on Japan's steel production is processing capacity . . . raw materials of all essential types are available to

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[1] *Asia*, Vol. XXIII, No. 7, p. 477.

[2] On the military side our ignorance was also great. Admiral Zacharias remarks, "When war came we had nobody in Tokyo to tap the grapevine of Japanese gossip and information, and nobody to send information out of Japan to us. Our ignorance of conditions within Japan was so complete that in 1942 the Chief of Naval Operations was obliged to confess publicly that he did not know whether or not Japan was building monster battleships of 45,000 tons' displacement." *Secret Missions*, by Zacharias, Ellis M., USN, New York, 1946, p. 56.

[3] MIS report on oil of August 1945, quoted in "U.S. Economic Intelligence on Japan," Appendix A to USSBS, *The Effects of Strategic Bombing on Japan's War Economy*, Washington, 1946, p. 80.

Japan in ample quantities."[4] This at a time when one-third of Japan's steel facilities were unused because of a dearth of raw materials in relation to capacity. In November 1944 the Foreign Economic Administration estimated steel ingot production at capacity, stating "equipment is being utilized at full operating capacity . . . ample raw materials are available for such operations."[5] At the time capacity was 15.2 million tons while actual production was 6.5 million metric tons. At a period when Japan was enmeshed in administrative ineptitude, the U.S. Committee of Operations Analysts reported "management and over-all planning are excellent," while OSS summed up the administrative ability of the Japanese civil service in one sentence to the effect that it was "honest and efficient." The fact that Japan's productive machine had come virtually to a standstill by mid-1945 came as a major surprise to U.S. observers who surveyed the scene in Japan immediately after the surrender. Failure to appreciate this most significant development led to concessions to Russia to enter the war against Japan, to the use of the atomic bomb, and was leading to Operation Olympic, which would probably have been a most costly and certainly a wholly unnecessary invasion.[6]

The Japanese, on their part, were guilty of equally unsound judgment. They assumed that the war would be a short one and that we would negotiate a peace, that Germany would win, that we could not mobilize as rapidly as we did and that they would have ample time to fortify their defense perimeter, that we disliked and would not use submarines as an offensive weapon, that we should grow tired and bored with war and soon call a halt, that we could not fight in tropical areas and endure hardships, that they could get along by simply exploiting existing resources and did not need to broaden the base of their economy. Admiral Soemu Toyoda, Chief of the Naval General Staff, testified:

I think the decision to expand the area of operations so widely might be attributed to a feeling on the part of the Japanese authorities at the time

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[4] Board of Economic Warfare report on Japanese Steel Capacity and Production, May 1943. quoted in "U.S. Economic Intelligence on Japan," *op. cit.*, p. 76.

[5] Foreign Economic Administration, Report on Japanese Steel Production, November 1944, quoted in *ibid.*, p. 70.

[6] There was much testimony along the lines of the following: "I think if you didn't bomb the cities your attacks on shipping would have brought the same results by next Spring (1946). . . . The great cause for the close of the war would have been lack of fuel and food which is shipped in." USSBS Interrogation No. 46, Tokyo, October 17, 1945. Zacharias notes: "When I arrived in Washington, President Roosevelt was in Yalta, attending what was to become his last conference with Generalissimo Stalin and Prime Minister Churchill. He took to Yalta voluminous intelligence material and evaluations thereof, and it seems that all these conclusions indicated a long hard war. This atmosphere was an aftermath of the difficult Iwo Jima campaign which increased the peculiar inferiority complex of our military leaders." *Secret Missions, op. cit.*, pp. 332-33.

that the state of mind under which you fought the war and the state of mind under which we fought the war were very different, in that to us this was the war for our very national existence, whereas in your case it was merely a case of national honor or perhaps protection of your economic interests in the Far East; and, because to you the war under such conditions would be of relatively slight significance as compared with ours, there might have been a feeling on the part of our leaders that, should the war continue a little longer, you would lose your will to fight. . . .[7]

Admiral Nomura declared:

They [the Privy Council] seemed to think that if we stood fast the people in the United States might, by and by, weary of the war.[8]

And:

They [the Army] underestimated the speed of your reactions. They did did not consider that when we occupied our outposts and established garrisons that the United States would react as quickly as actually happened. Some believed that your advance towards Japan would be very slow. However, I myself agreed to this. I did not think your force would be mobilized so quickly on so big a scale. Although the people to whom I talked upon my return thought I always overestimated the potentialities of the United States, now I feel that I myself underestimated.

On Germany:

Most of them [the High Command] thought that Germany would win; at least a majority thought so . . . they did not think that Germany would be defeated. Even at the time of the Normandy landings most people thought that this landing would be a very difficult operation and they did not think that the Allied armies would so quickly continue on to Germany's defense line. They were disillusioned.[9]

And:

They imagined it would take quite a time for you to recover your fleet strength; but you recovered more quickly than we expected . . . you had repair facilities beyond our imaginations . . . your repair facilities were better than we calculated . . . the speed of your operations was far quicker than our people thought. . . . Everywhere you attacked before the defense was ready . . . you came far more quickly than we expected.[10]

On submarines:

It was believed in Japan that your people did not like submarines because in the past your Navy always advocated the abolishment of undersea-craft. Therefore, we did not believe you would employ submarines so extensively.[11]

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[7] *Interrogations of Japanese Officials*, Vol. II, Naval Analysis Division, USSBS, p. 326. (Interrogation No. 378, Tokyo, November 13-14, 1945).

[8] *Interrogations of Japanese Officials, op. cit.* p. 384. (Interrogation No. 429. Tokyo, November 8, 1945).

[9] *Ibid.*, p. 385.

[10] *Ibid.*, p. 387.

[11] *Ibid.*, p. 388.

Vice-Admiral Fukudome, Chief of Staff of the Combined Fleet, testified:

This division [of the war] into phases was an arbitrary one adopted merely for the sake of convenience. However, such a division has always been contemplated and was always in the minds of the Navy General Staff from earlier years. The first phase operation was the occupation of the raw materials area to the south. The second phase was after the change from offensive in taking this area to the defensive of the occupied area . . . the period of stabilization of the occupied area immediately after occupation and prior to the beginning of the defensive operations. So the actual order became: first phase—occupation, second phase—stabilization, third phase—defensive.[12]

It is now clear from the weight of accumulated evidence that the Japanese leaders did not expect to fight a long war. Their war plan looked to the acquisition of strategic raw materials, not to broadening the base of the economy. Though impressed by their economic achievements, they were not deluded into believing that in the long run their economy was a match for that of the United States.[13] Statements of Japanese leaders at the outbreak of hostilities, that they were prepared to wage a hundred-years war, were for the purpose of bolstering morale at home and to convince the American public of the futility of trying to break the Japanese defense, and thereby hasten acceptance of a negotiated peace. The best economic evidence that the Japanese leaders expected no prolonged contest with the United States, is the fact that in the year after the outbreak of the war, they made no effort to expand the base and capacity of their industrial machine. Having mustered their resources and thrown them at the enemy, they were content to sit back and wait for the enemy to realize the futility of its counter-blows and then come to terms. They had no plan to lift total output to try and match America's massive economic weight. They had not reckoned in such terms and when, a year later, they were jolted out of their complacency into action, it was too late.

Lack of a blueprint to lift total output was a manifestation of the inherent limitation and vulnerability of the pigmy Japanese economy. Had

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[12] *Ibid.* (Interrogation No. 503, Tokyo, December 9-12, 1945). It is unfortunate that testimony must be quoted almost wholly from Japanese Naval sources. This is due to the fact that the U.S. Navy published all of its interrogations in their entirety whereas the U.S. Army classified and restricted many of its interrogations. The Army Air Forces published a report called *Mission Accomplished* which contained extracts of some of their interrogations. Most of the extracts, however, appear to have been designed to prove that air attack (Army) won the war. There is one pertinent quotation from Konoye, however: "There was considerable opinion in very high places, both military and political, that a few powerful blows against the United States might be sufficient to make you seek a way out of a war by negotiation." *Mission Accomplished*, Assistant Chief of Air Staff, Intelligence Headquarters, Army Air Forces, Washington, 1946, p. 1.

[13] See USSBS Interrogations of Baron Hiranuma, Marquis Kido, Prince Konoye and Prince Higashi-Kuni, Tokyo, 1945.

the Japanese leaders thought in terms of pitting their economic resources against those of the United States in a war of attrition, it is highly unlikely that they would have launched the Pearl Harbor attack. Japanese munitions output at its peak was never more than 10 percent of that of the United States, and her coal and steel production only one-thirteenth. Throughout the war the ordnance program had to be tailored to fit an economy incapable of any major overall expansion. Fifty percent of the population was engaged in feeding the nation and still 20 percent of the rice consumed annually had to be imported. The 1941 total food supply allowed for an averaged caloric intake only 6.4 percent above a subsistence minimum. Japan practiced the most intensive agriculture in the world; her rice yield per acre was the highest, dependent on the lavish use of nitrogenous phosphate, potash and fish fertilizer. If imports of food were cut off, fishing grounds lost, or ammonia plants forced to allot a larger percentage of their production to explosives rather than to fertilizer, the Japanese population would soon be hungry. The already meager prewar Japanese standard of living began to decline as far back as 1937, due to rising costs and a growing scarcity of certain consumers' commodities as Japan controlled her production and manipulated her exports to build up foreign-exchange balances and to permit the stockpiling of raw materials in preparation for war, as well as to supply her armies in China. Living from hand to mouth the Japanese civilian economy had no cushion, no "fat" upon which it could fall back in case of a prolonged conflict. The Japanese labor force was marked by qualitative deficiencies. There was an exceedingly small reserve of skilled workers, due to lack of adequate training programs in the prewar period. The very rapid growth of heavy industry during the thirties permitted no opportunity of building up a large reserve of skilled personnel. When the initial war strategy failed and an attempt had to be made to broaden the base of the economy, there was found to be a dearth of skill, ingenuity, and ability to improvise.

That the Japanese war plan assumed a negotiated peace without large-scale fighting, and therefore did not contemplate broadening the base of the economy, gains support from the fact that the overall production of Japan remained relatively stable in the years 1940-41-42. The real gross national product inched upward to only 40.6 billion yen in fiscal 1942 from 39.8 billion yen in fiscal 1940.[14] This period included sixteen months of war with the United States, whose real gross national product rose by more than one-third over the same period. Plant and equipment expenditures in the Japanese munitions industries actually declined between 1941 and 1942. There was no realization of the coming crucial need for merchant shipping. In fiscal 1941, which included the first four months of the war, the total merchant shipping tonnage completed fell to 241,120 gross registered tons,

[14] The Japanese fiscal year runs from April 1 to March 31 of the following year.

the lowest since 1935. By November 1942 total Japanese merchant shipping was 430,000 tons below the December 1941 level. In 1940-41 no large tankers were built, while total tanker construction fell to the lowest level since the mid-thirties. New tanker tonnage in fiscal 1940 totaled a mere 3,928 tons; in fiscal 1941 (ending March 1942) only 8,486 tons. Indicative of the relative lethargy and complacency characterizing the war economy of 1940-41-42 were the facts that despite the later drive to expand aircraft production, only 61 percent of 1942 aluminum ingot production was channeled into aircraft production, and that the estimated 1.9 million workers needed for the more essential phases of the economy for fiscal 1942 fell 250,000 below the comparable total for 1941.[15] Nor was the tax structure of this period consistent with a "war for our very national existence." Japan's ratio of taxation to national income in 1941-42 was 10.8 percent compared to 14.9 for the United States, 27.8 for Germany and 31.4 percent for Great Britain. The ratio of receipts from taxation to total annual expenditure was 27 percent for Japan for 1942-43, compared to 33 percent for Germany, 34 percent for the United States and 42 percent for Great Britain.[16]

The victories of early 1942 generated such a wave of overconfidence and enthusiasm that special measures had to be taken to check a runaway stock-market boom. The United Security Company and the Life Insurance Security Company were instructed to liquidate stock holdings in order to hold the market down and the government ordered the financial institutions to sell a part of their stock holdings to the Wartime Finance Bank so that it could conduct open-market selling operations. The *Oriental Economist* noted: "These restrictive measures which were taken in succession by the government . . . served to calm down the then prevalent wild bullish sentiment of the stock market. Speculative operations anticipating capital expansions were brought to an end Stock prices have since [November 1942] been on the downgrade."[17]

The contrast between the degree and nature of economic mobilization in Japan as against that in the United States is almost startling. From 1940 to 1944—the peak war year in both countries—total real output in Japan rose approximately one-fourth in contrast to an expansion of approximately two-thirds in the United States. More significant, and indicative of the lethargy and complacency of the Japanese is that, on an index basis with 1940 as 100, gross national product in Japan had risen to only 102 in 1942, while in the United States, on the same base, the index rose to 136. The increase in Japan's production from the beginning of the China War to the

[15] See Labor Mobilization Plans for 1941 and 1942, Ministry of Welfare (Koseisho), Tokyo, respective years, summarized in Chapter 5.

[16] "Japan's Taxable Capacity" by Nakajima, Yadanji, in *Toyo Keizai Shimpo*, Tokyo, February 1943, pp. 75-76.

[17] *Oriental Economist*, February 1943, pp. 61-63.

peak in 1944 was relatively less than that experienced by the United States between the years 1940 and 1944 the comparative increases being 50 percent for Japan over the longer period and 65 percent for the United States over the shorter period This is due not alone to the unused resources available to the United States in 1940, it is indicative of a basic difference in the concept of economic mobilization for war that prevailed in the two countries In the United States economic mobilization envisaged a substantial expansion of the entire level of output Increasing the capacity of basic industries drawing new workers into the labor force, raising the level of hours of work, and increasing the number of shifts, transferring resources to more productive uses, etc were all utilized to raise total output far beyond existing levels In Japan on the other hand, the economic mobilization for war was not dominated by this idea of overall expansion Of course, an increase in the output of munitions and in the capacity of the munitions industries was planned and did occur All the evidence indicates, however, that the major reliance for the wartime economic effort, as it was conceived at the outbreak of the war, was to be placed upon a further shift in resources from nonwar to war uses rather than upon a lifting of the whole level of output Having undergone a decade of substantial growth in production, the Japanese economic and military planners believed the nation had the basic productive power necessary for the purposes at hand They planned to adapt this to wartime needs—not to enlarge it materially While total output rose imperceptibly during 1940-42, as is shown in Table 6, the effort

TABLE 6

JAPANESE GROSS NATIONAL PRODUCT FISCAL YEARS 1940-44

(Billion of 1940 yen)

	1940	*1941*	*1942*	*1943*	*1944*
Gross national product	39 8	40 3	40 6	45 1	49 3
Government	8 0	10 1	13 2	18 0	24 1
Central Government	6 0	8 0	11 6	16 2	22 2
Non-War	1 3	1 4	1 7	1 7	2 0
War	4 7	6 6	9 9	14 5	20 2
Pay, travel and subsistence	1 2	1 5	1 8	2 3	3 4
Munitions	2 7	3 5	4 9	8 6	12 2
Other	8	1 6	3 1	3 5	4 6
Local Government	2 0	2 1	1 6	1 8	1 9
Private gross capital formation	5 1	4 2	3 6	4 7	6 4
Net exports	2	— 6	(*)	— 6	1 0
Residential construction	4	5	2	2	1
Plant and equipment	4 5	4 3	3 4	5 1	5 3
Munitions industries		2 8	2 5	4 5	4 9
Nonmunitions industries		1 5	9	6	4
Consumer expenditures	26 7	26 0	23 8	22 4	18 8
Food and tobacco	15 5	14 8	18 9	13 3	11 7
Clothing and furnishings	3 5	3 5	2 9	2 7	1 4
Other	7 7	7 7	7 0	6 4	5 7
War Expenditures Abroad	1 0	2 2	2 5	3 4	7 1

* Less than 50 million yen

Source Gross National Product of Japan and Its Components," Appendix B of *The Effects of Strategic Bombing on Japan's War Economy*, USSBS, Washington, December 1946

to expand war output at the expense of other segments of the economy is indicated by the growth of government war expenditures and the decline of private gross capital formation, residential construction, plant and equipment outlays and especially consumer expenditures. Government war expenditures and capital outlays in the munitions industries rose from 17 percent of gross national product in 1940 to 30.5 percent in 1942. Even in this diversion of output and plant, however, the United States effort far surpassed that of Japan. The comparable percentage figures for the U.S. were 2.6 percent in 1940 and 33.5 percent in 1942. Thus even in 1942, the first year of the war in the Pacific, the U.S. war effort surpassed that of Japan's.

The spectacular and easy Japanese military successes of the first six months of the war seemed for a time to justify the prevailing theory of Japan's wartime economic requirements. The acquisition of new territories and the consequent elimination of raw material deficiencies seemed to meet the economic needs of the immediate war plan. Emboldened by their victories, the militarists decided to push their margin of advantage beyond the previously set perimeter of expansion. The Solomons, Midway and the Aleutians were added to the planned outer ring, and this military overextension, coupled with the faster-than-expected recuperation of the United States, proved fatal. After Midway and the reverses on Guadalcanal, Japanese hope of a negotiated peace dimmed. America seemed not only determined to fight but, what was more, could apparently do so successfully in areas even uncongenial to the Japanese. It became apparent that, if America's retaliatory blows were to be successfully parried, Japan must plan to lift the total level of output. This recognition of the true military situation was quickly translated into an effort to expand the base of the economy. As Hoshino, chief secretary of the Tojo Cabinet, indicated later, the real Japanese "war" economy began "after Guadalcanal."[18] The whole scale of economic requirements for military and strategic purposes was seen to be too small. Japan realized she needed much more of everything but particularly ships and planes to defend the incredibly far-flung perimeter to which the impact and surprise of her initial strategic blow had carried her.

With November 1942 began the really energetic attempt to raise over-all production sights. The frantic effort made to equip a defense force capable of stopping the American counterattack led to a considerable rise in total output and an even sharper increase in the proportion of production going to war purposes. The index of gross national product rose from 102 in 1942 to 113 in 1943 and then to 124 in 1944. In real terms, the figure rose 10 billion (1940) yen in two years, compared to the tiny increase of less than one billion (1940) yen over the previous two years. Government war out-

[18] Hoshino's close relationship to Tojo resulted in his conviction and imprisonment for life by the International Allied Tribunal in the War Crimes Trial in Tokyo.

lays, after allowance for price changes, more than doubled over the period, rising from 9.9 billion yen in 1942 to 20.2 billion in 1944. As the period of complacency ended, emphasis was placed on increasing industrial facilities in the armament field as rapidly as possible so that by 1944 outlays in the munitions industries were more than double those of 1942 and three times higher than in 1941.

High ship losses due to submarine attack brought home the growing danger of blockade by the end of 1942 and, when the sights of the war effort were raised, the largest increase in capital outlays was made in the shipbuilding industry. Such outlays rose from less than half a billion yen in 1942 to over 2 billion yen in 1943 and were maintained at a high level in the following year. Although shipbuilding did increase over this period, as will be shown in detail later, the expansion of capacity was to a large extent aborted by growing shortages of basic materials. This was indeed the irony of the war effort in all fields. Given the inherent limitations of the Japanese economy in raw materials and skills, and in view of the delay of over a year before the need for greater effort was recognized, the performance of the economy in 1943 and 1944 was creditable but the very effort was negated by the growing shortages of materials due to the blockade which rendered some capacity excess even before it was completed. This was even true in those fields—such as aircraft—where there was considerable conversion of existing facilities from nonwar production (textiles) to output of finished munitions (aircraft). By the time the conversion of the textile industry to aircraft was substantially completed, excess capacity developed in aircraft production due to various shortages.

The degree of the Japanese effort and sacrifice in 1943-44 may be seen from the fact that the percentage of war expenditures to gross product rose from 30 percent in 1942 to 51 percent in 1944.[19] This exceeded the effort in the United States, for, at their peak, U.S. war expenditures were only 46 percent of gross product in 1944. By 1944 consumers' expenditures in Japan had dropped to 38 percent of gross product compared to 67 percent in 1940, while over the same period consumers' expenditures in the U.S. increased substantially. Consumers' expenditures declined 30 percent in Japan compared to a 16 percent increase in the United States. As will be shown in Chapter 6, the Japanese consumer was hit harder by war than civilians in any other major belligerent country for which data is available.[20] Produc-

[19] A post-war Japanese study placed war expenditures at 16 percent of national income in 1937; at 31 percent in 1941; and at 94 percent in 1945. See *Jiji Nenkan*, Tokyo, 1947, p. 225.

[20] See Table 71. While the gross national product technique is a very useful tool for a broad analysis of the course of a nation's economy, and for international comparisons, its inherent limitations should not be overlooked. Some of the components of the basic series are merely estimates and approximations, and the final results expressed in precise mathematical terms imply a much greater degree of finality and

tive facilities in the nonmunitions industries were permitted to deteriorate throughout the war, offset to only a minor extent by new capital outlays.

The parallel between the economic vulnerability and the economic mobilization of Japan and Germany is striking. Both were "have-not" nations dependent upon imported raw materials; both accumulated stocks of munitions and materials and as an initial war plan hurled them at an unmobilized enemy with devastating effect; both suffered from subsequent overconfidence and made no effort to broaden the base of their economy and match the feverish economic mobilization of their opponents. When the knockout blow failed and they awoke to their peril and attempted to fully mobilize their resources, it was too late. German production during the early years of the war expanded but little. From 1939 to 1941 the total gross national product of Germany, measured in 1939 reichsmarks, rose less than 4 percent. The increase in Japan from 1940 to 1942 was a little more than 2 percent. German armament output in the first three years of the war was surprisingly low. In aircraft, trucks, tanks, self-propelled guns, etc., British production was greater than Germany's in 1940, 1941 and 1942. Like the Japanese, the Germans did not plan for a long war, nor were they prepared for it. The easy victories in Poland and in the early stages in Russia led to such overconfidence that in the fall of 1941 Hitler ordered the reduction of war production and the beginning of reconversion. The Japanese sweep into Java, Sumatra, Borneo, Malaya, Burma, etc., instilled such overconfidence that plant and equipment expenditures in the munitions industries were actually allowed to decline in 1942 compared to 1941. When the Germans were shaken by the Stalingrad debacle as the Japanese were by the loss of Guadalcanal, a real effort was made under Speer, newly appointed Minister of Armament Production, to raise the whole level of war production. Output in Germany, as in Japan, reached a peak in 1944 but even as it did the base of the economy was crumbling. Measured from 1940, gross national product reached a peak of 120 for Germany in 1944 and 124 for Japan.[21] In Germany consumers' expenditures had been cut to 37 percent of gross national product in 1944; in Japan they were down to 38 percent.

The sacrifices were, however, in vain because, although the peak of the Japanese war economy came about the middle of the fiscal year 1944, by then the Allied attack on Japanese shipping had so reduced the importation of raw materials that not only was a further rise of total output impossible

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exactness than either the nature of the basic data or the methods of analysis warrant. See "National Income and Product Statistics of the United States, 1929-1946." Special Supplement to the *Survey of Current Business*, Washington, July 1947, pp. 1-17. Also "National Income and Expenditure: A Review of the Official Estimates of Five Countries," by Stone, J. R. N., *Economic Journal*, London, June 1947.

[21] On the same base (1940 = 100) gross national product for the United States rose to 165 in 1944.

but a downward trend set in. It is estimated that the level of gross product for the first half of fiscal 1945 was 25 percent below that of fiscal 1944. As in Germany, the air attacks against Japanese cities were not the basic cause of defeat. The defeat of Japan was assured before the urban air attacks were launched. The decline of Japan's war-making powers started before her industries were subjected to the main weight of the bombing attack during the months of March to August 1945. The insufficiency of the pigmy economy was the underlying cause of defeat. It has been estimated [22] that even without air attacks, overall production in August 1945 would have been only half of that of the 1944 peak due to dwindling stockpiles of raw materials, cessation of imports, shortage of skilled labor, absenteeism, incompetent administration, and an ill-conceived and poorly-executed dispersal program. By the end of 1944 the decline in production had resulted in a growing margin of unused plant capacity. Thus even substantial bomb damage to plant structures and equipment frequently had little, if any, effect on actual production. The effectiveness of the blockade caused some duplication of effort in our air attacks against the aircraft and heavy ordnance industries; considerably more in our attacks on aluminum, steel and oil plants. As a committee of economists of the Tokyo Imperial University, appointed to study the war economy, noted in their report:

Before the first heavy strategical air raid started, the munitions production of Japan had already been thrown into a desperate condition by the effective ocean blockade by the Allied forces, especially by U.S. submarine activities. According to the data of the economic mobilization plan which can be regarded as an index-number to the economic strength of our country, Japan was forced to the verge of collapse in the third quarter of 1944. On account of the successful blockade and eventually the isolation of Japan proper, the transportation of war materials from the southern regions and the continent had to be stopped. It was indeed a death blow to the war economy of Japan which had been importing almost every item of material from abroad for the use of its home munitions industry. . . .[23]

The Administrative Structure

The Japanese administrative structure at the outbreak of war left much to be desired. There was no centralized responsibility for planning and executing economic mobilization. Primary responsibility was vested in the Cabinet. The Cabinet Planning Board, which had been established in 1937, was designed to coordinate Cabinet policy in the economic sphere, but it possessed no executive powers; it could only recommend to the Cabinet. Thereafter, if its proposals were adopted, responsibility for execution passed to the individual Ministries. Each was supreme in its own sphere and

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[22] See *Summary Report—Pacific War*, USSBS, Washington, 1946, p. 15.

[23] *Report on the Effects of the Urban Area Bombing on Japanese Wartime Economy*, by Prof. C. Maiide and Associates, Tokyo Imperial University, December 23, 1945, p. 1.

jealously guarded its jurisdictional prerogatives. Strangely, they were largely unsusceptible to orders of the Prime Minister who functioned more as the chairman of a board of directors than as executive director of the government. So nominal was the authority of the Prime Minister that Tojo found it necessary later to have a special act passed empowering him to force the Ministries to carry out his directives.

To these two governmental layers of economic policy and operation must be added two others, the industrial control associations and the operating companies themselves. The control association pattern was in the formative stage; the first group of associations had been legally established in late 1941 but there were large sectors of industry without such organizations. Nominally these associations were responsible to and under control of the various ministries (coal and metals to the Ministry of Commerce and Industry, silk, foods, lumber, etc. to the Ministry of Agriculture and Forestry, aircraft and ordnance to the War Ministry, aircraft and shipbuilding to the Navy, freight and shipping tonnage management to the Transportation Ministry, etc.). In practice, however, they enjoyed great autonomy and, in fact, under the Transfer of Administrative Authority Law of February 18, 1942, received wide government power to allocate raw materials, regulate output, etc.[24] Usually the associations were headed by the former president of the largest and most powerful concern in the industry who had resigned explicitly to become head of the control association. Thus the Zaibatsu, though nominally yielding to government control, were in fact able to obtain fairly complete domination of all industry. The Army and Navy, however, reserved the right to, and on most occasions did, by-pass the control associations and place orders directly with operating companies, allotting raw materials directly from their own hoards. This was the administrative structure which prevailed virtually intact during the first year of the war. The Cabinet Planning Board had no authority; the Prime Minister did not control the Ministries; the Ministries did not control the control associations. While Tojo fought to overcome this administrative chaos and centralize power in himself, he was only partially successful, for in 1942 it was possible to ignore or discount the lack of centralized control in the mobilization of economic resources for war production, since the limited goals set for aircraft and shipping did not require a large-scale reallocation of facilities and materials.[25]

As was indicated in Chapter 1, the iron and steel, coal, mining, cement, electrical machinery, industrial machinery, precision instruments, automo-

[24] See *Asahi Nenkan*, Tokyo, 1944, pp. 117-24.

[25] See USSBS Interrogations of Aikawa, president of Manchukuo Industrial Development Corporation and Cabinet adviser, and Hoshino, Chief Cabinet Secretary 1941-44, Tokyo, November-December 1945. Also, for a detailed account of all economic legislation passed in 1942, see *Keizai Tosciho Nempo* (Annual Report on Economic Control Laws, 1942), Tokyo, 1943. 579 pp.

biles and vehicles, metals, foreign trade, and shipbuilding control associations were established late in 1941. The railroad control association was established in April of 1942 while the light metals, chemical, rubber, leather and hides, fats and oils, staple fiber and rayon, wool and hemp control associations were established in August of 1942. In November 1942 the Army Aviation Industry Association, an amalgamation of all aircraft interests concerned with the Army, was established and placed under the War Ministry's supervision. Goko, chairman of Mitsubishi Heavy Industries, was made president. At the same time a Naval Aircraft Control Association was established and placed under the Navy Ministry. The National Financial Control Association was established in the spring of 1942 with Yuki, former Yasuda managing director and governor of the Bank of Japan, as president. The Shipping Management Association was formed in mid-1942. Both the Financial and Shipping Associations will be discussed later. By 1944 the number of control associations had reached 314, of which 63 percent were in the field of production, 33 percent in the field of distribution, and the remaining 4 percent combined production and distribution.

The control associations were legally and explicitly endowed with government powers by the Transfer of Administrative Authority Law of February 1942 which transferred

> to the . . . control associations . . . national policy companies . . . corporations . . . governmental authority of granting authorizations and permissions in relation to the provisions of the National Total Mobilization Law, Exports and Imports Temporary Management Law, Temporary Capital Control Law . . . etc.

and provided that

> Matters which concern allocations of production and distribution, supply of materials, which have been decided by Imperial Ordinance, are to be conducted by control organizations.

In addition, Article 2 further provided:

> for the purpose of safe-guarding the authority of the control organizations, they are considered as government agencies. Any violation of their orders is considered as a violation of the particular law or regulation upon which the order is based.

Thus the primary function of the control association, the handling of allocations and priorities, was given legal status. However, just as their predecessors, the cartels in various industries, had found it necessary to establish "control" companies to handle the actual purchase and sale of raw materials and end products for the entire industry, the control associations found a similar need and either took over the existing distribution companies in the field or established new ones. This was given legal status by the Control Companies Ordinance of October 1943 [26] which provided for

[26] It was quite customary in Japan for such a de facto situation to exist well in advance of legalization.

joint stock companies in each industry, whose functions were the purchase, sale and distribution of commodities, the request for exports and imports, the safekeeping and storage of commodities and other undertakings related to purchase and sale within the incident industry. The shares of the control companies were usually held by owners of operating plants or by the control association of the industry. A commission was charged by the control company in connection with handling of raw materials and distribution of finished products. While control companies were under the supervision of control associations, in their internal operations they functioned as private corporations operating for profit, and in some instances performed mere profit-making paper transactions, neither storing nor handling the products but acting merely as an intermediate, funneling agency. In some instances they took losses on such paper transactions and were reimbursed by the government. For example, the Nippon Coal Company, the legal coal distributing agency, never actually had any coal in its possession. Its buying and selling was conducted merely as a book transfer. It paid cost-plus subsidy to producers for the coal and resold it at the government fixed price, its losses being compensated by government subsidy. In addition, transportation of coal from mines to consumers was placed in the hands of the mining interests at their own responsibility even though the coal might legally be in possession of the Nippon Coal Company. As the *Economist* noted,

> Nippon Coal Co. control is only technical. This system has proved far from satisfactory in enforcement of the government coal distribution plan and the company is now not only to buy coal from collieries but also to undertake its distribution in fact.[27]

The organization and structure of a typical control association and its satellite control companies may be seen in Chart 1.[28] The extent and ramification of its functions are apparent. More than 700 separate companies, with four times as many plants, were controlled by this association. The Industrial Machinery Control Association had 637 members, the Precision Machinery Control Association 381 member firms, the Electrical Machinery Control Association 245 member firms, etc. Generally speaking, it was the function of the control association to receive the estimates of member firms for labor, capital and material requirements, screen and adjust them, and then present a consolidated request for the whole industry to the appropriate government agency. When estimates from all control associations were turned in and the government pared them down and notified the association (a) what it was expected to produce over the coming quarter, and (b) what capital, labor and material it would be allotted in order to produce the re-

[27] *Oriental Economist*, December 1943, p. 577.

[28] For the full regulations of the more important control associations, such as in steel, coal, chemicals, automobiles, etc., see *Toseikai Nenkan* (Control Society Yearbook), Tokyo, 1943, 334 pp.

quired output, it was then the function of the control association to suballot its quota to member firms and furnish them with the chits to enable them to obtain the allotted amounts.

How the control association and control company system worked is best illustrated by taking, for example, a request from an individual concern, say for a specific machine tool, and indicating how it was handled if all official channels had been observed. The order would have gone up the line in the demanding industry, from individual firm to the specific industry control association, to the key industry control association, then on to the appropriate government bureau for approval and to the supplying industry control association after approval, then down to the producers' supplying industry, and finally to the individual producing concern which would then requisition materials from the control company handling this function in its field, and, upon completion, sell the machine to a distribution control company, which in turn would resell it to the concern which had ordered.[29] How cumbersome this method was to businessmen accustomed to direct dealing and negotiating and how strong the incentive to cut corners, avoid legal channels and deal directly, must be apparent. Since both companies and associations knew that their requests would be pared down and that it would take quite a while to secure what they wanted through official channels, they were stimulated to overstate their demands, order far in advance, and hoard what they could. This will be made more apparent later.

While methods of operation varied from one industry to another, a few examples may indicate more clearly just how the control and distribution structure functioned prior to the establishment of the Munitions Ministry in November 1943. Among the least complex was the rubber industry, but even here there were six control factors. (1) The Organic Chemistry Section of the Industry Bureau of the Ministry of Commerce and Industry was charged with administrative supervision. (2) The Rubber Control Association cooperated in planning raw material requirements, allocated raw materials to manufacturers and set production schedules. (3) The Rubber Materials Control Company purchased all new materials, sold allocated quantities to manufacturers, received a percentage commission on all sales and obtained a subsidy from the government to compensate for the difference between the cost of materials and final sales prices. (4) The Rubber Goods Control Company purchased all rubber goods other than that sold to the military, allocated goods to control unions for distribution in each consuming area, sold goods to distributors and received a percentage on all goods handled. (5) Rubber goods unions which allocated available stocks to dealers existed for each type of rubber goods. (6) Rubber goods dealers sold to consumers. They belonged to one rubber goods union for each type

[29] From *Report on Control Associations*, prepared by Legal Division, Economic and Scientific Section, SCAP, GHQ, Tokyo, November 20, 1945.

of goods sold, and to one or more local chambers of commerce and industry depending on the number of areas in which they operated.[30]

The system of controls which evolved in the distribution of basic materials, particularly iron and steel, became the pattern for Japan's numerous material allocation systems. As was indicated in Chapter 1, the plan for the overall allocation of steel was made on an annual basis until December 1941. Thereafter supply became so uncertain that national allocation plans were for six months only. In 1940 the Cabinet Planning Board took over the functions of the Council for Control of Iron and Steel and disestablished the Council. The Iron and Steel Control Association took over the overall plan from the Planning Board and gave it detailed execution in the association's quarterly plans. These plans specified production quotas for members and allocated the several products by categories to various consumer control associations. Suballocations to specific consumers were made by their control associations. Production estimates and quantities to be allocated were based upon quarterly reports of producers to the control association. Under the Ordinance for Adjustment of Supply and Demand of Iron and Steel, effective April 1942, and revised April 1944, the allocation was similar. Consumers were required to submit requirements four months before the quarter in which required. The control association of the consumer passed its estimates of needs to the Bureau of Iron and Steel in the Ministry of Commerce and Industry. There the Bureau, together with Army and Navy repersentatives, after consultation with the Planning Board on overall supply and demand, decided on total amounts to be allocated per consumer category. These totals were then given to the Iron and Steel Control Association, which broke the totals down into the various control associations to whom the allocations were to be made, and also allotted production quotas to its various operating companies. Actual sales to the individual consumers who had been authorized to purchase steel by their control associations was made through the Iron and Steel Sales Control Company (Tekko Hambai), which had been formed in November 1941. For the actual distribution and financing of sales to consuming companies, the Tekko Hambai relied upon eight geographically delineated, authorized distributing companies, which undertook the financial function of paying producers within twenty-five days.

Manchurian allocations and supply were integrated to a degree with those of Japan proper. In January of each year at a joint meeting of representatives of the Manchurian puppet government and representatives of the Cabinet Planning Board and Ministry of Commerce and Industry (later Munitions Ministry), total allocations were decided upon to use the products and fill the needs of Manchuria. An attempt was made to control the distribution of steel by the issuance of tickets against allotments made under the Material Mobilization plans. It was a loose system, however, which

[30] See *Summation of Non-Military Activities in Japan and Korea*, SCAP-GHQ, No. I, pp. 70-71, Tokyo, September-October 1945.

contained certain flagrant leaks, the most basic of which was that the armed forces did not need tickets. In addition, the autonomy of the military services—who were not required to make available, even to the Cabinet Planning Board, any data concerning their stocks, receipts and consumption of steel—made it impossible to prepare an accurate statistical accounting upon which an informed and workable allocations system could be based.[31]

Wartime controls over non-ferrous metals were centered ultimately in three organizations, the Mining Control Association, the Metals Distribution Control Company and the Metals Collection Control Company. The Control Association collected estimated production statistics for mines, smelters and refineries for the purpose of estimating transportation needs and for furnishing the government with data for the supply side. It also compiled and presented estimates of the needs of its subordinate companies for supplies, equipment, labor and capital. Government-established production quotas were suballocated by the Control Association to its constituent producing companies, and such allocations of supplies, equipment, labor, etc., as it received were rationed in accordance with expected production, or pressure or influence. Allocations and quotas were revised quarterly. The Army and the Navy each made totally arbitrary demands and refused to furnish even the government, to say nothing of the control association, with any details of the use to which allocations were put. The actual distribution to Army- and Navy-controlled companies was made as each branch of service saw fit. The indirect military and other demands were made up through combining the requests of all control associations which in turn had combined the requests of all subsidiary companies and plants. Allocations to these channels was made by the government to the control associations. Frequently, however, Army and Navy demands on the Mining Control Association were so large that little was left for these other requests, and the black market had to be resorted to by companies with legitimate but unfilled demands. A company favored by the Army or Navy could obtain a large allocation, sometimes in excess of its actual needs, and then barter the surplus on the black market for something which it could not obtain through regular channels. For example, Mitsubishi Kakoki KK. obtained an excess number of scarce electric motors from its sister company Mitsubishi Electric, and bartered these in the black market for materials which it could not obtain via regular channels.[32]

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[31] *Iron and Steel Allocating and Distributing Agencies*, USSBS Interrogation No. 38, Tokyo, October 11, 1945.

[32] Firms actually established special departments to procure materials on the black market. Estimates by these specialists of their purchases vary from 10 percent by Hitachi Jukogyo K.K. to 70 percent by Tsugami Seisakusho KK., in 1944. Toshio Suzuki of the Munitions Ministry estimated that in the machine tool industry, 20 percent of the materials were procured irregularly during the last three years of the war. See *The Japanese Machine Building Industry*, USSBS, Washington. November 15, 1946, p. 12.

Basically this was the pattern though there was some variation in organizational detail from industry to industry. In coal, for example, the Japan Coal Company (Nippon Sekitan KK.) made authorized deliveries not through a ticket system, but by direct allotment. Quality specifications had to be largely ignored. Toward the end of the war, the confusion which developed from the steady decline of domestic production and the dislocation of transportation became so acute that consuming plants rarely knew how much coal to expect—or of what sort—until deliveries had actually been received.

Perhaps the sector of industry which best illustrates the shortcomings of the control structure as it existed at the time was machine tools. Late in 1940 an attempt was made to put the control of machinery upon a uniform basis and when the various machinery control associations were established they continued the system, which was known as the Machinery Orders Recognition System. Under it the Machinery Section of the Ministry of Commerce and Industry attempted to check the propriety of all orders for machinery. The prospective buyer of the machinery was required to fill out a Certificate of Machinery Demand upon which he indicated name and type of machine desired, number required, the price, proposed place of installation, the manufacturer desired, the types and quantities of material probably required for its construction, time of delivery requested and reason for ordering the machine. The order was then screened by his control association and, if approved, was passed on to the Machinery Bureau of the Ministry of Commerce and Industry. Upon the basis of the orders which it approved the Ministry then drew up a quarterly production plan which it handed to the various machinery control associations together with authorizations to acquire the necessary materials. The control associations then divided the orders among member firms and also gave them the necessary tickets for purchasing raw materials.

This would appear to have been an orderly and logical procedure. In practice it failed. The examination of orders to determine their urgency became a mere rubber-stamp formality. An order was almost never refused because of pressure and because officials in the Machinery Bureau were reluctant to bear the onus of being charged with obstructing the war effort. It was easier to approve. As a result the production plans were far in excess of the production that was possible with either the plant capacity or the raw materials available. The backlog of orders grew. Machine makers had so many orders to choose from that they usually gave preference to the most profitable. This did not necessarily coincide with the most essential. Further, tickets for the purchase of raw materials were issued on the basis of orders approved and not on the basis of raw materials available. As a result, tickets were issued calling for far more materials than were actually available. Materials procured for the production of one type of machine were frequently used for production of another type. Machines built for

an approved purchaser were frequently diverted to others, largely as a result of Army or Navy pressure. The services often dealt directly with the producers of machinery without going through the control association or the Machinery Bureau. The services could supply the materials from their allotments, would pay promptly, and would notify the company not to inform the control association. As a result neither the control associations nor the Machinery Bureau really knew what capacity was available nor could they question the services' needs or orders. Orders were frequently duplicated because companies needing machines would place orders through their control associations and then, irked at the delay in receipt of the machine, would complain to the local Army Commandant that war production was being hindered. The Army would then make arrangements directly with some machine producer to obtain the required instrument, though the original order was allowed to continue through channels and was never canceled. Before examining the steps which were taken to correct such conditions, it might be well to consider other aspects of the economic control structure which preceded the establishment of the Munitions Ministry in November 1943.

The Eidans

A number of special corporations, known as Eidans, were established to carry out specialized economic tasks. The first to be established was the Industrial Facilities Corporation (Sangyo Setsubi Eidan). It performed a variety of functions. It purchased idle plants or equipment, contracted for construction of new plants, financed the construction of and purchased merchant ships. The corporation purchased plants from textile concerns and either turned them over intact to war industries or sold the equipment to the Metals Collection Control Company. Official compensation for losses arising out of the differences between the buying prices of the machines and the selling prices of scrap was paid to the Metals Company and not to the Eidan. In the case of ship construction, however, the corporation paid the shipbuilders cost plus and then resold at lower prices to shipping companies. To absorb losses of this type, which during the course of the war amounted to some two billion yen, the corporation was subsidized by the government.[33] The Corporation had an authorized capital of 400,000,000 yen of which 155,970,000 yen was paid-in, all of which was contributed by the government. The Corporation built a number of chemical plants, plants for the manufacture of aluminum from materials obtainable in Manchuria and North China, and later small iron and steel plants to utilize the low-grade ores of Japan proper when overseas supplies were cut off.[34]

[33] See *Final Report* of Sangyo Setsubi Eidan, Tokyo. December 1945. Also SCAP-GHQ, *Summary of Non-Military Activities in Japan*, No. 8, May 1946, p. 209; and *Oriental Economist*, November 1942, p. 528.

[34] The latter policy was criticized by Fujihara, the first head of the Corporation. He declared: "As the war progressed and it became apparent that iron production

The Essential Materials Supervision Corporation (Juyo Busshi Kanri Eidan) was established in February 1942, with a capital of 20 million yen supplied entirely by the government "to guarantee and increase stocks of essential materials in wartime; to provide for efficient and adequate utilization of stored essential materials". The basic function of the Corporation was to conserve, import, stockpile and release only under priority allocations, essential war materials.[35] The Corporation and its functions were absorbed by the Koeki Eidan, the Foreign Trade Management Corporation, which the government established in July 1943. In addition, the Koeki Eidan was authorized to control imports and exports. It thus was assigned jurisdiction over the foreign trade control association (Nippon Boeki Tosei Kai), which had been organized earlier. The Koeki Eidan was capitalized at 300 million yen, 250 million of which was furnished by the government. In addition, at the end of the war it had outstanding 1.9 billion yen of bank loans.[36]

The scope of the powers of the Koeki Eidan was broad. It had control over the import and export of commodities and the purchase and sale of the same in connection with their export and import. It could purchase unused raw materials in one factory and move them to where they were needed. This was not a major function since few firms would ever acknowledge that any of the materials they held were surplus. It was responsible for purchasing and warehousing materials such as lumber, galvanized iron, nails, medicines, etc., needed for emergency relief. It stockpiled essential war materials such as coal, cotton, bauxite, in cooperation with the control association in the respective field. It was given control over stocks of materials and commodities assigned for export but unshipped when the war broke out. It purchased and controlled luxury goods, confiscated enemy goods, raw rubber, etc. It also was entrusted with control over enemy property, and was responsible for adjusting commodity prices in foreign trade in the "co-prosperity" sphere. Whenever the Trade Corporation suffered a loss from trade transactions because of the differences in prices in the various regions to which goods were shipped or from which they were purchased, and those

must be increased, the Corporation was ordered to build a large number of small plants to be turned over to private operators. The corporation put up the money for these plants. However, with the war developed to the state in which it was, it seemed foolish to build such plants when they would prove of little value to us .... We felt it was not wise because such plants would not be able to produce advantageously nor come up to the expectation of the government, and so as businessmen we advised against it. However, the government did not listen to us, but simply ordered us to carry out their plans." USSBS Interrogation No. 504, Toyko, November 24, 1945.

[35] See "Essential Material Control Law," by Kawashima, Takehoshi, in *Keizai Toseiho Nempo* for 1942, Tokyo, 1943, p. 163.

[36] See *Report on The Trade Corporation—Koeki Eidan*, Military Intelligence Section, General Staff, SCAP, May 6, 1946 (available in the Library of Congress, PB 25489); also *Oriental Economist*, April 1943, pp. 176-77, and December 1943, pp. 578-79.

in Japan, the loss was met by disbursement from a Special Treasury account set up for this purpose, called Special Exchange Trade Account. Any profits which the Trade Corporation secured in its transactions were paid into this account. Since commodity prices on the mainland were higher than in Japan proper and the balance of trade was unfavorable to Japan during the last year and a half of the war, losses exceeded gains.

One of the first actions taken by the Koeki Eidan, at the direction of the Greater East Asia Ministry,[37] under whose jurisdiction it was, was the reduction of the number of persons and firms engaged in foreign trade from 6,000 in 1942 to 600 by the end of 1943. In keeping with the rationalization policy which the government pursued during the war, small traders were eliminated and the field was left to the large firms. Traders were divided into two classes, those dealing in general goods and those dealing in specified goods. In the case of the former, importers with a record of five million yen or more of trade for 1940 and exporters with the same record for 1941 and 1942 were, for the most part, permitted to remain in business. In the case of traders in specialized products, standard high norms were set for each group of commodities. Only those with trade records up to the standard were left untouched. Disqualified traders were either absorbed into the Koeki Eidan and its subordinate trade groups, or forced out of the field and compensated by the People's Rehabilitation Bank.

The scope of the Koeki Eidan was not all-inclusive. Burma, Malaya, the Dutch East Indies and the Philippines, which were under Japanese military administration, were excluded. Also articles under the monopoly system, such as salt, petroleum, alcohol, tobacco, etc., were likewise excluded. Rice, wheat, charcoal, fertilizer and fodder were also outside the scope of the Eidan. Indeed, SCAP was led to declare: "The characteristic features of Japan's wartime foreign trade were the complete absence of planning and dependence on the armed forces as collectors and distributors of goods not only in the newly occupied territories of South East Asia but also in China and Manchuria." [38]

A comparison of the Eidan's foreign trade business with the total yen value of Japan's recorded foreign trade, as given below, would seem to indicate that in 1944 the Trade Corporation accounted for 33 percent of Japan's exports and 56 percent of her imports.[39]

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[37] The Greater East Asia Ministry was established on November 1, 1942, absorbing the Manchurian Affairs Bureau and the China Affairs Board, which became bureaus of the new Ministry. In addition, a South Seas Affairs Bureau and a Trade Bureau were established. Tojo forced through this move over the strong opposition of the Foreign Ministry, whose head, Shigenori Togo, resigned in protest.

[38] *Summation of Non-Military Activities in Japan and Korea*, No. I. Tokyo, September-October, 1945, p. 80.

[39] Yen value figures for foreign trade during the war period are not too useful or reliable. The artificial pricing, the sharp rise in prices, particularly on the Continent,

Japan's wartime trade was as follows: (in millions of yen)

	1941	*1942*	*1943*	*1944*	*1945* (1st half)
Exports	2,634	3,412	2,969	2,173	353
Imports	2,885	2,811	2,793	3,101	831
Balance	—251	+601	+176	—928	—478

Source: Finance Ministry.

From an export balance of 601 million yen in 1942 there developed an import balance of 928 million yen in 1944. A relatively minor role was played by the occupied territories of South East Asia because of rapidly-declining shipping. From 6.5 percent of the total exports and 15 percent of total imports in 1942, it dwindled during the first half of 1945 to 3 percent of the total exports and 6 percent of the total imports. The latter consisted mainly of a few shipments of rubber and tin from Malaya.

At the outset of the war the services utilized the Zaibatsu but they later started their own trading companies. Showa Tsusho KK., from the latter part of 1942, monopolized the Army's share of the foreign trade of Japan. This firm was a faintly-veiled army organization originally capitalized by the Mitsui, Mitsubishi and Okura, but exclusively managed by army personnel. The Navy later entrusted their trade to Mitsubishi because they were not as successful as the Army with their own firm which they had founded in 1942. Showa Tsusho KK. and Mitsubishi Shoji Kaisha handled, between them, most of the services' share of Japan's trade. Mitsui Bussan Kaisha, Japan's largest foreign trade firm in prewar days, definitely fell out of favor with the armed forces.

The Drive for More Effective Control

When it became apparent to Japanese leaders at the end of 1942 that the whole level of output would have to be raised in view of the turn which the war was taking, a drive for more logic and order in the control structure began, which culminated in the establishment of the Munitions Ministry in late 1943. At a cabinet meeting on November 27, 1942, it was decided to establish the Emergency Production Expansion Commission, consisting of the President of the Planning Board and all departmental and section chiefs concerned with production control and expansion, with the Prime Minister as chairman. At the same time the prefectural governments were ordered to set up Prefectural Liaison Investigative Commissions to work with the central commission. At the time the *Economist* noted:

The membership of these commissions will comprise officials from local governments and local headquarters of the Army and Navy. In the five years since the outbreak of the China Affair, there has been no horizontal

and the additional fact that the Army and Navy were very lax about having the merchant ships they controlled stop at the customs houses and record their cargo, make dependence on the built-up series of the physical volume of exports and imports almost a necessity.

wartime production administrative organization. Although this was due to the military preparations being yet on a small scale, its absence frequently gave rise to duplication of orders. The establishment of the present central and local commissions will be a decided improvement. If functioning properly, they will fulfill the role of a Ministry of Production whose establishment has been demanded in some quarters.[40]

Needless to say, the commissions proved unwieldy and unsatisfactory. Mainly, of course, they lacked the power and authority to bring order out of the loose control structure. They did serve, however, as the forerunners of the more elaborate regional structure created in mid-1943. Government planning was still more in the realm of hope than reality. The Material Mobilization Plan which was issued on April 1 set production goals for the fiscal year, on the average 170 percent higher than 1942. This was coupled with and followed by the Production Expansion Plan, Labor Mobilization Plan, Electric Power Mobilization Plan, National Capitalization Plan, Trade Plan, Medical Plan, etc. It all looked very orderly on paper. Emphasis was laid upon five key industries, iron and steel, coal, light metals, shipbuilding, and aircraft. For the first time an attempt was made to estimate raw material availability on the basis of transportation possibilities, but as will be indicated later, the rate of ship losses was greatly underestimated.

In the first half of 1943 Tojo forced through several measures designed to give him greater power to implement such plans. As background for an understanding of these measures it should be noted that while the Cabinet Planning Board and the Ministry of Commerce and Industry perforce had to cooperate closely if effective economic control was to be achieved, the Cabinet Planning Board was controlled by the Army while business interests dominated the Ministry. Yet because of the intervening layer of control associations, the Ministry did not even have complete control over operating companies. In March 1943 Tojo obtained the Wartime Special Administrative Powers Act,[41] which was designed to concentrate supreme administrative power in the Prime Minister, to enable him to order other ministers to carry out measures he directed when necessary to enhance production of iron and steel, coal, light metals, ships and aircraft. It also enabled the ministers to take prompt action irrespective of the terms of existing laws if necessary to accomplish increased production. For example, if any of the firms in the above-mentioned five industries required additional capital, the competent minister might order the government banks to grant funds regardless of the provisions of the Capital Adjustment Law. Such powers were to apply to "labor, materials, motive power, and capital." The Prime Minister was empowered to shift functions from one Ministry to another if he found it necessary or transfer officials from one Ministry to another.

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[40] *Oriental Economist*, January 1943, p. 6.

[41] For full account see *Mainichi Nenkan*, Tokyo, 1944, p. 72.

There followed a series of administrative adjustments all designed to develop direct control over the economic structure and to increase production. To meet the charges that he was trying to establish a personal dictatorship, Tojo appointed a Cabinet Advisory Board of seven business leaders including Admiral Teijiro Toyoda, president of the Iron and Steel Control Association; Viscount Okochi, president of the Industrial Machinery Control Association; Fujihara, formerly a Mitsui executive, then president of the Sangyo Setsubi Eidan; Yuki, head of the Bank of Japan and president of the National Financial Control Association, a former Yasuda executive; Goko, president of the Army Aviation Industry Control Association, and formerly head of Mitsubishi Heavy Industries; Yamashita, president of the Shipping Control Association and Chuji Suzuki, president of the Light Metals Control Association and former manager of the Furukawa Electric Industry Company. This group of Cabinet Advisers, together with the Cabinet Ministers, was constituted the Supreme Wartime Economic Council.[42]

A new Price Adjustment and Compensation System was announced, the essence of which was that the government would pay higher subsidies for the production of coal, copper, ships, etc., to encourage greater production. A system of administrative inspection was established.[43] The first

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[42] Toyoda described the operations of the Council as follows:

"Q. How often were meetings held?
"A. About once a week.
"Q. Are there records?
"A. They just had free discussions and didn't keep notes.
"Q. Did they arrive at any decisions?
"A. No unified opinion on the Board. They didn't come to a decision.
"Q. The Board never made any recommendations to anybody, as a Board?
"A. No.
"Q. Did they decide that individuals should make recommendations?
"A. Individually, each adviser just gave his views on various things.
"Q. To Tojo?
"A. The Premier was usually there.
"Q. How many others were usually there?
"A. The Cabinet Ministers of Commerce, Agriculture and Communications.
"Q. Mostly the economic?
"A. The Economic Ministers.
"Q. Wasn't it one of the functions of the Board to make recommendations? Wasn't that why it was appointed?
"A. No.
"Q. What was the function of the Board, just to talk among themselves?
"A. Each adviser was an expert in a general field. They expressed opinions on their own specialized field.
"Q. But then, was that not passed on to Tojo as the opinion of the Board?
"A. That was just an individual opinion.
"Q. Didn't the Board make personal reports to the Emperor?
"A. No."

[43] See *Asahi Nenkan*, Tokyo, 1944, p. 124.

administrative inspector was Lt. Gen. Suzuki, head of the Planning Board, who in May 1943 made a one-week tour of the iron and steel plants in the Tokyo district. Nothing much came of his survey. The second administration inspection was carried out in the iron and steel industry in Hokkaido by Fujihara. At that time the steel mills at Muroran (principally Wanishi) and at Kamaishi were producing steel with coke made from Kailan coal shipped in from North China. Fujihara urged that Hokkaido coal be used for this purpose so that ships hauling North China coal to Hokkaido be freed for other purposes. He was vigorously opposed in the Cabinet Advisers' meetings on the ground that Hokkaido coal was not suitable, and was sent on an inspection to determine the facts. As a result of the inspection it was found that Wanishi could use Hokkaido coal entirely and that Kamaishi could combine 30 percent North China coal with 70 percent Hokkaido coal. Fujihara carried out the third administrative inspection of the aircraft industry in August-September 1943 and this had significant results.

In the summer of 1943 Japan was divided into nine regional administrative districts and the local commissions, described previously, were converted into regional administrative councils.[44] Up to this time a hiatus had existed between the Ministries' bureaus in the localities and the agencies of the forty-seven prefectural governments. Duplication of function, lack of centralized authority, little coordination and conflict of jurisdiction had hampered the war effort. To bridge the gap these regional councils were to be composed of the governors of the prefectures included in the regions, the chiefs of the local Superintendence Offices of the Munitions Ministry (after October 1943), and the chiefs of the local bureaus and offices of the other Ministries. These included Tax Bureau, District Monopoly Bureau, Home Affairs Bureau, Agriculture and Forestry Bureau, Labor Superintendence Bureau, Maritime Affairs Bureau, Mines Superintendence Office, etc. These Councils were the direct agents of the central government. They were given control of the whole scope of administration affecting national war policy, especially the economic aspects of it. They received orders from the Cabinet and were directly responsible to it. Each administrative council was headed by two new officials—a president and a councilor. The presidents were the presiding officers of the councils and were appointed by the Premier from among the prefectural governors in each region. They were directly responsible to him and met with him once a month. Thus the Premier established a mechanism by which he could push his authority down to the local administrative level directly without going through some Ministry. However, since no Japanese move was without compromise, the regional councilor, the executive officer of the council, was responsible to the Home Ministry and met with the Home Minister once a month. Thus the principle of Home Ministry responsibility for local administration was preserved.

[44] See *Domei Jiji Nenkan* for 1943, Tokyo. 1944. p. 184.

An industrial conversion program was also announced and carried out from the summer of 1943. Its purposes were to free labor for more essential functions, provide additional plant floor space for the expanding aircraft industry, divert machine tools to munitions production, provide scrap, etc. Industries chiefly hit were textiles, foods (fats and oil, flour, beer), metal products and chemicals (fertilizer branch).[45]

Fujihara's second administrative inspection, that of the aircraft industry, was most significant.[46] The background is given in his own words:

The Army and Navy were each anxious to build even one more plane, if it could be done. The Navy was ahead of the Army in technical skills and the Army tried its best to catch up with the Navy. Then the Navy tried to keep ahead of the Army and so the thing developed into an intense struggle for supremacy. . . . The reason for setting up the Munitions Ministry developed out of this severe competition between the Army and the Navy in aircraft production. Both the government and the military recognized that the thing had gone to serious extremes and it would be very advantageous to bring them together in a single aircraft ministry and steps were taken to bring that about.[47]

There was abundant testimony on all sides to the deleterious effects of Army-Navy competition. An example where it was carried to a ridiculous extreme is found in the testimony of Vice-Admiral Miwa, successively Director of the Naval Submarine Department and Commander-in-Chief of the Submarine Fleet.

Q. We understood that toward the end of the war, the Army was building submarines to operate itself. That seems somewhat peculiar. Do you know what the reasons were?

A. When the Army planned that building up his own submarine, the Navy side opposed that plan; but the Army answered they were planning on building up special submarines for supplying these islands and Army didn't want to use Navy submarine for such supplying because Navy submarine had more important missions to fight with fleet, and the Navy agreed with that plan. The Navy explained to the Army that building of submarine very difficult, and they wanted to show how to build them; but Army did not want to be assisted by Navy, so Army themselves built the submarines.[48]

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[45] See Chapter 5 for labor aspects of this conversion and Chapter 6 for details of its impact on food and clothing supply.

[46] He carried out a third administrative inspection, of the shipbuilding industry, in the fall of 1943, but no significant results came of his work in this field.

[47] The fact that Fujihara was a Zaibatsu executive and might have been trying to shift as much blame as possible to the military must, of course, not be overlooked.

[48] USSBS Interrogation No. 366, Tokyo, October 10, 1945. The extent of the Army-Navy rivalry and its disruptive impact upon economic planning and control cannot be overemphasized and additional examples could be cited.

Fujihara stated that at the time 8,000 to 10,000 planes per year were being built but that as a result of his investigation he concluded that 53,000 planes a year could be built. When asked how he believed such a great increase was possible, he replied:

It would take a long time if I went into details on this question but I can give you an overall conclusion something like this. The Army and Navy were stirring up a lot of fuss with their competition but were not producing much results. They had very large factories and pretty good machinery but when the Army built a big plant, the Navy built one.[49] There was a lot of competition with little thought to efficiency. There was no lack of plants but a tremendous lack of efficient operation. . . . I went to each plant, talked with the managers, together with them figured out how many planes they should produce and thus arrived at the figure I gave.

Fujihara also startled the government with the announcement that he had discovered that only 55 percent of the aluminum was used in planes, that the other 45 percent, mostly scrap due to inefficient use, was going into pots, pans, tools, the black market, or unessential plant uses such as bases for machinery, storage containers, etc.

The Munitions Ministry

As a result of the inefficient operation of the control associations and their ineffective handling of priorities and allocations, the growing demand for a production ministry, the rivalry of the Army and Navy and their disruption of planning and control, and Fujihara's revelations and recommendations regarding the aircraft industry, Tojo brought about his most sweeping change and augmented his power. The Ministry of Commerce and Industry and the Cabinet Planning Board were abolished and the Munitions Ministry was established in November 1943. The Bureaus of the Ministry of Commerce and Industry which dealt with heavy industry were transferred to the Munitions Ministry. Those which dealt with consumer goods and commerce were transferred to the Agriculture Ministry which now became the Ministry of Agriculture and Commerce. In addition, the old Communications Ministry and the Railways Ministry were abolished and in their place a new Transportation Ministry was established. Tojo became Munitions Minister in addition to being Prime Minister, War Minister and Chief of Staff. In practice the new Munitions Ministry was run by Vice-Minister Kishi,[50] until the fall of the Tojo Cabinet in mid-1944. Almost simultaneously with this reorganization in the Cabinet, the Munitions Company Act was passed. It provided that private companies, to be

[49] Fujihara did not mean that the Army and Navy actually built the plants themselves. They either had the Sangyo Setsubi Eidan do it or instructed their affiliated companies to do it. For example, Kyushu Airplane Company worked with the Navy while Tachikawa Aircraft Company was an Army affiliate.

[50] Kishi had worked with Tojo in Manchuria and had been the last Commerce and Industry Minister.

designated later, specializing in various phases of war production, were to become "munitions companies" and thereby incur certain obligations and receive certain privileges. According to Article 5 of the Act, the designated companies were "to select a person responsible for production among the officials of the company." If they could not do so the government would appoint a person to that position. The managerial staff and employees would be subject to the orders of this "leader" (Art. 14). The government could punish this designated "leader" for failure to carry out his duties. The government might designate the "time, plans, quantities, and other necessary matters" relating to production schedules (Art. 6). It might issue orders directly to the companies relating to acquisition, storage and movement of basic materials, to the improvement of technique, the supervision of labor, and other matters necessary to carry on the enterprise (Art. 7). It might restrict the munitions companies from engaging in other than designated operations (Art. 10). It could control the use of the funds of munitions companies and order their amalgamation or dissolution if necessary. The companies obtained special privileges. They would be given special priorities to obtain materials, capital and labor. The government was empowered to guarantee profits, grant subsidies, or indemnify losses.

The Munitions Ministry consisted of a General or Total Mobilization Bureau (Sodo In Kyoku), an Air-Ordnance Bureau (Koku Seiki Sokyoku), a Machinery Bureau (Kikai Kyoku), an Iron and Steel Bureau (Tekko Kyoku), a Light Metals Bureau (Keikinzoku Kyoku), a Non-ferrous Metals Bureau (Hitetsu Kinzoku Kyoku), changed to Mining Bureau, June 6, 1945, a Chemicals Bureau (Kagaku Kyoku), a Fuels Bureau (Nenryo Kyoku), an Electric Power Bureau (Denryoku Kyoku) and an Enterprise Readjustment Headquarters (Kigyo Seibi Hombu) changed to Readjustment Bureau on June 6, 1945. There was also a Secretariat (Daijin Kambo). The two most important bureaus were the General Mobilization and the Air Ordnance. The former took over most of the functions of the Cabinet Planning Board and added others, such as control of wholesale prices, while the latter, since the Ministry tended to become an aircraft production board, became the heart of the agency. It was headed through its entire existence by Lt. Gen. Endo. Its activities were broader than its title implied and it concerned itself with the whole scope of aircraft production. Its Ordnance Branch encompassed aircraft, engines, bombs and ammunition, torpedoes, electrical instruments, optical instruments and general equipment. Its Materials Branch included a light metals section, an iron and steel section, a chemical section, a lumber section and a miscellaneous materials section. Its Intendance Branch had a finance section, a contracts section and a construction section.

In theory the Ministry was to center in one body the basic planning previously done by the Cabinet Planning Board, the control and screening done by the various Ministries, and the actual handling of allocations and

priorities previously administered by the control associations. The latter continued to exist but their functions were curtailed. For a while they operated almost entirely for the production and consumption of consumer goods. The Ministry was also to centralize control of aircraft production which had hitherto been split between Army and Navy. In the plan to have the operating companies report directly to the Ministry and receive their orders and allocations of materials from the Ministry, a major step toward tightening controls was taken. By eliminating service rivalries and independent administration of part of the allocation and priority system, much was to be gained. Also for the first time, priorities were to be enforced which would indicate the relative importance of orders and the time in which they were to be filled. With unification of control in a centralized body, the screening of orders and requirements could be brought into more realistic relation to availability of raw materials.

The theory was good. In practice, it can be categorically stated that the desired unification was never achieved. The services continued to operate independently, some control associations continued to administer allocations and priorities, an adjustment between orders and supplies was never achieved, production was consistently overestimated, the special priorities were never observed.[31] It is only fair to add, however, that in view of the economic realities which confronted Japan in 1944 and early 1945, no matter how expert the planning, how cooperative the agencies, and how thorough the unification in one body, it could never have succeeded. Wholly aside from administrative controls, good or bad, the ship losses and the consequent shrinkage of raw material supply which occurred made inevitable a drastic decline in output of finished munitions. The incompetent planning, of which the Japanese were guilty, only intensified their plight.

The Transportation Ministry had partial control over shipping and freight allocations. Control over shipbuilding (merchant and naval) and naval ordnance remained with the Navy, over land ordnance and ammuni-

[31] Japanese propaganda broadcasts during the war led even skilled American observers to conclude that effective centralization of control had been achieved. Dr. Borton concluded: "The complete and direct control by the military of all phases of Japanese government and administration was finally achieved in November 1943, through the establishment of the Munitions Ministry and through the inauguration of widespread administrative changes within the Government. . . . These changes have enabled the militarists to enforce a policy of total mobilization. The rivalry which continued to exist between the militarists and big business during the period from 1937 to 1943 has now been largely eliminated. . . ." *The Administration and Structure of the Japanese Government*, by Borton, Hugh, Department of State Publication 2244, Far Eastern Series No. 8, Washington, D. C., 1945, pp. 14-15.

T. A. Bisson declared: "The chaotic situation which prevailed in the administration of Japan's war economy during 1942-43 was largely rectified. A relatively efficient economic administration, with adequate centralized control, was finally established in 1944 . . . ." *Japan's War Economy*, Institute of Pacific Relations, New York, 1945, p. 202.

tion with the Army, over fuel with both combined. The activation of the Munitions Ministry was actually delayed by the unwillingness of the services to turn over aircraft production control to the new agency. Domei remarked delicately: "The air headquarters of the Army and Navy, anxious over a possible decrease in aircraft production during the process of transfer of business, have continued to exercise jurisdiction over it."

When the transfer was effected, the two Aviation Industry Associations were merged into one Aircraft Industries Control Association, but it was not given control of priorities and allocations, which were handled directly by the Ministry.

The first designation of munitions companies under the new law was made on January 17, 1944. They numbered 150 but not all were assigned to the Munitions Ministry. As the *Economist* noted: "They were placed respectively under the jurisdiction of the Departments of Munitions, of War, of the Navy and of Transportation and on the same day were given written charters by the respective ministers."[52] On April 24, 1944, the Ministry designated an additional 424 firms as munitions companies. While the first list included companies in a position to enhance air power, the second list included metal and coal mining, gas and electric power companies, etc. On October 24, 1944, an additional 97 companies in Korea and Formosa were designated, bringing the total up to 671 companies.

During the first six months, the Ministry under Tojo and Kishi groped toward an effective priority system. An ordinance was passed, entitled Enforcement of the Adjustment of Industrial Orders, under which all orders given or approved by the Army, Navy and other governmental branches were first to be screened and passed by the Munitions Ministry. To handle this function a Central Council for the Adjustment of Orders was established within the Ministry on March 16. The procedure was initially applied to drop-forging machines, electric motors, black lead crucibles, pig-iron and ordinary rolled-iron, and certain chemicals.[53] While the method varied from item to item, one illustration will suffice to indicate generally how the system worked. The Machinery Bureau of the Ministry collected requirement estimates for motors from various government agencies and from control associations. These were then screened by the machinery section of the Central Council for Adjustment of Orders and allocations made according to groups of industrial users. Upon the basis of these pared estimates the Machinery Bureau figured out what materials would be needed and sent this estimation to the General Mobilization Bureau. When this Bureau worked out its material mobilization plan and notified the Machinery Bureau what allocation of material could be made for production of electric motors, the Machinery Bureau, after a second screening by the

[52] *Oriental Economist*, March 1944, p. 120.

[53] See "Order Placement and War Industry," *Oriental Economist*, May 1944, p. 221.

Order Council, worked out a production schedule, notified the manufacturers, set time limits and arranged to supply them with the raw materials. This was done through the Koeki Eidan and the previous chit system was eliminated. All motors produced would be purchased from manufacturers by the electric machinery industry control company. The Machinery Bureau would notify government agencies and control associations of their allotment and they would be authorized to purchase from the electric machinery industry control company. Had the system worked, and had it been extended to all other fields, effective control might have been achieved. It failed, however, because, among other reasons, if the Army-dominated Tachikawa Aircraft Company needed electric motors quickly, the Army would give some of its steel to the Shibaura Denki KK. and order it to manufacture the electric motors which Tachikawa needed.

With the loss of Saipan the Tojo Cabinet fell on July 18, 1944, and Fujihara became Munitions Minister in the new Koiso Cabinet. He remained in that position throughout the last half of 1944, resigning ostensibly on the grounds of ill-health at the end of the year. His problems and troubles in his own words shed considerable light on the operations of the Ministry:

When I became Munitions Minister, I considered that there were three important jobs to do—(1) To expand aircraft production—(2) to increase the production of iron and steel—(3) to step up aluminum production. Then I stopped and I said: 'The defeat at Saipan shows very clearly there is something seriously wrong', and I asked myself 'Why were we defeated at Saipan?' There were many reasons but the first of all the reasons was that we had too few ships. We had insufficient transportation to bring materials from the South so we could expand production so I thought I could do nothing after that defeat unless I had the ships to bring in the materials.

Q. Was progress made in expanding production in all these three fields?

A. The results of my efforts to expand production were just the reverse of successful. . . . There were three main reasons why I was not successful; first the decrease in shipping tonnage so drastically affected bauxite supply; second because of the shipping shortage the imports of coal from China, Hokkaido, Karafuto and other places to Japan were drastically cut. Therefore steel production went down. Thirdly it was agreed among the Ministers and particularly the Navy, Army and myself that unification was necessary—very, very urgent, but there had been this old competition between the Army and the Navy and the lower officer ranks simply did not like the idea, so even though I urged unification, I could not get the people to really do it to any appreciable extent, so I had only the most limited success. . . . Here is an example of the difficulties of effecting unification. Suppose for example that they wanted 30,000 machine tools for stepping up aircraft production. I would put in an order and the Navy would put in an order and the Army would put in an order to the same makers, and they would all struggle to get their machine tool orders filled first. But in fact the makers might only produce say 10,000. Then my job was, in order to satisfy everybody, to give one-third to the Army, one-third to the Navy, and one-third to the Munitions Ministry.

Q. Was this true for aircraft also? It was my understanding that the Army and Navy gave up their separate struggle for aircraft?

A. The fact was that they achieved unification as regards the plan for the increase of aircraft but they had these various departments in the Navy for shipbuilding, etc. and in the Army for tanks and guns, etc. and since they all needed tools, and steel, etc., they did not give a damn for the aircraft. Although there was theoretical unification in fact they could not achieve actual unification. What I am saying in effect is this—I was Munitions Minister but my function actually was that of conciliator between Army, Navy and Air people.

Every other bit of testimony tends to bear out this view. Our Far Eastern Air Force interrogators who questioned Lt. Gen. Endo and other members of the Air Ordnance Bureau after the war concluded that the energetic competition between the Army and Navy for aircraft manufacturing capacity relegated even the Air Ordnance Bureau to a position of secondary importance. The Bureau passed on the Army and Navy orders to manufacturers, made studies of production capacities, arranged for the conversion of some manufacturing plants, controlled many of the minor aircraft factories (the services controlled the major ones) and acted in an advisory capacity, but its powers were limited. After May 1944, for example, the total supply of aluminum was divided, 45 percent to the Army, 45 percent to the Navy and 10 percent for other uses. The General Mobilization Bureau allocated the 10 percent to various producers of other essential goods. Aircraft plants not under the Army or Navy had to requisition aluminum directly from the Army or Navy for the fulfillment of aircraft orders placed with them by the Ministry of Munitions.[54]

Shiina, who was head of the General Mobilization Bureau and later Vice-Minister of the Ministry and who had concerned himself primarily with steel allocation, pointed out that planning by the Army and Navy was carried on independently of each other and of the Munitions Ministry. He said the services would never discuss the details of their requirements with him. They just presented a blanket total demand. Nor did they submit their individual orders for steel via the Ministry. Plants making tanks or ships got their steel from the Army and Navy in the form of "chits" permitting purchase of the amount required for fulfillment of orders.[55]

The allocation of oil was another area in which the Army and Navy never relinquished control and where the activities of the Munitions Ministry were nominal. The testimony of Takamine, one of the section chiefs in the General Mobilization Bureau, and later its head when Shiina was moved up, is interesting on this point.

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[54] "The transfer of control to the Air Ordnance Bureau of the Munitions Ministry was designed to eliminate such troubles, but its efforts were only partly successful. The military forces never fully relinquished their notions of autonomy and their representatives acted accordingly up to the end." *The Japanese Aircraft Industry, op. cit.*, p. 3.

[55] See USSBS Interrogation of Shiina, Esatsuburo, No. 12, Tokyo, October 6, 1945.

Q. What was the function of the General Mobilization Bureau in the allocation of fuel?

A. Though my office was connected with the supply and allocation of oil, it was separate from the Army and Navy.

Q. What do you mean it was separate from the Army and Navy?

A. The total supply of oil which my office controlled came from the Japanese homeland factories which we controlled. This included oil from the wells and refineries, synthetic oil, and alcohol. A certain percentage of oil was secured from what the Army and Navy had in the South. We made demands to the Army-Navy Oil Committee from which we got an allocation. The Army and Navy got some of this. What the Army and Navy take back I presume is for the local armed forces and for the factories which they control in the local vicinity. The Army and Navy had their own factories generally.

Q. In what way did you make your request to the Army-Navy Oil Committee to get an allocation?

A. We explained the total production figures at the committee meetings. From past experience we know just how much the civilian needs are. The situation is explained to the Army and Navy at the meeting and they supply whatever they can.

Q. As far as you were concerned, the matter of allocation of oil was only a matter of allocating local production plus whatever the Army and Navy gave you from their supplies. Is that right?

A. Yes.

Q. Did you have anything to say about the allocation of the total amount of oil that the Army and Navy imported into Japan?

A. We had nothing to do with it. All our office would do was make demands.[56]

Takamine was the one who put together the Material Mobilization and Production Expansion Plans in the Munitions Ministry. In informal conversations he indicated that one reason the production estimates and material allocations were always higher than the actual production was that, aside from deteriorating economic conditions, the civilian officials were inclined to overestimate for self-protection.[57] When a realistic first draft of

[56] See USSBS Interrogation of Takamine, Meitatsu. Tokyo, November 8, 1945.

[57] At times orders placed by the Munitions Ministry with aircraft plants even exceeded their capacity. For example, from April 1944 through August 1945, the Ministry ordered 2,964 airframes from Nippon Kokusai Koku Kogyo KK. The company's capacity was only 2,113 and it actually produced only 1,292 airframes. During the existence of the Munitions Ministry the aircraft industry produced only 56,000 airplane engines or 53 percent of the 105,000 ordered from it by the Ministry. Another example of ministerial incompetence in control was the production record of the Mitaka Koku Kogyo KK. Government orders for fuel pumps were always greatly in excess of production capacity, varying from a low of 220 percent to a high of 800 percent. On the other hand, except for a three-month conversion period in the summer of 1944, production capacity of fuel controllers was greatly in excess of government demand. No explanation could be offered by the corporation management or the Munitions Ministry for failure to convert excess fuel-controller capacity to increase the short capacity of fuel pumps. Technically it was entirely feasible.

the first plan prepared by the new Ministry was submitted, the services protested the low estimates of production and their resultant low allocations. Several civilian chiefs were almost fired for this reason. Thereafter, the larger the estimates of production the larger could be the paper allocations to everybody and there would be less cause for protest. Takamine's official testimony on the subject was amusing.

The Army and Navy make a demand for their necessary amounts to our office [General Mobilization Bureau]. The General Mobilization Bureau asks what they are to be used for but the Army and Navy explain only in a general way and do not go any further. *The General Mobilization Bureau gives them what they want anyway.* I do not know whether the Army and Navy's total use is the same figure that their demand to us is. Some of their materials may come from outside sources. As far as rubber is concerned, for example, the Army and Navy were responsible for the transportation of it from the southern areas. Whether they took any of this out for themselves when bringing it into the country, I do not know.

This dichotomy of planning, allocations and priorities, with the Army and Navy and their overriding authority upsetting all attempts at centralized control, persisted through the first half of 1945 until the end of the war. As the administrative structure began to fall apart in 1945, and as, with the disruption of communications, it became more difficult to communicate central decisions to the localities, an attempt was made to decentralize more of the functions of the Ministry to its regional offices and to coordinate these with local Army commands. Regional Councils were reduced from nine to eight to coincide with the Army administrative districts and the offices of president of the regional council and chief of the regional munitions ministry office were combined. Plans were drafted for area by area self-sufficiency and defense in the event of invasion and a decentralization and dispersion program for industry was finally adopted. While economic realities by this time were making Munition Ministry planning completely ineffective, the Ministry's ineptitude was nowhere more clearly apparent than in its handling of the dispersal program.

The Japanese did not profit by the experience of the Germans, British and Russians in dispersal measures. They failed to take any action until it was too late, until their vital centers of war production were under heavy air attack. After the raids on the aircraft industry in December 1944 only a few aircraft factories, acting upon their own initiative, or upon the prompting of local Army and Navy officials, began to disperse. In a number of cases plants which asked the Ministry for lumber, cement and other material allocations essential to dispersal were not only denied the allocations but were actually ordered not to disperse.[58] The first national decree

[58] For example, the Tachikawa plant asked to disperse in January 1945. Despite the fact that it was attacked in February it was not allowed to disperse until May when the Army began construction of three semi-underground plants for it. By the end of August, however, these were only 5 percent completed.

which permitted and ordered dispersal was issued on April 1, 1945 and applied to the aircraft industry. This was followed in May by another decree applying to ordnance production and to all producers of parts for aircraft or ordnance. Finally on July 1, a decree ordered dispersal of all other war plants. A Planning Headquarters for Dispersal and Defense was set up in the Munitions Ministry to supervise and enforce dispersal of all war industry. It functioned through the regional offices of the Munitions Ministry. Nationally, the organization planned to move major war industries to 1,575 dispersed plants, 1,191 of these to be located above ground, 132 semi-underground and 252 underground. In addition, it planned to disperse thousands of small producers, on a local basis, through its regional offices. The Industrial Equipment Corporation was to purchase or lease the sites and provide subsidies for dispersal expenses. Legal difficulties in the acquisition of sites resulted in securing only 19 percent of those planned by the end of August.

Had dispersal been widely undertaken in 1944, it might have been successful and Japanese industry might have been better able to withstand the air attack when it came. The few independent dispersals which were undertaken in 1944 were successful and by 1945 the plants were fully operational. But to undertake to disperse the entire aircraft industry at once under heavy air attack, and then to order other companies to disperse while the aircraft industry was still trying to carry out the plan, only led to competition for transportation, labor, materials and government aid, and compounded the confusion. The order in July to disperse all war industry, at a time when local transportation had broken down completely for lack of fuel, when the aircraft industry had not yet carried out even a half of its planned dispersal, and when much of the capacity of these other war industries was already excess because of the lack of materials, was utter folly. Planning was unrealistic and estimates of production losses due to dispersal were so highly optimistic that few companies took the government's figures seriously. For example, when the Ministry ordered the Sumitomo Propeller Company, which produced 66 percent of all aircraft propellers in Japan, to disperse, it estimated that the company would lose only 20 percent of its production during the dispersal period. The company estimated it would lose 60 percent; actually it lost 70 percent. The Ministry lost control of the situation. There was no coordination of transportation, labor supply, materials, etc. Some plants refused to disperse because of this, others found their machinery and materials exposed to the weather for days while awaiting rail transportation. Others moved the machinery out into the country where it stood in isolated spots exposed to the weather because the government had not supplied the labor or materials promised to construct protective sheds. At times plants moved, only to find that they had lost their labor supply because no shelter had been provided for labor at the isolated spots to which dispersal had been made and no transportation was available from nearby towns.

The armed forces embarked upon a program of helping and protecting their own important producers and this further damaged the authority of the Munitions Ministry. Companies were reluctant to report their own noncompliance or failure and uniformly overestimated how much they had accomplished. If machinery was moved to a new site but not installed, or was simply enroute, it was reported as "dispersed." For example, the Kawasaki Aircraft Company planned to disperse its Kagamigahara airframe assembly plant to three production lines running through a series of old mills and forest huts. It also planned to disperse its Futami and Takatsuki engine plants, utilizing tunnels and old mines for shops. At the time the war ended, 1.2 million square feet out of a planned 1.9 million square feet of new construction had been completed, power had not been hooked up to the partially-installed machinery and at the war's end production had not yet started at the new sites, yet this company reported its dispersal 60 percent completed. The net result of undertaking dispersal in 1945 was to further reduce industrial output. Poor planning and administration led to greater loss of production than would have occurred had dispersal not been undertaken at all in 1945.

With the fall of Iwo Jima and the invasion of Okinawa the Koiso Cabinet fell, and the fourth and last Munitions Minister, Admiral Teijiro Toyoda,[59] took office. On the day that the new Suzuki Cabinet was formed, April 7, the *Asahi Shimbun*, in its leading editorial, blasted the administration of war production and noting the divided control stated that it was anything but rational and caused unnecessary confusion.[60] Toyoda attempted to reorganize the Ministry, reducing its 75 sections to 54 and reshuffling 67 of its key officials. In addition aircraft plants were "nationalized," called "Munitions Arsenals" and directly operated by the Ministry, but since they remained privately owned, this involved no great change. The government agreed to guarantee at least a five percent dividend, enterprises were to be indemnified for bombing losses or dispersal costs and the building of any new plants or plant expansions was prohibited. In June, the Extraordinary War Measures Act empowered the government to rule by decree without the Diet. Under threat of invasion increased regional autonomy was granted. The regional offices were strengthened by a transfer of personnel from the Ministries to them and they were endowed with the same new emergency powers as the central government. Other than those measures no basic changes in the control pattern occurred during the remainder of the war.

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[59] The third Munitions Minister was Yoshida, a bureaucrat. Fujihara testified that when he wanted to resign "the question was to get somebody acceptable to both the Army and Navy, and so they agreed on a compromise man—Yoshida—who could not do anything anyway. They thought perhaps that having a man who didn't know anything, they could both have their way."

[60] *Asahi Shimbun*, Tokyo, April 7, 1945, p. 1.

Toyoda's cautious testimony after the war shed further light on the nature of Munitions Ministry operations. He declared:

The basic step in planning was the assembling of data. After this had been accomplished members of the Army and Navy were called in for consultation and the necessary requirements were discussed. Civilian groups played little part in this business. Actually no decisions were made by one person or one group. It was assumed that certain basic decisions would be made by consultations but in the last analysis these had to be approved by Army and Navy officers. I might add that the Minister of Munitions had a strong voice in the matter but even he could not decide by himself. . . . Arms and ammunition was always a direct responsibility of the Army and Navy, ships of the Navy. The only responsibility of the Munitions Ministry was raw materials and the one ordnance exception—airplanes . . . my concern was not particularly with these items [ships, tanks, guns, etc.]. We didn't know whether they [the services] wanted tanks or guns, we only knew that they wanted materials. For example, when I took over, the quarterly steel production was about 250,000 tons. I had control in the sense that the Army and Navy just couldn't get any more.[61]

Goko, president of Mitsubishi Heavy Industries and head of the Aircraft Industry Control Association, when questioned about Munitions Ministry control of allocations, declared:

It became quite a bit better after the establishment of the Munitions Ministry, but still the Army and Navy had extreme power within the organization. The Munitions Ministry did not have sufficient strength. As it was the Army and Navy had too much power. . . .

The last word may well be left to Toyoda who, when pressed for details by the interrogator, exclaimed, "Really this control business is very complicated to have to get into."

To sum up: The Munitions Ministry was established to mobilize the resources of Japan for the prosecution of the war, to stimulate war production and to control the allocation of raw materials. Its particular mission was to take over control of aircraft production and lift the level of output. Actually it was unable to perform these functions successfully for two basic reasons: (a) shipping losses and decline in supply of raw materials rendered any attempt at planning unlikely of success, (b) independence of and interference by the armed forces prevented effective working of the allocation and priority system. At the time the Munitions Ministry was formed the Army and Navy had already taken direct control of many manufacturing plants and of stocks of raw materials and were unwilling to turn these assets into a common pool. Neither were they willing to submit their requirements to any other governmental agency for detailed review and adjustment to overall national productive capacity. By means of their power to allocate material directly from their own supplies, by their ability to obtain additional materials on blanket demand, and by inspectors whom they main-

[61] USSBS Interrogation No. 10, Toyko, October 5, 1945.

tained in factories making war goods, they were able to control many of the "civilian" plants which were nominally under the jurisdiction of the Munitions Ministry. On the other hand, the services were never able to secure complete control of war production and material allocation because strong business groups were unwilling to submit to complete military domination or relinquish control of their enterprises. As a result, a compromise was reached which resulted in poor planning and ineffective control.

Financing the War

In contrast to materials and labor, the problem of supply of funds never caused any major difficulty during the Pacific War period since the government showed no reluctance to use its credit and fund-creating powers lavishly in order to foster the war effort. Fund allocation and financial planning were carried out smoothly, largely because there was a considerable community of interest and common ties among the major financial controlling agencies—the Finance Ministry, the Bank of Japan and the National Financial Control Association. Business and financial interests were not reluctant to go along with the government's financial policy since the latter stood ready increasingly to guarantee the risks of the former and in the more precarious ventures to assume the burden alone. Though dividends were limited to keep capital within the major war industries to finance further expansion, profits were not, and corporations could view their swelling balance sheets with satisfaction. When Japan won, the strain upon her finances would be met and other eventualities which were not considered at first could hardly be planned. While financial matters assume great importance in peace time and secure appropriate attention and publicity, no major belligerent, during a war, is ever kept from exploiting its resources to the hilt by financial limitations alone. Japan was no exception to the pattern. Of all the factors of production, capital, in the financial sense, provided the least problem for Japanese planners.

In contrast to Great Britain and the United States, Japan made no serious attempt to finance the war by any appreciable degree of taxation. Nor were there any drives, such as this country witnessed, to induce widespread bond ownership among the large masses of people. For one thing, there was no tradition in Japan of widespread security holdings and the war period was not an appropriate time to reeducate the population.[62] Then, the financial resources of Japan were so compactly held that it was far more simple and productive to create an internal financing circuit which for a long while yielded the same results with much less trouble. The tax struc-

[62] Government bonds held by the public (other than financial institutions of various types and governmental bodies) totaled 10.6 billion yen or less than 10 percent of the total domestic government bonds outstanding, on July 31, 1945. See *Nippon Times*, October 11, 1945, p. 3. This is in contrast to the 4.8 billion yen or 13 percent of the total held by the general public on December 31, 1941.

ture was used mainly to curtail civilian consumption and in place of bond drives the government's propaganda was directed toward stimulation of savings which was wholly in keeping with the Japanese tradition. While the government called the savings drive a "moral" and "voluntary" one, it was so well organized through neighborhood groups, with rates of savings prescribed in accordance with income levels, that it hardly deserves to be called "voluntary." As the head of the Finance Ministry's Savings Bureau described the system:

All the peoples must join the National Savings Association, and collectively, systematically, successively, and self-governingly make savings. The Government expects that the peoples competes with another in savings under the self-established savings plans by this system and self-governingly saves their incomes superintending one another, and not intends at all the forced savings by the law. The Government indicates the expected amount of savings during a year, or the standard rate of savings, but does not constrain the attainment of these indicated standards, and takes into consideration the various personal conditions to some extent as the individuals who might have a large family to support, or the sickman, and to the contrary, the unmarried person or the individuals who have increased their income rapidly.[63]

For example, a man with three dependents (wife and two children) outside the six large cities, who received 150 yen per month salary, would pay a 12 yen per month income tax and be expected to save 20 percent of his monthly income or 30 yen, leaving 108 yen for living expenses. If at the end of the year he received an 800 yen bonus, the income tax would take 144 yen and he would be expected to save 37 percent or 296 yen, leaving 360 yen net. Thus of a total income of 2,600 yen he would be permitted to retain 1,656 or 63 percent. Nor would he be permitted to withdraw savings without permission of the head of his neighborhood association to whom he would have to explain in detail his reasons. In addition to the income tax, of course, there were a large variety of indirect taxes, on transportation, tobacco, amusements, luxuries, sake, beer, etc., which further reduced his consuming power, or inclination to spend. The primary emphasis on savings, however, is apparent. In the rural districts savings were placed either with agricultural cooperative societies or with the postal savings system.[64] In the cities the larger firms made deductions from salaries and such savings were usually deposited with the bank with which the company was affiliated. The individual saver either resorted to a savings bank or more usually to the postal savings system which was under the Deposit Funds Management Bureau of the Finance Ministry. The relative standing of the various savings institutions in Japan near the end of the war (May 31, 1945) was as follows:

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[63] *The Voluntary Savings System in Japan*, by Imai, I., Chief, Savings Bureau, Ministry of Finance, Tokyo, December 1945.

[64] See *Nippon Kokumin Undo Nenkan* for 1943, Tokyo, 1944, p. 81.

	Yen
Deposit Funds Management Bureau [65]	33,895,000,000
Ordinary Banks (savings deposits only)	32,627,000,000
Agricultural Cooperatives	12,908,000,000
Savings Banks	9,202,000,000

The postal savings deposits of the Deposit Bureau of the Finance Ministry rose fourfold from 9.2 billion yen as of December 31, 1941, to 36.4 billion yen as of August 31, 1945. Deposits with the Agricultural Cooperative Societies rose from 4.1 billion yen to 16.1 billion yen over the same period. Savings bank deposits rose only from 5.5 billion yen to 7.8 billion yen.[66]

Each year the Finance Ministry estimated the probable national income for the ensuing fiscal year in current yen terms (largely as a propaganda item to encourage savings), and on the basis of this figure and the needs of the government and industry for funds, the total amount to be saved was determined. This was allocated by quotas to the various financial institutions. These quotas were broken down to a quarterly basis and revised from time to time if the estimates seemed out of line with the probable outcome. For example, with intensified Munitions Ministry spending for aircraft production during the latter half of 1944, the goal for 1944-45 was raised from 36 billion yen to 41 billion. In 1945 it was announced that 48.4 billion had actually been raised during the 1944-45 fiscal year, or in other words that the goal had been over-subscribed 18 percent. The goal for fiscal 1945-46 had been set at 60 billion against which results for the first quarter totaled 11.8 billion.[67]

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[65] The figure for the Deposit Bureau is postal savings deposits only. The growth of the Bureau's funds during the war was as follows: (in billions of yen)

Year (Dec. 31)	*Total Assets*	*Govt. Bonds*	*Total Deposits*
1940	9.8	6.4	8.9
1941	12.1	8.1	11.0
1942	16.3	11.2	15.0
1943	24.0	16.7	22.5
1944	36.1	26.3	34.2
1945 (Aug. 31)	46.6	34.4	43.7

Source: Ministry of Finance.

[66] They reached a peak of 9.9 billion yen at the end of 1944 and then declined during the ensuing six months. See *Investigation of Important Finances and Conditions of Money Exchange in Greater East Asia War*, Finance Ministry, Tokyo, September 4, 1945.

[67] The results of the government's savings drive as computed by the Finance Ministry, in billions of yen, were as follows:

Fiscal Year	*Goal*	*Actual Results*	*Percentage*
1938	8.0	7.3	91.7
1939	10.0	10.2	102.0
1940	12.0	12.8	106.8
1941	17.0	16.0	94.2
1942	23.0	23.4	102.0
1943	27.0	30.9	114.8
1944	41.0	48.4	118.3
1945	60.0	11.8*	....

* First quarter only.

The government (Finance Ministry) estimated that total national savings in September 1945 amounted to 170 billion yen. See *Hokubei Shimpo*, November 15, 1945.

Paralleling the national savings plan were two other plans. Based on the budget, the amount of government bonds to be sold was estimated and a plan drawn up indicating the amounts to be absorbed by each class of financial institutions. Since Japan depended primarily upon bond issues to finance the war, to an increasing degree, the ability of the financial structure, and in the last analysis of the economy, to absorb these bonds was the basic concern of the financial authorities. The ability to carry out this plan successfully was the crux of war finance. The second plan had to do with the capital requirements of expanding war industry, and the sources which would provide such funds. It may be said that in the last analysis they came from expanding government credit and therefore depended upon the success or failure of the economy to finance the growing government deficit.

It will be recalled from Chapter 1, that the proportion of revenue to expenditure in 1936-37 was 74 percent. As will be seen in Table 7, this declined to 24 percent in fiscal 1944-45 and therefore the increasing degree of Japan's dependence on deficit financing is apparent. Even this comparison, however, understates the degree of dependence, since revenues include not only taxes, but also revenues from government monopolies. Taxes in fiscal 1944-45 actually amounted to only 11.6 billion yen or 15 percent of total expenditures. The comparable figure on this basis for 1937 was 30 percent.[68] While taxes rose 265 percent from fiscal 1940 to fiscal 1945, expenditures increased by 845 percent.[69]

TABLE 7

JAPANESE GOVERNMENT REVENUES AND EXPENDITURES, 1940-45

(in billions of yen)

Fiscal Year	*Total Revenue*	*Total Expenditure*	*Deficit*	*Proportion of Revenue to Expenditure*
1941-42	5.8	19.2	13.4	31%
1942-43	9.8	24.7	14.9	40%
1943-44	13.4	32.1	18.7	41%
1944-45	18.5	77.6	59.1	24%
1945-46*	27.2	103.8	76.6	26%

*Budget in force until end of the war.

Source: Finance Ministry.

The resultant growth in the national debt may be seen in Table 8. Compared with a pre-war debt (1936) of 10.3 billion yen the Japanese national

[68] The proportion of taxes to expenditures of the U.S. Federal Government was 56 percent in 1937 and 44 percent in 1944. In an article entitled "Postwar Taxation in Japan," Henry Shavell compares tax revenues (national government only) with budget appropriations and concludes that tax revenues as a percentage of appropriations were 25.4 percent in fiscal 1942, 30.3 percent in 1943, 26.9 percent in 1944 and 16.6 percent in 1945. See *Journal of Political Economy*, University of Chicago, Vol. LVI, No. 2, April 1948, p. 126.

[69] *Principal Monetary and Financial Figures of Japan*, Liaison Office, Ministry of Finance, Tokyo, November 26, 1945.

TABLE 8

JAPANESE NATIONAL DEBT OUTSTANDING, 1940-45

(in millions of yen)

Year[a]	Total Debt	Domestic Bonds	Bonds Payable[b] in Foreign Currencies	Food & Silk Certificates	Bank Borrowings
1940	23,625	21,628	1,257	656	84
1941	31,078	28,611	1,236	1,124	107
1942	41,784	39,248	1,221	1,206	109
1943	57,005	54,222	1,221	1,408	154
1944	85,113	76,660	894	2,097	5,462
1945-M ..	150,795	106,744	887	1,901	41,263
1945-S ...	177,696	122,497	886	3,442	50,871[c]

[a] As of March 31. Second figure for 1945 is as of September 30.

[b] With one exception these bonds were issued in foreign currencies. In converting these to yen value, the Japanese government used gold par rates in effect in 1923 as follows: $1 = 2.007 yen, £1 = 9.767 yen, 1 franc = .387 yen.

[c] 49.1 billion yen of unfunded borrowing for military operations abroad.

Source: Finance Ministry.

debt was 17 times greater by the end of the war. This compares with a six-fold increase in the United States between 1940 and 1945. On a per-capita basis the national debt in Japan rose from 332 yen in 1940 to 2,434 yen in 1945, a 633 percent increase, compared with a per-capita increase in the United States from $326 in 1940 to $1,852 in 1945, a 468 percent increase.[70] By the end of the war the Japanese debt consisted of 122 billion yen of domestic bonds, 50 billion yen of government borrowings from banks largely to finance military expenditures abroad, and contingent liabilities totaling 74.9 billion yen.[71] In the 1945-46 budget, which was in effect when the war ended, expenditures were 45 times as great as in 1936-37, revenues were 16 times as large and the deficit was 126 times as great.

The absorption of so large a deficit year after year required delicate financial handling if inflation was to be controlled, in view of the scarcity of goods and the inadequacies of price control. Until mid-1944 the Japanese succeeded rather well but the tremendous increase in expenditures during the last twelve months of the war made it difficult for financial institutions to absorb bonds, forced the government to resort to direct borrowing, saw a sharp increase in the note issue outstanding, the beginnings of hoarding on a large scale[72] and a definite manifestation of inflation. In other

[70] U.S. Source: *Governmental Debt in the United States: 1946*, Bureau of the Census, Dept. of Commerce, Washington, June 1947.

[71] These contingent liabilities consisted of compensation for dispersal of war plants, government guaranteed dividends, war-damage insurance to factories, compensation for cancellation of contracts, compensation for commandeered shipping, war damage insurance for the general public, and compensation for forced evacuation of urban areas by civilians. For details, see *Oriental Economist*, August 3, 1946, p. 504.

[72] The national savings plan for 1944-45 announced on February 12, 1944, included a drive for one billion yen of hoarded money. The *Oriental Economist* remarked, "That the last item should have been included in the savings goal represents an interesting phase of the present economic situation in our country." (Issue of March 1944, p. 102.)

words, during the last year of the war the financial structure began to crack.

As long as the outflow of government funds found its way back to the banks in the form of increased deposits and these deposits were utilized to purchase government bonds from the Bank of Japan, there was no undue currency expansion and munitions financing proceeded smoothly. While this process had the effect of blowing up the financial structure in balloon-like fashion, it did not, of itself, result in inflation. But when in 1944 and 1945 the banks found that the sharply rising combined demands of the government for greater government bond purchases and larger extensions of credit to munitions companies taxed their resources, with deposits not flowing back as rapidly and public hoarding increasing, they were forced to borrow at the Bank of Japan more and more. The net outflow of funds from the Bank resulted in a larger and larger outstanding volume of currency and the government was confronted with a floating debt and contingent liabilities growing at rates faster than the capacity of the market to absorb new bond issues. During the first half of 1945 the Bank of Japan attempted to combat this trend by reducing its holdings of government bonds but this was entirely inadequate to stem the rising tide of inflation which took place through the expansion of note issue, increased loans to banks (rediscounts) and an increase in government and other deposits. In order to remove any reluctance upon the part of the banks to expand credit, the Bank of Japan guaranteed that credit would be made available to any bank if a run should develop.

Let us examine the pertinent statistics. The ballooning of the whole financial system may be seen in the growth of the total assets of all ordinary commercial banks.[73] Those increased by 27.5 billion yen during the China War period and by approximately 100 billion during the Pacific War period. For example, total assets of the Mitsubishi Bank rose from 2.1 billion yen on June 30, 1941, to 38.1 billion on November 30, 1945. Sumitomo grew from 2.9 billion to 23.0 billion over the same period; the Yasuda Bank from 2.9 to 18.0 billion, and the Sanwa Bank from 3.0 to 12.8 billion yen.[74] The most fantastic increase was recorded by the Yokohama Specie Bank whose "assets" swelled from 3.4 billion yen on June 30, 1941 to the enormous total of 341 billion on November 30, 1945. This reflected not so much inflation in Japan proper as inflation on the Continent, since the Bank was intimately involved in the financing of military expenditures in China, the Philippines, etc.

[73] The term is used in contrast to the special banks such as the Industrial Bank of Japan, the Wartime Finance Bank, the Hypothec Bank, the Yokohama Specie Bank and, of course, the Bank of Japan. Ordinarily commercial banks include the provincial banks as well as the big urban banks such as Teikoku, Mitsubishi, Yasuda, Sumitomo, and Sanwa.

[74] The fact that Sanwa showed the least growth during the war is attributed by the Edwards mission to the fact that it had no Zaibatsu connection and was therefore discriminated against. See *Report of the Mission on Japanese Combines, op. cit.* p. 59.

Evidences of the strain imposed on the banking structure in 1944-45 and of the growing inflationary pressure are evident from the following figures. While during the first year of the Pacific War deposits rose only 5.6 billion yen with concomitant increases of 1.8 billion in loans and 4.0 billion in security holdings, in contrast during the first eight months of 1945, deposits were expanded 34.5 billion yen while security holdings rose 9.6 billion but loans jumped 18.4. To finance this expansion the banks were forced to increase their borrowings from the Bank of Japan by 10.7 billion yen which exceeded their entire borrowings over the previous three years of war.

While the balance sheet of the Bank of Japan expanded from 2.4 to 7.7 billion yen (an increase of 220 percent) during the China War period, it rose from 7.7 to 60.1 billion yen during the Pacific War period, an increase of 680 percent. During the China War period the increase in the note issue of the Bank about paralleled the increase in security holdings and the increase in loans to banks was minute. By contrast, during the Pacific War, note issue expanded sevenfold while security holdings did not quite double.[75] Loans to banks rose 29.4 billion yen or 3,284 percent in contrast to an increase of only 0.15 billion or 21 percent during the China War period. Most of this stretching of credit and currency came in 1944-45. The note issue increased only 1.1 billion yen during the first year of the Pacific War, while during the last eight months of the war it rose 24.5 billion yen. Security holdings actually declined slightly during the last months, but while security holdings exceeded loans to banks at the end of 1944, by the end of the war banks had been forced to resort to the Bank of Japan to such an extent that loans were almost four times security holdings. Security holdings fell 0.8 billion yen while loans rose 21.4 billion. The increase in loans to banks during the first eight months of 1945 was greater than during all the previous war years. In addition, advances to the government, government deposits and agency accounts (used to finance wartime overseas activities for the government) increased sharply during the last year of war. As a result the note issue, which had increased only four billion yen during the first two years of the Pacific War, rose by seven billion during 1944 and then by 24.5 billion yen during the first eight months of 1945.

The strain is apparent. Just how far this expansion could have gone is problematical. The limiting factor would seem to be the disruptive effects of the growing signs of inflation due to the rapid expansion of currency and credit. Since the whole structure was tightly controlled, confidence would hardly seem to have been a major factor. Early in 1942 a new law governing the operations of the Bank of Japan had been passed which definitely placed it under the aegis of the Finance Ministry, and increased its lending powers by removing many of the old provisions regarding kinds of security

[75] Money in circulation rose 240 percent in the United States between 1940 and 1945; in Japan it rose 785 percent. In contrast, over the same period federal expenditures in the United States rose 1000 percent while in Japan they rose 843 percent.

necessary.[76] An article, not to be found in the old regulations at all, was inserted in the new law (Article 47) providing that

If the officials of the Bank of Japan commit an act against the laws or the statutes, or the competent Minister's orders or detrimental to the public interest, or when it is considered specially necessary for the accomplishment of the objects of the Bank of Japan, the Government may release the Governor and the Vice-Governor of the Bank from office, and the competent Minister may release the directors, auditors, and councillors from office.[77]

In 1944 when Yuki, then governor of the Bank and also president of the financial control association, opposed the munitions company financing plan, the Finance Minister forced his resignation. Shibusawa, the Vice-Governor, who was more amenable to the proposal, became Governor. Concomitantly with the law which officially made the Bank of Japan a tool of government finance, another measure[78] established the National Financial Control Association (Zenkoku Kinyu Tosei Kai) and a number of subsidiary control associations such as Ordinary Banks (commercial) Control Association, Trust Companies Control Association, etc.

The National Financial Control Association had as its members the Bank of Japan, the national control associations of the various types of financial activities, and the local financial control associations. It acted as a central advisory and coordinating organization between the Ministry of Finance and the various financial institutions. Its principal function was participating in the formulation and application of the government's financial plans for the collection of savings, the issuance of corporate debentures and the absorption of government bonds. In ladder fashion the control association for each financial branch required all its constituent members to formulate their respective fund absorption plans and fund investment plans and submit them to the National Financial Control Asso-

[76] See "Regulations Governing the Bank of Japan," by Kushita, Nichiro, in *Keizai Toseiho Nempo* for 1942, Tokyo 1943, p. 157.

[77] *Oriental Economist*, May 1942, pp. 227-29. In this issue the *Economist* remarked, "In other words express provision is made in the text of the new law of the Bank of Japan for what has been practised in the business of the Bank in recent years and the new law confirms and makes legal without change this practice. When it is looked at in this light, the change seems not to amount to much." In another issue it declared: "According to the new system, the Bank of Japan is given greater freedom in the conduct of its business and nothing restricts the Bank from doing what it decides to do either in the domestic or international money markets. . . . What the new law provides is admittedly the confirmation and public recognition of the past practices. This public recognition alone means a great change in the matter. The Bank of Japan, for instance, has hitherto made loans often on the security of shares or debentures or at times on that of merchandise, contrary to its Regulations. The Bank itself has never favorably considered this method of loaning, although that was forced upon it by the circumstances of the times." *Oriental Economist*, August 1942, pp. 368-70.

[78] The Finance Control Organization Ordinance (Kinyu Tosei Dantai Rei) promulgated under the National General Mobilization Law in April 1942.

ciation, which consolidated them and passed them on to the Finance Ministry. When the final plans were fixed, quotas and goals were allocated down through the various financial control associations and their members.

The National Financial Control Association was entrusted by the Finance Ministry with the task of carrying out the Ordinance for the Consolidation of Financial Institutions which was passed early in 1942 and which gave the Finance Minister broad powers to bring about amalgamations of banks, trust companies, etc. While this was an historic policy,[79] the number of ordinary banks having been reduced from 782 in 1930 to 186 by the end of 1941, and the number of savings banks from 90 to 69 over the same period, the program was pressed with renewed intensity during the Pacific War period on the grounds of the need for simplicity of administration and economy of manpower and facilities.[80] The pre-war "big seven" banks became the "big five" as the Mitsui and Dai Ichi (Shibusawa) banks combined to form the Teikoku, and the Mitsubishi Bank absorbed the Dai Hyaku (Kawasaki). The Yasuda Bank merged with the Showa and the Daisan, and the Teikoku absorbed the Jugo Bank. This made the Teikoku the largest and the Yasuda the second largest commercial bank in Japan. By August 31, 1945, the number of ordinary banks had been reduced to 61 and savings banks to just five.

A variety of new financial institutions were established to assist in various phases of war finance. The earliest and most important was the Wartime Finance Bank (Senji Kinyu Ginko). This was patterned after the Industrial Bank of Japan and operated side by side with it during the war. Just why the Industrial Bank, whose debenture limit was expanded successively from 500 million to 5 billion to 10 billion yen, could not have extended its facilities somewhat further and thereby have eliminated the need for another bank, the Japanese were never able to explain convincingly. The purpose of this bank, as defined in its law was

to provide in wartime loans which are difficult to obtain from other financial organs for the expansion of production and for the reorganization of industries, and also to stabilize the market prices of securities.

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[79] The policy dates back to the 1920's when the Japanese banking system was in a precarious condition, partly due to the property damage resulting from the great earthquake, but much of it due to unsound practices of Japanese bankers. Many provincial banks made heavy loans to their directors and stockholders for purposes of speculation. The Ministry of Finance demanded that directors and stockholders either make good the losses personally or give up control of the bank. A large number of mergers resulted and the Finance Ministry adopted the slogan "one bank for each prefecture," which was not carried out, though the approach by August 1945 was close.

[80] A paraphrase of the official reasons advanced was: ". . . the existence of numerous banking institutions inevitably leads to unnecessary friction for the acquisition of funds. This and duplication of loans are apt to thwart control operations." *Oriental Economist*, February 1943, p. 58.

The Edwards Mission has suggested that the creation of the Bank was

> a patent effort to take the strain and risk of wartime financing off the Industrial Bank,

and noted that the principal effect of the creation of the Wartime Financing Bank was

> to alter the participation of the ordinary banks in two respects: to reduce their equity risk from over 75 percent to only 17 percent; and to alter their status, as far as dividends were concerned, from an unguaranteed to a guaranteed common stockholder.[81]

The Wartime Finance Bank was capitalized at 300 million yen, of which 200 million yen were subscribed by the government and 100 million yen by various financial institutions. The first president of the Bank was Masatsune Ogura, a leading Sumitomo executive. Among its outstanding loans were 243 million yen to the Nichitsu Combine, 25 million to the Manchuria Investment Securities, 16 million to Nippon Soda and 17 million to Nichiden. By the end of the war the Bank's loans on bills amounted to 3,662 million yen compared to 14,331 for the Industrial Bank. Its non-government security holdings were 953 million while the corresponding figure for the Industrial Bank was 97 million yen.

In 1943 the Enterprise Readjustment Act was passed which provided for indemnities to be paid owners of plants converted to war industry, plants abolished, buildings pulled down under the air-raid precaution law and plants taken over under the air-raid defense law. In addition to large expenditures for these purposes by the Industrial Management Corporation and People's Rehabilitation Bank, sums were being paid out in settlement of war risk insurance claims. To channel these funds into war industries and to prevent these payments from inducing inflation, the Special Law for Disposing of Funds was enacted in 1943. This act set up the system of blocked accounts which remained in effect[82] through the end of the war. Under this system funds were released from blocked accounts only for the payment of taxes, for paying retirement allowances, for purchases of equipment and stock in war industries, or to pay off bank loans. From the inauguration of the blocking system until the end of August 1945, 18.8 billion yen had been paid into blocked accounts of which 5.1 billion had been released.[83]

Although the Finance Ministry continued to draw up its Capital Allocation and Subscription Plan[84] until the end of the war, with the formation

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[81] *Report of the Mission on Japanese Combines*, Pt. I, *op. cit.*, p. 66.

[82] It was continued and expanded by SCAP, after the surrender.

[83] See *Summation of Non-Military Activities in Japan*, *op. cit.*, No. 2, Tokyo, November 1945, pp. 142-43; also *Oriental Economist*, July 1943, pp. 308-9.

[84] This quarterly "debt issuing plan," as it was sometimes called, indicated the amounts of various types of debentures which were to be absorbed by various investing

of the Munitions Ministry and the designation of munitions companies, a new approach in industrial war financing was undertaken. Munitions companies were assigned to designated banks which were responsible for meeting their financial needs. The broad financial requirements for each field were determined by the Finance Ministry in consultation with the Munitions Ministry which determined the needs of individual companies. Once the overall requirements and the needs of the individual companies had been agreed upon, the designated banks were required to supply the funds. It was largely this system which forced the banks to resort to the Bank of Japan to the degree shown previously. The then current Finance Minister Kaya explained the system:

Under the Capital Adjustment Law as it has operated, the industrialist in need of fresh funds for production expansion was required to negotiate with financiers. The financiers, in turn, had to apply to the Government for permission for loans to the industrialists and for other proceedings involved. This was found unsatisfactory. Under the new system, munitions companies in need of industrial funds may dispense with the trouble of negotiating with financiers and apply directly to the Ministry of Munitions. Of course capital allotment for various fields of industry are previously set. Capital supplies to munitions makers are provided within these limits annually, semi-annually, or sometimes on a quarterly basis. While the Ministry of Finance must plan capital operations as a whole, the Ministry of Munitions, and only that Ministry may freely decide on capital operations as far as munitions manufacture is concerned.[85]

A variety of advantages were claimed for the system, such as that deposit and loan accounts of a company would be concentrated in the same bank thereby giving the bank greater control over and scrutiny of the capital of the company with resultant restriction of wasteful use. It was extended until by the end of the war 2,240 firms were assigned to designated banks, of which the "big five" banks serviced 1,582 and the provincial banks 658. Most of the larger companies were assigned to the "big five." There appears to be no indication that this system did not operate effectively. There is no evidence of complaint that war production was retarded or slowed due to lack of credit.

When the Japanese overran the southern areas and in the first flush of victory optimistically anticipated long-term exploitation of the resources of the regions, they established a new financial institution on July 1, 1942—

groups. For example, the plan for the first quarter of 1944-45 called for a total purchase of 817 million yen of debentures, 33.7 percent to be absorbed by bankers' syndicates, 26.3 percent by public subscription and 40 percent by government agencies and banks. The debentures were broken down according to special companies, ordinary companies, companies operating in China, companies operating in Manchuria, etc.

[85] "Recent Financial and Monetary Problems," by Kaya, Okinori, in *Oriental Economist*, February 1944, p. 74. See also *ibid.*, February 1945, pp. 60-62.

the Southern Development Treasury—to finance long-term development.[86] Theoretically, financial activity in the occupied areas was to be divided between the Treasury and the Yokohama Specie Bank, with the former handling long-term finance and the latter short-term. Most of the 32 offices of the Southern Development Treasury were set up in the offices of the Yokohama Specie Bank, which increased its branches from 8 to 47. When it became apparent, however, that the anticipated development of resources would not materialize on the expected scale, the Southern Development Treasury was quickly turned to other purposes; it was given authority to issue bank notes without limitation and played the role of central bank in those areas where there were none or until puppet banks were organized.[87]

In all areas of military operations in the South after the attack on Pearl Harbor, the military scrip issued by the Japanese armed forces circulated as a fiat currency side by side and at par with the existing currency, such as the peso in the Philippines, the Straits dollars in Malaya and Borneo, the rupee in Burma, and the guilder in the East Indies. The Japanese were anxious to eliminate the military scrip to create the semblance of equality of status and independence for the puppet governments. The first step was to withdraw the military scrip and replace it by notes of the Southern Development Treasury. If and when a puppet Central Bank was organized, as was done in the Philippines, bank notes of the Central Bank were exchanged at par for notes of the Southern Development Treasury.

In China, where the Yokohama Specie Bank and not the Southern Development Treasury operated, the puppet Central Reserve Bank of China was established and bolstered by a loan from the Bank of Japan. The notes of this bank were then used to redeem the military scrip.[88] Subsequent military expenditures were financed by branches of the Yokohama Specie Bank, particularly the Shanghai Branch, securing currency from the Central Reserve Bank of China through the device of crediting the C.R.B. with a special deposit. From time to time the special deposit account (a liability on the banks of the Yokohama Specie Bank) was reduced by turning in Central Reserve Bank of China notes purchased in the open market for gold, but the volume of military expenditures was such that toward the end of the war Japan began to lose economic as well as military control of the occupied areas. Large expenditures in Central China during 1945 were re-

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[86] See "Concerning the Treasury for the Development of the Southern Regions," by Kitabawa. Katsusatoshi, in *Keizai Toseiho Nempo* for 1942, Tokyo, 1943, p. 129.

[87] See *The Japanese Occupation Technique in the Field of Money and Banking*, Foreign Economic Administration, Washington, February 1944. Declassified by authority of C. C. Stelle, Department of State, April 16, 1947.

[88] The Japanese government compensated the central banks of the occupied countries with yen credits on the books of the Bank of Japan in amounts equivalent to those of military yen notes withdrawn, but at the arbitrary rates of exchange set by Japan. In the case of China the rate of exchange was set at 100 yuan equal 18 yen.

flected in the October 31, 1945, statement of the Shanghai branch of the Yokohama Specie Bank showing total assets and liabilities at the astronomical figure of 340 billion yen. In 1944-45 the flight from yen currencies in Occupied China assumed such proportions that prices in terms of local currency took an uptrend sharper than in Free China.

Such were the essential features of the financial pattern in wartime Japan.[89] The war industries never lacked funds. Lavish government spending, guarantees and subsidies, resulted in an extensive inflation of the credit structure, and the growing strain upon this in 1944-45 began to be translated into currency expansion, which tended by early 1945 to be excessive in terms of the Japanese capacity for control but was not a significant check on industrial activity. Had the war continued, this mounting inflation would have sapped the war effort, wholly apart from the more important physical factors which made it impossible for Japan to continue the war.[90]

The Trend of Prices

Prices rose more sharply in Japan than in any other major belligerent country, with the exception of China. This was true, even if the official index of prices is used for comparison. (See Table 9.) A variety of reasons

TABLE 9

Price Trends—United States, Japan, United Kingdom, Germany, 1936-44

(1936 = 100)

Year	*Wholesale Prices*					*Retail Prices*[a]				
	U.S.	Japan		U.K.	Germany	U.S.	Japan		U.K.	Germany
		Real*	Official				Real*	Official		
1936	100	100	100	100	100	100	100	100	100	100
1937	107	119	121	115	102	104	109	110	105	100
1938	97	126	127	107	102	102	120	125	106	101
1939	95	145	141	109	102	100	135	141	107	101
1940	97	171	158	145	106	101	175	163	125	104
1941	108	184	167	162	108	106	204	165	135	106
1942	122	236	180	169	110	118	266	170	136	110
1943	128	267	191	172	112	125	312	180	135	111
1944	129	325	214	176	113	127	390	202	137	113[b]

[a] "Consumer" prices for U.S., cost-of-living for U.K. and Germany.

[b] Average January-November 1944.

Sources: U.S. Bureau of Labor Statistics; Japan, official—Bank of Japan, *real—*Morita Index*, see Chapter 6, Table 47, p. 356; United Kingdom—*Ministry of Labor Gazette*; Germany—*Statistiches Jahrbuch*.

[89] For an overall Japanese account of the trend of war finance, see the Ministry of Finance report to the Diet summarized in the *Nippon Times*, Tokyo, September 15, 1945, p. 3.

[90] For an excellent wartime evaluation of the situation, see Hunsberger, Warren, *Control of Inflation in Japan*, State Department, R. & A. 2451. Washington, 1945. Declassified by authority of C. C. Stelle, State Department, May 6, 1947.

were responsible for this. Japan was at war longer than any of the other powers and had an unbroken series of deficits since 1930. Although Germany began rearming early, her price control was much more effective than Japan's. In Japan the price freeze of September 18, 1939, was used as a basis for setting ceilings on consumer goods. As will be shown later,[91] subsequent attempts to control prices failed in the face of the growing diversion of increasingly scarce consumers goods to the black market. In the war industries the cost-plus method was widely utilized in establishing ceiling prices.[92] This was coupled with the lavish use of subsidies to stimulate production of essential war products. For example, government subsidies to permit fixing of coal prices to consumers and to encourage production began in 1938 and assumed increasing importance through the war years. Bonuses were paid in accordance with quotas apportioned by the Control Association. Operators submitted estimates of their costs to the association for six-month periods: these estimates, revised after three months in the light of actual operating costs, formed the basis of the cost-plus price established for each mine. Until October 1943 prices varied with the grade of coal, but thereafter that factor was eliminated. Total subsidy funds paid to coal producers in Japan proper rose from 48 million yen in the first half of 1941 to 406 million yen in the latter half of 1944 although during that period production declined 11.2 percent. The extent of the financial inducement given to spur production of the conveniently-situated, but low-quality, lignite of Eastern Honshu, as the shipping position deteriorated, may be seen from the fact that the average subsidy per ton of coal paid to these producers in the latter half of 1943 was 10.06 yen while that for the far better bituminous of Hokkaido and Kyushu was 4.95 and 7.41 yen respectively. When translated into subsidy per million calories, the variation is even more striking. As a result of the subsidies the official price of coal to consumers, c.i.f. Yokohama, only rose from 23.42 yen per ton in early 1941 to 24.55 during the last half of 1944. By 1945 the price to the producer was 65 yen per ton (including transportation costs) with the government subsidy amounting to 41 yen per ton.[93] It is noteworthy that—notwithstanding the considerable increase in production costs because of rising wages and black-market prices paid for some materials and equipment—due to the subsidies the major Japanese coal mining companies found wartime production highly profitable.

The government spent freely in all fields in which it wished to encourage production. Total direct production subsidies rose from 545 million

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[91] See Chapter 6.

[92] Hatta, when asked how the price for contracted aircraft was fixed, replied: "The cost price was figured by the military and a profit added . . . . the cost plus fee was severe in the early days, but later they were inclined to pay more liberally so as to increase production." USSBS Interrogation No. 380, Tokyo, November 17, 1945.

[93] See *Nippon Times*, Tokyo, September 21, 1945, p. 4.

yen in fiscal 1941 to 4,387 million yen in fiscal 1945. Whenever any essential sector of Japanese industry protested that costs had outrun fixed prices and that it could no longer operate at a profit, the government was never reluctant either to grant a price increase or to extend the subsidy system. Since costs rose steadily, this resulted in a steady upward pressure on prices and a progressive extension of the subsidy system. For example, when the U.S. embargo cut off scrap, and domestic pig iron production had to be expanded and substituted, the industry demanded that the government meet the increased cost. Not only were prices raised but subsidies were paid. One firm, Nittetsu, whose profits fell from 29.5 percent in 1938 to "a mere 19.5 percent" in 1941, received a subsidy of 30 million yen annually, or about five percent on its paid-up capital of 575 million yen.[94] This set off a series of increases in other industries, such as copper, which were also affected by the embargo. To expand and stimulate production, in the 1943 drive to raise the level of output, the government early in the year announced an Emergency Price Readjustment Plan and a Price Compensation Plan. The former was a large-scale adjustment in essential industries to cover the rising costs of 1942. For example, the price of soda was raised 25 percent to 192.50 yen per ton while cement prices which had been increased 25 percent in 1942 were raised another 16 percent.[95] The Price Compensation Plan adjusted and extended payment of subsidies when production goals were reached or exceeded. It was employed in a variety of industries such as copper ore, chemicals, shipbuilding, etc. For example, in shipbuilding, construction was divided into stages, laying of keel, construction of hull, completion of whole ship. If the work was finished in the time prescribed for each stage, compensation was granted at set rates. If it was finished in less than the prescribed time it was paid at higher rates in proportion to the time saved.[96]

As output of basic materials fell after 1943 and of finished products in late 1944-45, unit costs rose and a renewed series of price increases and subsidies resulted as the government attempted vainly with the few ineffective tools it still had left, such as funds and prices, to counter the tide. Although the output of ammonium sulphate, for example, had been subsidized to the extent of 44 million yen in 1944, the subsidy to the producers was raised from 105.6 yen per ton to 204 yen per ton at the beginning of 1945.[97] During the first seven months of 1945 general wholesale prices rose 22 percent, or 54 points on the official index.

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[94] *Oriental Economist,* November 1941, p. 623. Also. *ibid.,* February 9, 1946, p. 81.

[95] *Oriental Economist,* May 1943, p. 232, and December 1943, p. 580.

[96] *Ibid.,* October 1943, p. 482, and November 1943, pp. 510-12.

[97] *Summation of Non-Military Activities in Japan, op. cit.,* March 1946, p. 192; also *Oriental Economist,* February 9, 1946.

Consolidation and Rationalization

In common with other countries at war, the reorganization of the economic structure attendant upon conversion to full war production saw the elimination of a number of small enterprises and, on the other hand, the expansion of production and liberal government expenditures brought with them a greater concentration of resources in fewer hands. Possibly in Japan this was carried to a greater extent than elsewhere but in the absence of any comparative statistical series this is not capable of demonstration. Only fragmentary evidence is available. The cartels had long encouraged consolidation [98] and when they became control associations and received legal powers, they pursued their policy anew. Shortly after Pearl Harbor, Commerce and Industry Minister Kishi announced that

> Progress is being made with the movement for amalgamation of smaller manufacturers and traders, which is necessary in order to rationalize industry and improve the production and distribution of various materials. . . .[99]

Shortly afterwards he announced

> Manufacturers without whom the nation can do very well must be reduced in number, so that labor can be directed to other undertakings

and that

> the problem of reorganization of medium and small scale business is one of the most difficult with which the government has to deal.[100]

In May, an Enterprise Readjustment Ordinance was promulgated under authority of the National General Mobilization Act, giving the Ministries authority to bring about mergers, consolidations, etc. In addition it listed a wide range of business fields in which one could not engage without special government permission. By denying permission the government could force an established business to liquidate. This was applied when the Koeki Eidan decided there were too many people engaged in foreign trade and reduced the number by 90 percent. In 1942, 410 mergers involving a capitalization of 2.9 billion yen were carried out under authority of the act. In

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[98] In June 1930 an Industrial Rationalization Bureau had been set up in the Ministry of Commerce and Industry. (For an account of the work of this bureau over the next few years see Fujita, K., "Cartels and Their Conflicts in Japan," *Journal of the Osaka University of Commerce*, No. III, December 1935.) It had long been a policy of the cartels to urge rationalization wherever and whenever possible and the China War provided an additional talking point. By 1939 the impact of the war had caused public concern over the degree of absorption of small- and medium-scale business and in July 1939 the government appointed a Committee to look into the problem. It recommended government relief and in 1940 the government decided to establish the People's Rehabilitation Bank (Kokumin Kosei Ginko) which was opened in March 1941 to grant relief and loans to displaced small businessmen.

[99] *Japan Times and Advertiser*, March 8, 1942.

[100] *Ibid.*, April 28, 1942.

1943 there were 570 mergers involving a capitalization of 7.8 billion yen.[101] Paint plants were reduced from 300 to 60. The 20 cement companies were cut to 6. The number of glass works was reduced from 800 to 90; the number of shipping firms from 234 to 10. The number of tanneries was cut from 700 to 28. The pre-war 13.7 million cotton and staple fiber spinning spindles were cut 77 percent and the number of companies reduced to 10. The larger companies were allowed to convert to war production, the spindles of the smaller ones were taken for scrap.[102] Retail trade was particularly hard hit. By mid-1943, 11,000 shops in Tokyo alone had been closed. The records of the People's Rehabilitation Bank indicate that 43,262 rice dealers were forced out of business, 8,030 confectionery makers, 1,428 petroleum dealers, etc.

On the other hand, the war expansion of the "big four" Zaibatsu holding companies—Mitsui, Mitsubishi, Sumitomo and Yasuda—is reflected in Chart 3 covering assets, liabilities and capitalization of the primary holding companies.[103] These Zaibatsu holding companies emerged from the war with assets aggregating more than 3 billion yen as compared with 875 million in 1930. SCAP declared: "They accomplished this by obtaining preferential government subsidies, loans, grants and forced mergers of small business concerns without materially increasing their capital investment."[104] An indication of the growth of the capital and assets of two of

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[101] *Oriental Economist*, March 1944, p. 104.

[102] *Ibid.*, March 16, 1946, p. 78.

[103] It is not possible to present accurate year-by-year figures for the whole holding company complex, because the Japanese did not use consolidated balance sheets and the varying degree of holding company control of or investment in other companies has never been finally determined. The Edwards Mission noted: "There are certain types of financial information which the Japanese do not provide in any form. Consolidated balance sheets are not to be found in Japanese accounting. This is particularly unfortunate because large Japanese corporations almost always control a large number of subsidiaries; systems of that kind cannot be viewed accurately without statements on a consolidated basis. Supplementary schedules providing a reconciliation of surplus and showing the details regarding depreciation and other reserves are also foreign to Japanese accounting practice. A proposal for disclosure of corporate reserves would be particularly repugnant to Japanese corporate executives. Fictitious provisions for reserves, concealment of real profits and losses and consequent distortion of assets and liabilities are accepted as an essential feature of corporate accounting to which no invidious connotations are attached." *Report of the Mission on Japanese Combines, op. cit.*, p. 27.

[104] *Summation of Non-Military Activities in Japan*, No. 6, p. 211, March 1946.

the old and two of the new Zaibatsu, over the war years, in millions of yen, may be seen as follows:

	1935		1940		1945	
	*Capital**	*Assets*	*Capital*	*Assets*	*Capital*	*Assets*
Mitsui	100	423	150	505	300	1,233
Yasuda	30	98	30	127	30	140
Fuji Ind.** ...	12	23	50	476	50	3,123
Kawasaki	80	150	200	346	600	1,558

* Authorized; ** Formerly Nakajima Aircraft.

These figures are only for the principal holding companies and do not include any subsidiaries. The Yasuda Honsha appears insignificant but it has been estimated that it controlled companies having total assets of about 40 billion yen and was one of the larger Zaibatsu. Kawasaki, one of the smaller ones, appears here to be much larger than Mitsui and Yasuda combined, because it was a holding company which was also directly engaged in production, while the Mitsui and Yasuda Honsha's were almost pure holding companies. The figures, however, do indicate the striking growth of the concerns as a result of war.[105] The assets of Sumitomo Honsha, the Sumitomo Holding Company, for example, increased from 481 million yen at the end of 1941 to 1.1 billion in 1945. Chart 4 indicates the growth between 1930 and 1945, and the profit and loss records, over the same period, of the seventeen leading holding companies in Japan. The degree of control exercised by these companies over the Japanese economy was summed up by Edwards as follows:

At a minimum estimate, the paid-up capital of seventeen of them in 1944 amounted to 24.6 percent of the total paid-up capital of all joint stock companies in Japan. In key industries their place was substantially stronger. Fifteen of these concerns, for which production figures are available by industries, produced 51 percent of the total Japanese output of coal, 69 percent of aluminum, over 50 percent of the pulp and paper, 88 percent of the steam engines, 69 percent of the steam locomotives, 88 percent of the soda, 43 percent of the ammonium sulphate, 33 percent of the soap, and 49 percent of the synthetic dyes. In finance, the Zaibatsu are peculiarly strong. They have 57 percent of the assets and 71 percent of the loans and advances of all Japanese ordinary banks. Their savings banks have 99 percent of all savings bank assets; their trust companies 69 percent of all trust company assets. They have 74 percent of the total assets of fire insurance companies and 38 percent of the total assets of life insurance companies.[106]

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[105] Diagramatic presentation of the holdings of the big four Zaibatsu will be found in *SCAP Summation No. 5*, Tokyo, February 1946, Chart Nos. 48, 49, 50, and 51.

[106] "The Dissolution of Japanese Combines," by Edwards, Corwin D., *Pacific Affairs*, Vol. XIX, No. 3, September 1946. The financial percentages quoted were based on relationships prevailing at the end of 1945.

While the volume of profit expanded sharply during the Pacific War period because of the great increase in capitalization and assets, the rate of profit in many cases declined. For example, the largest Asano subsidiary, Nippon Steel Tube, which with its subsidiary companies accounted for about one-sixth of Japan's ordinary rolled steel products during the war, saw an expansion of its assets from 116 million yen in 1936 to 857 million yen in 1944 and of its profits from 9 million to 35 million yen over the same years. The rate of return on invested capital, however, fell from 7 to 4 percent. The Industrial Bank of Japan made a semi-annual survey of profits for a representative sample of corporations and its reports show a decline in the average rate of return on invested capital from 13.3 percent for the second half of 1941 to 12.9 percent, first half, 1942; 12.6 percent, second half, 1942; 10.8 percent, first half, 1943; 11.1 percent, second half, 1943; 10.7 percent, first half, fiscal 1944.[107] While Japanese profit figures are hardly reliable,[108] this decline may be attributed in part to the Regulation Governing Depreciation of Fixed Assets of Corporations, of September 1942, which required corporations capitalized at five million yen or more to depreciate their assets at fixed rates instead of at their discretion as theretofore. The period for depreciating assets was made shorter than had been customary. In addition, the growing scarcity of materials, developing black markets, decreasing efficiency of labor, etc., increased costs. The *Economist* in commenting on the decline in profits, in 1942, noted:

One particular point that should be emphasized as a factor of no small influence is that the second half, 1941, in which the prospects were most depressing in general, had stocks of raw materials to fall back on, but in the first half of 1942 these stocks were exhausted. In this circumstance no improvement is possible for the second half of the current year. Much hangs on the question of how soon and how much of the natural resources secured in the southern regions will begin to be reflected in the condition of Japanese industry. . . .[109]

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[107] As reported in the *Oriental Economist*, July 1943, p. 339, and October 1944, pp. 430-31.

[108] The Mission on Combines noted: ". . . corporate net profits, as computed in Japan, are subject to all sorts of arbitrary adjustments and concealed charges . . . the financial statements are curiosities in obscurity and evasion . . . with such leeway in methods of making financial reports, the question of enforcement [tax] becomes almost academic. But the Japanese go through the motions. . . . The Taxation Bureau of the Finance Ministry receives and examines these financial reports in connection with the tax on corporate profits. The Ministry has been known on rare occasions to object to the data filed with it, but all such cases have involved 'small corporations'. So far as is known, no such objection has ever been raised in connection with a Zaibatsu enterprise." *Report of the Mission, op. cit.*, pp. 26-27, 64. The USSBS report on the electric power industry declares: "There is considerable evidence that the balance sheets and profit and loss accounts of Nippon Hassoden fall far short of presenting the true picture of its financial incapability." (p. 24.)

[109] *Oriental Economist*, September 1942, pp. 421-22.

Causes of the Debacle

This indeed was the supreme gamble of the war, and in undertaking it the Japanese reckoned without sufficient attention to their shipping position.[110] Japanese attention to shipping was characterized by the same early confidence, the same lack of planning, of poor administration and of internal conflict of interest, as marked the allocation of materials. Japan entered the war with 5,916,000 tons of steel merchant shipping of 500 gross tons and over.[111] During the war an additional 4,100,000 tons were constructed, captured or salvaged. Of the combined total, 8,617,000 tons were sunk and an additional 937,000 tons were so seriously damaged as to be out of action at the end of the war. U.S. submarines were responsible for sinking 54.7 percent of this total; Navy carrier-based planes accounted for an additional 16.3 percent and Navy and Marine land-based planes for 4.3 percent. Army land-based planes accounted for 10.2 percent, mines for 9.3 percent, marine accidents for 4 percent and surface gunfire for less than 1 percent.

The Japanese Planning Board had estimated that after the third year of the war, if the war lasted three years, Japan would require 5,050,000 gross tons and would have on hand, after balancing losses against replacements, 5,250,000 gross tons of shipping.[112] Actually, after the third year of the war Japan was down to 2,100,000 tons of shipping, only half of which was serviceable, and seven months later, at the end of the war, total serviceable shipping available to the Japanese was only some 700,000 gross tons.[113] Never in modern times was an island nation so thoroughly cut off.

The initial overconfidence was manifested by a very modest shipbuilding program of only 350,000 tons for 1942 and complete lack of escort protection for its shipping. For a nation which initiated the war by a naval and air attack, Japan was singularly lacking in foresight. U.S. naval authorities noted:

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[110] In his speech to the 88th Diet session on causes for Japan's defeat, Prime Minister Prince Higashi-Kuni did, however, pay sufficient attention to it: "The production of military supplies had been seriously affected by the curtailment of our marine transportation facilities . . . by May of this year our carrying capacity had dwindled to less than one-quarter of what we had at the beginning of the war owing to the ever increasing loss of ships. . . . The excessive reduction of transportation capacity affected conspicuously the supply of coal and other basic raw materials for industrial purposes and made well nigh impossible the importation of goods from the South. . . ." *Nippon Times*, Tokyo, September 6, 1945, p. 1.

[111] In addition there were about one million tons of Japanese-type wooden junks, called Kihansen.

[112] *Estimate of Japanese National Strength at the Outbreak of the Greater East Asia War*, Cabinet Planning Board, Tokyo, December 1941.

[113] Includes 557,000 tons of operable steel shipping of 500 tons and over, 110,000 tons of wooden shipping, and the remainder, a combination of metal and wood, under 500 tons.

The Japanese Navy although profiting by following the British example in many ways did not profit by the bitter British experience with German submarine warfare in WW I. There was no single command or office of the Japanese Navy primarily responsible for shipping protection at the outbreak of the war. There was no program for construction of Japanese escort vessels and only two were built prior to April 1943. There was no escort organization and the procedure for coordinating the work of adjacent commands or the various commands along an extended shipping route was loose and inefficient.[114]

Available merchant shipping was divided among Army, Navy and the civilian Shipping Control Association (Sempaku Unei Kai). That which was not requisitioned by the Army and Navy fell in the "civilian" category. It was this latter category which came under the aegis of the Transportation Ministry and upon whose carrying capacity the Munitions Ministry could base its allocations and planning. What the Army and Navy brought in, in their ships, they alone determined, and they might or might not tell the Munitions Ministry about it. In December 1941, the "A" ships in service of the Army totaled 2.1 million tons, the "B" ships under the Navy totaled 1.5 million tons (exclusive of tanker tonnage) and the "C" ships—civilian, under the Shipping Control Association and Communications (later Transportation) Ministry—amounted to 1.7 million tons. As the Army quickly occupied the southern areas, it began to release shipping to the "C" category and by October 1942 a million tons had been transferred. With the adverse turn of the Guadalcanal campaign, however, it started to requisition once again. This, of course, upset planning for commodity imports in "C"-class ships. Such imports of key commodities fell from a pre-war, 1941, total of 48,723,000 metric tons to 40,520,000 in 1942 and then plummeted to 17,129,000 metric tons in 1944, and to 3,000,000 tons in the first quarter of fiscal 1945.[115] The Army controlled its merchant shipping through its shipping headquarters at Ujina and five subheadquarters outside of Japan proper, the Navy through its Central Office of Naval Transportation at Yokosuka and sub-offices in the occupied territories. Coordination of control existed only at the top through conferences of the various interested Ministries. Arrangements for shipping protection were not uniform and information regarding sailings, departures and enemy sub sightings was not transmitted from one Ministry to another.[116]

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[114] *Campaigns of the Pacific War*, Naval Analysis Division, USSBS, Washington, 1946, p. 378.

[115] *Summation of Non-Military Activities in Japan*, Vol. I, September-October 1945, p. 77.

[116] The policy of sailing unescorted merchant vessels in groups was, however, adopted. This made the ships more vulnerable to submarine attack and the U.S. Navy was curious as to the Japanese logic. A Japanese Naval officer explained it as follows: "... first that they might be sure to get a radio message back ... second to make better use of the few convoy commanders ... third to improve the chance of rescuing crews

At no time did the Transportation Ministry have complete control of merchant shipping. It was not until the incredibly late date of May 1945 that control of all shipping was centralized within Imperial General Headquarters with the establishment of an Inspectorate-General for Marine Transportation. But this was much too late. Long before, the shortage of shipping had begun to strangle the Japanese economy. The increasingly critical nature of her shipping situation caused Japan to expand her naval and merchant shipbuilding plants to a point where 35 percent of a constantly dropping steel supply was being consumed in shipbuilding alone. Construction of merchant ships increased from approximately 238,000 tons in 1941 to 1,600,000 tons of steel ships and 245,000 tons of wooden ships in 1944. But the raw materials which had to be imported to maintain steel production—coking coal and pig iron—were cut two-thirds by the middle of 1944 by the increasing stringency of shipping and the interdiction of many of Japan's shipping routes. As a result there had to be a scaling down of steel availability for lower priority items such as tanks, guns, trucks, and the complete elimination of steel for civilian requirements, construction or export. By the end of 1944 it was no longer possible to protect even high priority war production by further shifting of allocations of scarce materials from items of lesser priority.

While the greatest achievements of the Japanese war economy were registered in 1944 with peak output coming roughly about the middle of that fiscal year, there was a basic dichotomy of production. The peak in output of basic raw materials was reached in 1943; the peak in end-product output—ships, planes, ordnance, munitions—came in 1944. Ingot steel output reached a peak of 7.8 million metric tons in 1943 and then fell to 5.9 million tons in 1944. Finished steel rose to 5.6 million metric tons in 1943, then fell to 4.3 million tons in 1944. Coal production rose to 55.5 million tons in 1943 then fell to 49.3 million tons in 1944. Everywhere in basic materials—coke, iron ore, pig iron, alumina, aluminum—the story was the same. The basic irony—and for the Japanese, tragedy—of their industrial war effort was that by the time they belatedly recognized the need for rais-

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of sunken ships; and fourth because the British appeared to have found it successful in WW I. There was an added factor in that the Navy had taken many of the experienced merchant ship captains and chief officers leaving comparatively inexperienced merchant marine officers to take charge of the ships. These officers had no training in handling ships under attack. There was also reluctance on the part of many merchant captains to sail singly in dangerous waters. Most of them who did sail singly were lost in the early part of the war. After that if a ship was ordered to sail alone, the captain often would put into port at the first scare and wait until he thought the threat of the attack was over. This caused reduction in the usefulness of shipping, of course. The policy of sailing in groups was adoped in 1942 and adhered to throughout the war. The Chief of the Navy General Staff was opposed to it but was persuaded by other members to adopt it for the above reasons." USSBS Interrogation No. 460, Tokyo, November 19, 1945.

ing the level of industrial output, and took energetic and, for their economy, enormous strides in increasing capacity and output, it was too late. The declining flow of raw materials would not support the new higher level of output. Capacity increased but output fell. The shortage of special steel cut aircraft engine production. In April 1944 the available supply of aircraft engines fell below the 1.8 engines per airplane requirement which was considered minimum. From then on, though airframe production expanded, engine supply was the bottleneck. The aircraft industry in 1944 was increasing output at a time when its subsidiary aluminum industry was beginning to decline, a typical relationship at this stage of the war. Imports of bauxite fell from 820,534 tons in 1943 to 347,335 tons in 1944 and by the end of the year reached the vanishing point.

By the middle of fiscal 1944 the Allied attack on shipping had so reduced the importation of raw materials that not only was a further rise of total output impossible, but the foundations of basic industry crumbled. The Japanese war economy disintegrated at its base, even though utilization of available stocks kept the end-product output at high levels for from three to nine months longer. By the beginning of 1945 most of the oil refineries were out of oil, the alumina plants out of bauxite, the steel mills lacking in ore and coke, and the munitions plants low in steel and aluminum. Thus the decline of Japan's war-making powers started before her economy was subjected to the main weight of the bombing attack during the months of March to August 1945. It may be said that in large measure Japan's economy was destroyed twice over, once by cutting off of imports and secondly by air attack.

By 1945 the interdiction of shipping had so reduced the food supply that a recommendation of the Foreign Ministry was adopted urging that "the last shipping space should be set aside to the greatest possible extent for the importation of salt, cereals and soy beans, abandoning the former principle of having as the main import items iron ore, coal, pig iron and other non-ferrous metals." [117] It was carried out, as may be seen in Table 10, despite the desperate need for the industrial raw materials which were reduced.

When Suzuki became Prime Minister in the spring of 1945 he instructed the Chief Cabinet Secretary Sakomizu to make a study of Japan's resources to see whether they were sufficient to continue the war. Sakomizu noted that available shipping was down to one million tons, that transportation was faced with insurmountable difficulties due to lack of fuel, insufficient manpower in cargo handling, shortage of local transportation, etc. He predicted that railroad transportation would be confined to local areas after the middle of the year, that construction of steel ships could not be expected after June, that oil reserves were on the verge of exhaustion and that im-

[117] *Dependence of Japan on Continental Raw Materials*, Research Bureau, Foreign Ministry, Tokyo, February 1, 1945.

TABLE 10

ALLOCATION OF SHIPPING DURING THE LAST MONTHS OF THE WAR*

(in metric tons)

	April	*May*	*June*	*July*
Coal	605,500	467,900	268,398	277,728
	51.4%	42.3%	31.2%	35.8%
Iron & Steel	75,200	69,800	27,744	17,771
	6.4%	6.3%	3.2%	2.3%
Non-ferrous metals	73,400	79,900	21,101	32,326
	6.2%	7.2%	2.4%	4.2%
Salt	74,000	90,200	99,684	112,911
	6.3%	8.1%	11.5%	14.6%
Cereals	194,900	329,300	345,786	294,452
	16.5%	29.7%	40.1%	38.0%
Miscellaneous	155,600	70,500	100,423	39,374
	13.2%	6.4%	11.6%	5.1%
Total	1,178,600	1,107,600	863,136	774,562
	100 %	100 %	100 %	100 %

* Material actually shipped.

Source: Total Mobilization Bureau. Munitions Ministry.

ports had ceased, that as a result of the decrease in shipping from the continent the production of chemicals was falling at an alarming rate due to lack of salt and soda. He pointed out that inflation was at hand, the food position desperate and that

there is a strong possibility that a considerable portion of the various industrial areas will have to suspend operation for lack of coal.

He also stated:

The question of whether or not we can maintain communication with the continent will greatly depend upon the results of the Okinawa campaign. If the campaign turns out to our disadvantage, we cannot hope to maintain planned communication after June.[118]

By the end of the Okinawa campaign Japan's economic system had been shattered. Production of munitions had been curtailed to less than half the wartime peak, a level which could not support sustained military operations. The Navy had been sunk. There was no fuel for the air force, no aluminum for planes, little steel for war plants and insufficient food for the whole population. The economic basis of Japanese resistance had been destroyed. In July 1945, the last full month before surrender, electric power and coal consumption were both exactly 50 percent of the peak reached in 1944. Production efficiency had, however, declined and the overall industrial out-

[118] *Survey of National Resources*, by Sakomizu, H., Chief Cabinet Secretary, Tokyo, June 10, 1945. The importance of this study became apparent in the interrogation of Admiral Yonai: "The first concrete step taken with the idea of terminating the war was probably the instruction given to the Coordination Bureau within the Cabinet to make an investigation as to the present state of various war materials. As a result of that investigation the situation became more and more clear that continuation of the war was going to be difficult." USSBS Interrogation No. 379, Tokyo, November 17, 1945.

put was approximately 40 percent of the 1944 peak. Serviceable merchant tonnage was a little over 12 percent of the fleet with which Japan had begun the war. Output of airframes had fallen 56 percent from the 1944 peak; aircraft engines, 73 percent; merchant shipbuilding, 81 percent; army ordnance, 44 percent; and naval ordnance, 57 percent. Oil imports had ceased and oil refining had declined to less than 15 percent of the 1943 output. Primary aluminum production was only 9 percent of the 1944 peak. Explosives production was 45 percent of the 1944 figure but its basic ingredient, nitric acid, had declined to 17 percent of the 1944 figure.

In each one of these industries the immediate occasion for the decline appears to have been different. Electric power consumption fell, not because more power was not available but because demand had declined. Coal supply was primarily limited by the decline in inter-island shipping from Hokkaido and Kyushu, and the inability of the railroad system completely to fill the gap. Airframe production was limited primarily by the continuing effects of the dispersal program brought on by bombing. Had the level of production been any higher, however, aluminum stocks would have been exhausted and aluminum would have been the controlling bottleneck. In any event, not enough aircraft engines were being produced to equip the airframes. Aircraft engine production was plagued by shortages of special steel. Even if the engines had been available, stocks of aviation gas were about exhausted. Shipbuilding and heavy ordnance production were limited by the lack of steel. Production of this was restricted by the drop in imports of coking coal and pig iron. In the case of oil refineries and aluminum plants, the cause was very simple. Imports of oil and bauxite had ceased. Explosives plants were using up inventories of nitric acid and would soon have had to adjust to the new low level of nitric acid production. It is to an exposition of such problems that the following two chapters will be devoted.

The last word may well be left to Lt. Gen. Kawabe, Deputy Chief of the Army General Staff at the end of the war:

> If I were to try to say who was responsible, the Army or the Navy, for the final defeat, I would say it was mutual. They both didn't have the power to carry out the war to a successful termination. I feel, looking back on it now, that had Japan been prepared for the eventuality of such a war on the scale of this one, then we might have had a better chance. The national potential wouldn't allow Japan to build up a military force adequate for a war on this scale, so the bold beginning at the outbreak of this war was just a very unfortunate thing.[119]

[119] *Interrogations of Japanese Officials, op. cit.*, No. 447, Tokyo, November 26, 1945.

CHAPTER THREE

PILLARS OF THE ECONOMY

Therefore, should there ever come a time when supplies of raw materials from overseas are cut off, we cannot but predict that the continuation of this modern war will become almost impossible.—GREATER EAST ASIA MINISTRY, 1943.[1]

At the outbreak of the war Japan was critically dependent upon imports of oil, coking coal, bauxite, rubber, nickel, tin, cobalt, cotton, lead, phosphate, salt, graphite, potash, magnesite, food, and many ferro-alloys such as vanadium, molybdenum, chromium, etc. Seizure of the southern areas appeared to solve some of these requirements. But processing facilities in these areas were negligible.[2] Time and capital would be required to exploit them. And unless Japan could ward off obvious enemy retaliatory blows designed to capitalize on her greatest weakness, vulnerability to blockade, seizure of the southern areas would be just a hollow and ephemeral event, improving but little the basic weakness of Japan's economy. Actually, because of tremendous ship losses and inability to increase shipbuilding proportionately, the southern areas were important for only the first year and a half, too short a time for development work. After that the Japanese economy, with the possible exception of oil, was based on the continent and upon Japan proper. The contributions of the continent never came up to expectations. Resources proved less than the expansionist propaganda of the late thirties had indicated. Inadequate rail facilities made it difficult to bring resources to the coast and from mid-1944, due to the attack on shipping, only a small percentage of the material that reached the coast could be transported to Japan proper. Japan's own ability to produce basic materials was completely inadequate to support a war against a major industrial power.

Japan was able to flex her muscles and feel strong in the late thirties for two basic reasons. In contemplation of war, output at home had been expanded in substantial degree. Coal production had risen from 27 to 56 million metric tons per annum between 1931 and 1940; ingot steel output from 1.8 to 6.8 million tons over the same period. Oil-refining capacity in

[1] Quoted in *Dependence of Japan on Continental Raw Materials*, Research Bureau, Foreign Ministry, Tokyo. February 1945, p. 7.

[2] With the exception of oil-refining facilities.

the home islands had been expanded until, just prior to Pearl Harbor, it was 17 times that required to process domestic production of crude. A synthetic oil industry had been started. Electric generating capacity in the home islands had risen from 4.3 million kilowatts in 1930 to 9.4 million kilowatts in 1941. By 1940 organic high explosives production in Japan exceeded that in the United States. A variety of precautionary measures had been taken, such as the building up of stockpiles of iron and steel scrap, of bauxite, lead and of oil; the building of a tunnel between Kyushu and Honshu; some few attempts to make greater use of electric power to lessen dependence upon coal as in the case of zinc reduction plants built after 1935 which used the electrolytic method despite its higher cost. Heavy subsidies were paid to stimulate production of low-grade ores such as iron, copper, manganese, etc.

Secondly, the Japanese had moved toward and felt they were achieving substantial self-sufficiency within the "Greater East Asia Co-prosperity Sphere." Particularly for propaganda purposes was this stressed and a large segment of the Japanese public came to believe it. One publication listed the "rate of self-sufficiency based on average conditions 1935-1937" at 2,285.6 percent for rubber, 1,361.1 percent for tin, 170.1 percent for sugar, 100.6 percent for coal, 100.0 percent for iron ore, etc.[3] A more realistic private account[4] for 1936 was as follows:

Commodity	*Percent Self-Sufficient*
Iron Ore	16.7
Pig Iron	93.8
Steel	62.2
Scrap Iron	...
Copper	63.2
Lead	8.2
Tin	28.8
Zinc	38.9
Bauxite	...
Finished Aluminum	40.6
Nickel	...
Sulphuric Acid	14.1
Crude Oil	20.2
Coal	90.9
Crude Rubber	...
Salt	31.3
Phosphate rock	12.0
Raw cotton	...

Many of Japan's leaders had deep-rooted within them that special feeling of vulnerability to blockade to which a dependent island people are ever

[3] *Orient Yearbook, 1942*, p. 359. These fantastic figures were supposedly based on annual output in the "co-prosperity sphere" in relation to annual consumption in the area.

[4] *Japan's Dependence on Imports*, Special Study No. 28, Mitsubishi Keizai Kenkyu Kyoku (in Japanese), Tokyo, January 1938, p. 11.

subject. Several members of the Jushin (the elder statesmen) warned the Emperor, in the fall of 1941, of Japan's acute dependence upon imports of coal, oil, iron ore, bauxite, food, etc., and of the weakness of Japan's shipping position.[5] The Cabinet Planning Board in its estimate of Japan's strength as of December 1941 declared,

In a greatly changing world situation, the policy adopted by the Japanese Empire is to attain a position of self-sufficiency based upon national strength which it can independently maintain

and then noted a number of "scarce items preventing complete self-sufficiency," including oil, the supply of which would have to come largely from the Netherlands East Indies, iron ore, of which it stated, "requirements could be supplied from Japan, Manchuria, China (including Hainan Island) and French Indochina." Of nickel it declared,

. . . the shortage is great and there are no measures for obtaining supplies within our sphere of influence. It must be obtained from occupied territories in the south.

On crude rubber,

On the basis of an economic agreement, the amount expected from Thailand and French Indochina is 45,000 tons. Domestic requirements are 65,000 tons and the amount on hand is less than 500 tons. Unless the amount procured from French Indochina and Thailand is increased, or a supply of over 20,000 tons is secured from the Netherlands East Indies, the shortage will have a great effect upon domestic industry and especially upon the progress of military preparations.

On tin,

Unless a supply of about 10,000 tons annually is procured from Thailand and French Indochina, not only would it be impossible to meet national requirements, but even peacetime military preparations would come to a standstill. After two years of war present stockpiles would be completely depleted.

On copper,

Supplies on hand will soon be cut in half if the present trend continues. Thus it will be necessary to develop sources in the Philippines for supplies of copper.

On lead,

If the present situation continues, the supply will be halved. If more lead can be obtained from Burma, the supply will be sufficient.

On cobalt, "It must be procured entirely from the Netherlands East Indies." Manganese, tungsten, molybdenum, antimony, mercury, bauxite, mica, salt and rice were in turn reviewed. Though the warning of the report was clear it hedged in its conclusion, declaring:

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[5] *Japan's Struggle to End the War*, USSBS, Washington, July 1946, p. 10.

However, because of extreme difficulty in obtaining complete data and because of the many complicated and unpredictable factors in the changing material resources situation, an estimate of the actual strength of the Empire is not a simple matter. Thus, it is a dangerous practice to translate national strength into mathematical terms and use them without hesitation as the criteria in deciding on war or peace.[6]

The economic motive for the drive to the south (compared to an attack on Russian Siberia, which some observers at the time thought Japan would undertake) is apparent. The degree to which Japan was able to exploit the resources acquired and the detailed impact of their subsequent loss, the following pages will attempt to recount. A general conclusion in broad terms may be ventured here. When such basic pillars of industrial production, as oil, coking coal, iron ore, bauxite, etc., were sapped by the ever-enveloping blockade, Japan had lost the war. The fighting might continue for a little while, but the ultimate debacle was inevitable. The growing lack of vital materials brought even the most ingenious of Japanese planners to despair.

The blockade struck at the Japanese economy from a thousand places all at the same time. Graphite for electrodes for electric furnaces became unobtainable. This, plus the shortage of ferro-alloys such as nickel, tungsten, chromium, etc., reduced the quantity and quality of special steels. As a result aircraft engine output was limited and this in turn restricted finished plane production. Lack of oil limited pilot training and naval ship operations. Rubber for tires was reserved for aircraft use and otherwise serviceable vehicles were laid up. Local transportation breakdowns resulted. Deep sea fishing was abandoned and imports of salt and phosphates were cut. As a result fertilizer supplies were reduced sharply. Rice shipments from the south dropped. The shortage of food reduced the miners' efficiency and output of coal fell. Lack of coal caused a decline in cement output and airfield and defense installations suffered. The decline in imports of coking coal and iron ore cut steel output. Less steel meant less maintenance in coal mines and, as coal output dropped, chemical production, particularly of coal tar derivatives used for explosives production, declined. More ammonia had to be used for nitric acid production and less for ammonium sulphate output. Fertilizer output dropped further. Shortage of food led workers to forage for it in the countryside and absenteeism rose and efficiency declined. The copper shortage led to substitution of aluminum for it in some uses until bauxite imports fell and therefore aluminum could no longer be diverted. Then steel was substituted for copper, in shell casings for example, but when steel output declined, production of ammunition had to be reduced. The list of illustrations and the chain of relationships might be continued almost endlessly. In 1944-45 Japan seemed to be short of everything. While the basic cause of Japan's defeat was the

[6] *Estimate of Japan's National Strength at the Outbreak of the Greater East Asia War*, Cabinet Planning Board, Tokyo, December 1941, p. 14.

failure of her war plan, the failure of her gamble on a short war and the resultant necessity of having to pit her pigmy economy in a prolonged contest against a vastly superior economic power, the blockade heightened the disparity and brought Japan to the economic breaking point. The air attack persuaded her leaders to recognize the facts.

Steel

The most fundamental limiting factor in the Japanese war economy was the very low iron and steel production. Throughout the war the shipbuilding and munitions programs had to be tailored to fit this output. In the late thirties, when an expanded naval shipbuilding program was undertaken, it was necessary to curtail merchant shipbuilding because Japan did not have the steel for both. Late in the war when merchant shipping became the desperate need, increased production of merchant ships could be accomplished only at the expense of curtailing steel for naval ships and cutting maintenance and replacement supplies even for essential industries. To increase aircraft ordnance it was necessary to curtail output of heavy artillery and armored vehicles. Much of the administrative difficulty, service rivalry and bickering arose from the necessity of allocating an inadequate supply of steel to a variety of pressing and essential demands. From the standpoint of war needs, most were deserving, vital and legitimate, but all could not be filled. Japanese steel output at its peak was only a thirteenth of United States production.

The basic weakness of the steel industry of the thirties, aside from its size, as Japanese war planners were well aware, was its great dependence upon imported raw materials. Iron ore, high-quality coking coal, scrap iron and steel, and ferro-alloy ores were all largely obtained from abroad. In 1937, when finished steel output totaled five million tons,[7] 84 percent of the iron ore consumed was imported. Domestic production was small and poor in quality. Of the scrap iron and steel consumed in 1937, 55 percent was imported. Only small quantities of Hokkaido coal were suitable for coking alone. Japan was dependent upon imports of substantial quantities of high-grade coking coal from North China, for steel production. Satisfactory coke was produced by using a mixture of 70 percent domestic and 30 percent imported coal. To produce her special steels Japan had to import nickel from Britain, Canada, the Celebes, New Caledonia, etc., tungsten from China, South America, Thailand, cobalt from Burma, molybdenum and vanadium from the United States and Peru, chromium from the Philippines, and manganese from India. Reflecting this dependence upon imports, most of Japan's steel plants were located on the sea coast.

Thus Japan was highly vulnerable to economic strangulation by blockade. Her leaders were well aware of this and efforts were directed toward

[7] Metric tons will be used throughout this chapter unless otherwise specified.

decreasing the dependence upon foreign materials as well as at increasing production. Ironically, the effort in one direction only resulted in even greater dependence on water-borne transportation. To free herself from dependence on scrap imports, Japan had to increase her imports of iron ore. To produce the equivalent in pig iron of one ton of imported scrap required from two to three tons of iron ore and coking coal imports. The United States effort to contain Japan's ambitions began with the scrap embargo of October 1940 and the attack continued on this vulnerable and vital economic sector by submarine, plane, surface bombardment and mining warfare against shipping as the screws of the blockade pinched tighter, until finally in 1945, with steel output whittled down to an annual rate of less than 1.5 million tons, Japan was forced to abandon virtually all imports except food and salt. Japan's steel industry could be, and was, starved to death and war production came tumbling down with it.

Japanese plans to decrease the vulnerability of her steel industry looked to increased production of domestic iron ore to lessen dependence upon imports; to the shifting of import sources from potential enemies to regions within her growing sphere of influence; to the substitution of pig iron for scrap in steel making and to the building of large stockpiles of iron ore, scrap, manganese and other ferro-alloys. In addition, a five-year plan looking to the expansion of pig iron, ingot and finished steel output in Japan proper, Korea, Manchuria and China was undertaken.

In spite of her desperate attempts to become self-sufficient in iron ore, even at high costs, domestic production of iron ore exceeded imports only in 1944, partially because imports had fallen off sharply. From January 1, 1925, to January 1, 1946, the home islands produced approximately 19.8 million metric tons of iron ore. Over the same period approximately 56.7 million tons were imported. The iron and steel industry thus had available 76.5 million tons for these years of which imported ores constituted 74 percent and domestic ores 26 percent. Production of domestic ores began to rise from 1939 as Japanese war moves increased. Before 1939 domestic ores comprised 13 percent and imported ores 87 percent of the total ores obtained. From 1939 to the end of World War II, domestic ores comprised about 37 percent and imported ores about 63 percent of the total available.[8] Most Japanese mines were small, the ore was low-grade and had to be beneficiated by concentration or sintering before use in the blast furnace.[9] The

[8] *Iron Ore Resources of Japan*, Natural Resources Section, SCAP-GHQ Report No. 69, Tokyo, February 26, 1947, p. 9.

[9] By beneficiation is meant any treatment by which the raw materials, iron oxides (ore), etc., coke and limestone are rendered more suitable for use in the blast furnace, and includes improvement in physical form and properties as well as chemical purity. Hard ores must be crushed, fines must be sintered, large lumps excluded, and lean ores concentrated to a standard iron content. Beneficiating consists of drying, crushing, screening, washing, sintering, etc. Sintering is a method of converting fine ores or flue

Fe content of domestic ores was much lower than that of imported ores. In addition, the percent of domestic iron sand used to obtain ore rose from 2.7 percent in the 1925-38 period to 15.3 percent from 1939-45. Iron sand had the lowest Fe content and the additional disadvantage of a high titanium content,[10] which was difficult to remove.

The contrast between the iron content of imported ores and that of domestically-mined ores in Japan over the period 1937-45 may be seen in the following table, which shows both total ore produced or imported and the iron content in thousand metric tons.

Fiscal Year	*Domestic Ore Production*	*Iron Content*	*Ore Imports*	*Iron Content of Imports*	*Total Iron Content*
1937	632	301	3,313	2,007	2,308
1938	800	378	3,212	1,939	2,317
1939	962	439	4,949	2,988	3,427
1940	1,229	564	5,129	3,095	3,659
1941	1,614	745	5,058	3,021	3,766
1942	2,532	1,179	4,880	2,911	4,090
1943	3,057	1,459	3,666	2,147	3,606
1944	4,367	1,911	1,668	925	2,836
1945*	837	394	144	67	461

* First quarter.

Source: Iron and Steel Control Association.

Thus it is apparent that the total iron content available to the Japanese from imports and domestic production reached a peak in 1942 and declined thereafter despite the sharp increase in domestic production of low-grade ores. The mining of such ores was a considerable burden upon both manpower and transportation. Generally the small mines used during the war were in remote and almost inaccessible places.

There was also a material change in the source of iron ore imports, as the Japanese attempted to free themselves of dependence on hostile sources. Prior to the imposition of the embargo, Malaya and the Philippines were the principal suppliers. In 1937 they supplied 51 percent of total iron ore imports; Korea, Manchuria and China together supplied 21 percent, and other countries provided 28 percent. By 1940 Malaya and the Philippines were supplying 57 percent, but the share provided by China, Manchuria and Korea had risen to 29 percent and that of other countries had fallen to 14 percent. With the imposition of the embargo in 1941 China (including Hainan Island) became the largest supplier, providing 50 percent in 1941 and 88 percent of total imports in 1943. Iron ore imports from China rose from approximately a million tons in 1940 to nearly four million in 1942.

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dusts into a porous clinker which can be easily smelted. The ores are agglomerated or fused into nodules or blocks. See *The Making, Shaping and Treating of Steel* by Camp, J. M., and Francis, C. B., United States Steel, Pittsburgh, October 1941, p. 279 *et seq.* See also *Iron and Steel*, by Tiemann, H. P., New York, 1933, pp. 48-49.

[10] For an account of the troubles of companies mining and smelting iron sand, see *Oriental Economist*, August 1942, pp. 381-84.

Though Japan broke the impact of the embargo by seizing the Philippines and Malaya, she was never able to exploit their iron ore resources, nor would she have had the shipping to carry their output plus Chinese production to the home islands. While Malaya and the Philippines had supplied almost three million tons of ore in 1940, Japan obtained only 118,000 tons from them in 1942 and 169,000 tons in 1943. In 1944 imports from these sources were only 23,000 tons.

After Guadalcanal, when shipping became scarce and the Japanese took stock of their position, they determined to exploit the low-grade Mozan mines in northeastern Korea, since this would require a minimum of transportation and could move across the relatively safe Japan Sea. They were moderately successful in this step and imports of iron ore from Korea rose from 235,000 tons in 1943 to 610,000 tons in 1944. Whereas in 1943 Korea supplied 7 and China 88 percent of Japan's iron ore imports, in 1944 the Korean share rose to 37 percent and the Chinese fell to 61 percent. The 400,000-ton increase in supplies from Korea did not, however, counterbalance the 2,230,000-ton decline in iron ore imports from China between 1943 and 1944. Such imports dropped from an average of 374,000 tons per month in the January-June 1943 period to only 37,000, or to less than 10 percent, in December 1944. Furthermore, Chinese ore had a 60 percent Fe content, whereas Korean ore at its best reached 54 percent. (Malayan ore had an Fe content of 63 percent, Philippine ore 60 percent and average home island ore 45 percent.) Late in 1944, however, stocks of iron ore at the mines and at loading points on the mainland had piled up so that practically all further mining operations were abandoned. The important Tayeh and Maanshan iron districts on the Yangtze River ceased all operations after February 1945, by which time well over 1,000,000 tons of ore had accumulated at river landings. Manchuria never provided more than 4 percent of Japan's iron ore imports, though she met her own demands largely by production in the Anshan district. The widely-publicized development at Tungpientao, where there were supposed to be large deposits of high-grade iron ore and coking coal readily available, proved a great disappointment to the Japanese. The deposits turned out to be scattered, difficult to mine and not as rich as thought; as a result work was allowed to lapse.

Forced dependence in 1945 on domestic low-grade ore and coking coal, most of which came from Hokkaido, added to Japan's transportation headache. Transportation between Hokkaido and Honshu was a bottleneck even before carrier-based aircraft destroyed the rail ferries in 1945. The already overloaded railroads of Honshu were in no position to move 700,000 additional tons of iron ore and 1.2 million additional tons of Hokkaido coal hundreds of miles to the idle blast furnaces in central Honshu and northern Kyushu. The carrier strike therefore materially reduced Japan's chances of using even her inadequate domestic resources of iron ore.

The use of ores of lower iron content and resultant heavier silicon and sulphur content (especially pyrite sinters) greatly increased slagging requirements in the blast furnaces. For example, at Yawata, slag produced per ton of iron rose from 750 kg. in April 1944 to 1,230 kg. a year later. It also increased the residual quantities of silicon and sulphur in the iron, because of the shortage of manganese. The silicon content of pig iron, at Hirohata, the largest new plant in Japan, averaged 0.92 percent in April 1944, but by February 1945 the average had risen to 2.15 percent and by August to 4.95 percent, an intolerable level for normal steel production. The impact on the quality of the steel produced will be discussed later.

In June 1936 the government ordered various steel plants to accumulate stockpiles, over and above normal requirements of iron ore, scrap, and pig. Yawata, for example, was ordered to accumulate a stockpile of 3 million tons of iron ore and 115,000 tons of manganese ore. The total iron ore stockpile reached a peak of 4.2 million tons in 1938 and then was drawn down to 2.6 million tons by the end of 1941. The confidence of the early years, which induced the Japanese to permit themselves the luxury of stiffening finished steel specifications during 1942, resulted in further rapid declines in the stockpile during 1942 and 1943. By the end of 1942 the total had declined to 1.3 million tons and by the end of 1943 to only 792,000 tons. Thus in the first year of the Pacific War the Japanese used up one-half, or 1.3 million tons, of their initial stockpile. In the second year of the war they cut consumption to some 600,000 tons, or about 50 percent of the previous year-end stockpile total. During 1944, however, they utilized only 120,000 tons and at the beginning of 1945 they still had 672,000 tons. Thus in the early years when imports were ample they used the stockpile freely but when imports began to drop sharply they began to hoard the small remaining stocks.

The same was true of the scrap position. Imports and stockpiles both reached a peak in 1939 when imports totaled 2.5 million tons and the stockpile reached 5.8 million tons, as may be seen in Table 11. Imports were

TABLE 11

SCRAP IRON AND STEEL SUPPLY, CONSUMPTION, AND STOCKPILES, JAPAN PROPER, 1937-45

(in thousands of metric tons)

Fiscal Year	*Imports*	*Domestic Purchases*	*Self-generated*	*Total*	*Consumption*	*Balance*	*Stockpiles*
1937 ..	2420	1100	1894	5414	4394	1020	4509
1938 ..	1358	1100	2119	4577	4265	312	4821
1939 ..	2555	890	2185	5630	4660	970	5791
1940 ..	1391	871	2064	4326	4405	- 79	5712
1941 ..	203	1022	2018	3243	4487	-1244	4468
1942 ..	39	1251	2118	3408	4777	-1369	3099
1943 ..	25	1292	2296	3613	5275	-1662	1437
1944 ..	74	1317	1766	3157	4145	- 988	449
1945 ..	1	175	251	427	568	- 141	308

Source: Japan Iron and Steel Control Association (Tekko Tosei Kai).

50 percent less in 1940 and in 1941 were less than 10 percent of the 1939 figure. During the war they fell to negligible levels. In 1941, 1942 and 1943 the Japanese drew upon stockpiles to an increasing extent, as the "balance" column in Table 11 shows. In 1944 they grew cautious and consumption was curtailed materially. By 1945 they had only a mere 308,000 tons left, and their ability to obtain more at home had collapsed in the chaos of early 1945. Thus the exhaustion of stockpiles and the cessation of imports descended upon the Japanese simultaneously. A wartime report lamented:

Iron ore, which is the chief raw material of iron production in Japan, has hitherto been dependent upon overseas materials. In the fiscal years of 1940-41, the main stress was laid upon ore from the Southern Areas, but in 1942-43 the main stress was transferred to Chinese ore, and in 1944 Japanese ore became comparatively important. Year by year the source of ore supply has consistently diminished and stockpiles have evaporated. The ore in Japan is not of suitable quality. We are dependent upon Chinese ore from Likuo, Tayeh, Hainan Island, etc. for almost our whole supply. We must consider the storage of ore within the homeland by increased advanced imports of high grade Chinese ore.[11]

Japan was also dependent upon North China for high-grade coking coal. In 1941 China supplied 96 percent of Japan's imports of coking coal. Total imports reached a peak in 1942 of four million tons and declined steadily thereafter. (See Table 12.) Receipts in 1944 were only 35 percent of the 1942 figure; by the first quarter of 1945 they had dwindled to 14 percent and toward the end they fell away to nothing. During the first six months of 1945 they totaled only 134,000 tons or 6 percent of the amount in the comparable 1942 period. To counter the downward trend in 1944, Japanese

TABLE 12

COKING COAL IMPORTS TO JAPAN PROPER, 1940-45

Fiscal Year	*Thousands of Metric Tons*
1940	3,315
1941	3,417
1942	4,025
1943	2,939
1944—Total	1,435
I	497
II	420
III	317
IV	201
1945—I	116
II	18

Source: Japan Iron and Steel Control Association.

planners attempted to use the coking coal from the Mishan deposits in northeast Manchuria. To replace water-borne shipments from North

[11] *Dependence of Japan upon Continental Raw Materials*, Research Bureau, Foreign Ministry, Tokyo, February 1945, p. 11.

China to both Anshan steel mills and to those in Japan proper, Mishan coal would move by rail to Anshan and the shipments to Japan would be moved from Rashin and Seishin in Korea across the Japan Sea to Hokkaido and Honshu. This would cut the water haul considerably and route it through safer waters. Imports to Japan proper increased from 5,000 tons in 1943 to 124,000 tons in 1944, which was, however, only 10 percent of what was obtained from North China in 1944.[12] The 119,000 ton increase in imports from Manchuria could hardly offset the 1.3 million ton decline in imports from China. The severity of ship sinkings in 1944 forced the Japanese to attempt to route coal shipments from China via rail through Manchuria to Korean ports but the limited capacity of the railroads proved almost as retarding a factor as the ship losses.[13] Of the 134,000 tons of coking coal which were imported during the first half of 1945, 93,000 tons came from North China and 41,000 from Manchuria. The loss of North China coking coal forced the use of Hokkaido coking coal. Only one plant in Japan, the Wanishi plant of the Japan Iron Manufacturing Company in Hokkaido, succeeded in becoming self-sufficient, using domestic coking coal and iron ore. All the Mishan coal from Manchuria was routed to the Kamaishi plant, of the same company, located on the northeastern coast of Honshu. These two plants accounted for 40 percent of the remaining pig iron production in Japan proper during the first quarter of fiscal 1945. Their output, expressed as a percentage of production to capacity compared to the national average, in June 1945, before they were subjected to severe naval surface bombardment (neither had been bombed from the air), was as follows:

	Coke	*Pig Iron*	*Open-Hearth Ingots*	*Rolled Steel*
National average	27	32	17	19
Kamaishi plant	56	38	42	53
Wanishi plant	33	31	10	20

Although Wanishi had an ample supply of coking coal, the quality was so poor that its output of pig iron was no higher than the national average of plants using various combinations of domestic and imported coking coal. The quality of its pig iron was so poor, however, that a large percentage could not be used at the neighboring steel works and armament plant at Muroran. Manchurian and domestic coking coals were weaker in coking

[12] *Coke in Japan,* Preliminary Study No. 2, Natural Resources Section, SCAP-GHQ, Tokyo, November 1946, p. 7.

[13] The problem had been recognized prior to the beginning of the Pacific War but nothing had been done about it. Okabe, writing in *Sozo* in December 1940, declared: "The most difficult problem we must tackle in exploiting coal resources in North China is undoubtedly the expansion and consummation of traffic facilities from the mines. There are some mines in the interior which are obliged to curtail production simply because of lack of freight cars. First of all railway services must be expanded and improved." "Development of Collieries and Iron Deposits in North China," by Okabe, Masao, *Sozo,* December 1940, p. 17.

power and higher in ash than Chinese coal. At Yawata, for example, the ash content of the metallurgical coke rose from about 19.7 percent in April 1944 to about 23 percent in April 1945, when the admixture of Chinese coal had declined to 9 percent. The ratio of coke consumed per ton of pig iron became greater and thereby lowered smelting capacity. At Yawata the ratio increased from 1.0 in 1942 to 1.3 in 1945. The poorer coke carried further sulphur to the iron already too high in sulphur content because of low-grade ore.[14]

When it became apparent to the Japanese after the first year of the war, that scrap imports would have to be replaced by iron ore and coking coal imports, which would take much more shipping than the scrap had required, they hit upon a plan of conserving shipping by utilizing the raw materials at their source and importing the resultant product, pig iron. It was estimated that the pig iron would require about a third of the tonnage that the ingredients necessary to produce it required. To secure this savings the government, in December 1942, decided to build about 160 small-type blast furnaces with a total rated capacity of one million tons a year in China, Inner Mongolia, Korea, etc., close to the sources of raw materials. So enthusiastic did they become about the small blast-furnace idea that they decided to extend it to Japan proper.[15] The furnaces were to be mass-produced with a minimum of scarce materials; they were to be simple in design and easily installed; operation was to be very simple, so much so that almost the whole operation could be carried out by unskilled labor. After the war the Japanese were reluctant to talk about the scheme because almost everything went wrong. U.S. experts have held that technologically the design hardly surpassed early eighteenth century occidental practice and that in relation to output and materials consumed, the small blast furnaces were far less economical than large furnaces.[16] Fujihara, who as head of the Sangyo Setsubi Eidan at the time had the unenviable job of constructing the furnaces, stated that he had protested the whole plan but had been overruled. He placed the blame on the Army, stating that since the Navy supervised most of the large steel plants at home, the Army had originated the idea in accordance with its own policy of achieving continental self-sufficiency. He stated that big plants had been considered but ruled out because they would take too long (two years) to build and would eat up too much scarce material.[17] With considerable effort 117 furnaces with about 730,000 tons of annual capacity were built by the end of 1944. Peak quar-

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[14] *Technological Problems in Iron Production in Japan During the War*, Report submitted to USSBS by Iron and Steel Control Association, Tokyo. November 1945.

[15] "New Iron Manufacturing Processes." *Oriental Economist*, April 1943, p. 179.

[16] See USSBS, *Coal and Metals in Japan's Economy*, Washington, April 1947, p. 69.

[17] See "Material Requirements in Constructing Blast Furnaces," Iron and Steel Bureau, Ministry of Commerce and Industry, Tokyo, October 2, 1942, pp. 14-15.

terly output reached 86.000 tons of pig iron. The life of the equipment, however, was short and the output of such poor quality that Japanese steel firms protested. They treated the iron as high-grade ore and passed it through their blast furnaces again. Labor and coke requirements at the small furnaces were out of all proportion to output and Toyoda, head of the Iron and Steel Control Association, testified that a number of key engineers were shipped to the continent to get the furnaces operating and were thus lost to the industry at home, which needed them badly.[18] Pig iron output in China, where most of the furnaces were located, rose from 5,000 tons in the second quarter of 1943 to a peak of 59,000 tons in the third quarter of fiscal 1944. Decline was rapid thereafter and before the end of the war many of the small blast furnaces in China had been abandoned. In Japan proper they served merely to spread meager resources thinner and prevent concentration at the largest, most efficient plants. Japan derived relatively little help from the plan. Home island production reached a peak of 4.3 million tons in 1942 and even though capacity rose to 6.5 million tons in 1944, output dropped to 2.6 million tons. The sharp drop brought output by the first quarter of 1945 down to an annual rate of 1.2 million tons and this could not have been sustained very long. Imports of pig iron to Japan proper reached a peak back in 1936 and although they increased in 1938 and 1943 they never regained their pre-war level.[19] There was no significant increase in imports from either Korea or Manchuria. Peak output in Manchuria was 1.7 million tons in 1943 and in Korea 556,000 tons in the same year.[20]

Production of ferro-alloys in Japan reached a peak of 143,518 metric tons in 1940 and, although production approached this level in 1942, it never regained it during the war years despite intensive efforts to mine substitute low-grade ores at home to replace imports of high-grade ores from abroad upon which Japan was dependent. This was particularly serious in view of the growing demands for and production of special steels in Japan during the war. In contrast to total steel production, as we shall see, special steel

[18] The President of the Sumitomo Mining Company, after an inspection tour in North China, declared: "As to the small-size furnaces for iron manufacturing, we faced many problems. These small ones may offer temporary conveniences but the large ones certainly possess their proven advantage. Some years ago a simple method of iron manufacturing was introduced, but it was later found to be highly inefficient and was unable to replace the regular furnaces. We found the efficiency of small size furnaces to be far less than we had imagined. We concluded that a thorough-going revision of these furnaces must be made." "North China's Economy," by Matsumura, Kiichi, *Nippon Times*, Tokyo, August 13, 1945, p. 2.

[19] See Chart in *Summation of Non-Military Activities in Japan*, SCAP-GHQ, No. 5. February 1946, p. 53.

[20] See "Increased Metal Output in Chosen and Manchukuo," *Oriental Economist*, August 1944, p. 333.

reached a peak in 1944 but due to lack of proper ferro-alloys much of it was not the high grade necessary for aircraft, chemical and ship production. The two principal uses of ferro-alloys were as a deoxidizer in the removal of impurities and gases in the manufacture of ordinary steel and as alloys in the making of special steels. Because of the urgent need for iron and steel during the war, all blast furnace capacity was confined to steel, leaving ferro-alloy production to the electric furnaces. Standard specifications were relaxed twice. Known as the Japanese Engineering Standard, they had been first established in December 1937. As steel production increased, the use of ferro-alloys increased proportionately, but because of the growing shortage of high-grade ores, maintaining both high standards and ferro-alloy tonnage became more and more difficult and, when the embargo hit Japan in the summer of 1941, some of the standard specifications were revised downward on specific metal content and upward on the allowable limits for impurities. The new specifications were known as " Temporary Standard." With the cessation of imports, even from the continent, in late 1944, and the high output of special steel that year, standards were again relaxed. On December 28, 1944, the " Convenient Standard " was established.[21]

The principal ferro-alloys used were ferro-manganese, ferro-silicon, and ferro-chrome, in that order and, in addition, ferro-tungsten, ferro-vanadium, ferro-molybdenum, ferro-phosphorus and ferro-zirconium. Ferro-nickel and ferro-titanium were little used. Metallic nickel was used for nickel steels when available. The supply of silicous materials was adequate in the home islands; chromium, moderate; manganese, poor; tungsten, slight; nickel, vanadium, molybdenum, cobalt, etc., extremely small.

The story of manganese was a remarkable example of wartime development of low-grade ore production. Prior to the beginning of the Pacific War, Japan obtained most of her high-grade manganese ore from India and in the late thirties to a lesser extent from the Philippines. In 1939, for example, imports totaled 173,500 tons, of which 150,000 tons came from India and the remainder from the Philippines. In 1942 and 1943 Japan continued to obtain 20,000 tons annually from the Philippines but the flow ceased at the end of 1943. Thereafter Japan had to depend wholly on her own resources. Production of low-grade (31 percent) manganese ore in Japan proper rose from 67,000 tons in 1936 to 162,000 in 1940 and then to 400,000 tons in 1944. From 1942 on, however, the grade of the ore fell so low and the difficulties in handling it became so great, that output of the alloy declined.[22] In addition, because of the severe winter in 1944 and diffi-

[21] For a detailed account of these standards and specifications, see *Ferroalloy Metallurgy of Japan*, Natural Resources Section, SCAP-GHQ, Report No. 62, Tokyo, December 5, 1946, pp. 12-13, and Tables 2, 3 and 4, pp. 42-43.

[22] *Summation of Non-Military Activities in Japan*, SCAP-GHQ, No. 4, Tokyo, January 1946, p. 100, and Vol. 5, February 1946, pp. 106-07.

culties of transportation, stocks of ore accumulated in Hokkaido and could not be moved to Honshu. The shortage of manganese was felt in 1944 (despite peak ore production) with the sharp upsurge in electric steel output. Coming at the same time that low-grade ores with a high sulphur content were being used with poor coking coal, the combination resulted in incomplete desulphurization of steel.

Peak output of ferro-silicon also came in 1940 and then dropped one-third by 1943. Output increased in 1944 but did not attain the 1940 level. The limiting factor in this case was not the raw materials which were available, but electric furnace capacity. Since production of ferro-silicon consumes more electric power than any other ferro-alloy, the many competing demands for limited electric furnace capacity in 1944 restricted its output. Peak output of ferro-chrome coincided with peak imports of high-grade chromium ore from the Philippines of 50,000 tons in 1943. When imports were reduced by 60 percent the following year the alloy output fell at a time when military needs for it increased.[23] Ferro-tungsten output fell from its 1940 peak but output was almost restored in 1943. It fell sharply thereafter because of decline in imports of tungsten from China, Burma and Thailand and because the supply of tungsten concentrates from domestic production was only about one-eighth of requirements. Output of ferro-tungsten in 1944 was less than 50 percent of the 1943 level.[24]

Until 1934, when five tons of molybdenum concentrates were made, Japan imported all of its molybdenum. By 1940 domestic production reached a peak of 407 metric tons of concentrates. Output of ferro-molybdenum increased from 21 tons in 1931 to a peak of 1,802 tons in 1940 and then fell off to 337 tons in 1944 and to 65 tons in 1945. The decline after 1940 was simply due to a cessation of imports and inability of mines in Japanese-controlled areas to supply sufficient molybdenum concentrates to permit operation at capacity of Japan's comparatively small facilities for processing.[25]

Prior to the beginning of the Pacific War Japan obtained all her vanadium from the United States and to a lesser extent from Peru. After Pearl Harbor the only imports she succeeded in obtaining were 200 tons of vanadium ore from Manchuria in 1944. During the war Japan attempted to use vanadium-bearing magnetite beach sands at Hachinohe, Aomori prefecture, but was not very successful and output of ferro-vanadium dropped from a peak in 1940 to 25 percent of that level in 1944. Nickel steels were in great

[23] See *Chromite Resources of Japan*, Natural Resources Section, SCAP-GHQ, Report No. 64, Tokyo, January 15, 1947, p. 5.

[24] See *Tungsten and Molybdenum Metallurgy in Japan*, Natural Resources Section, SCAP-GHQ, Report No. 61, Tokyo, November 30, 1946, p. 8.

[25] *Molybdenum in Japan*, Natural Resources Section, SCAP-GHQ Report No. 72, Tokyo, March 14, 1947, p. 7.

demand in the aircraft industry but since Japan had no nickel deposits of importance, severe shortages developed early in the war. She succeeded in obtaining some nickel concentrates from the Celebes during the war, the peak coming in 1943 with the importation of 48,271 tons. The following year imports fell to one-seventh this figure, and the shortage became most acute. Japan stepped up output of nickeliferous iron ore from 33,000 tons in 1937 to 428,000 in 1944 but the nickel metal content at its peak in 1944 was a mere 2,527 tons.[26]

Japan produced little or no cobalt before 1938, and imported cobalt chloride and special steels containing cobalt. Unrecorded small amounts of cobalt ore were imported in addition to 750 metric tons of ore from Canada in 1939-40. During the war only 200 metric tons were imported from Burma over the two years 1943-44. Production from four domestic mines began in 1938, but the ores were very low-grade, the hand-cobbed concentrate ranging in Co content from 0.8 to 3.4 percent. Refinery production reached a maximum of only 90 tons in 1942 and declined thereafter.[27]

A Japanese estimate of the percentage of deoxidizing and alloying elements available in Japan proper during the war years in relation to requirements was as follows:

Element	*Percent of Requirements Available*					
	1940	*1941*	*1942*	*1943*	*1944*	*1945*
Cobalt	50	20	10	5	5	5
Nickel	60	30	20	10	10	10
Tungsten	100	100	65	65	65	65
Molybdenum	100	100	65	65	65	65
Vanadium	100	100	70	60	60	60
Chromium	100	100	90	70	70	70
Manganese	100	100	100	100	70	70
Silicon	100	100	100	100	72	70

Source: Special Steel Section, Iron and Steel Control Association.

While this is admittedly a rough estimate, it was provided by those in the best position to know the facts. As a result of the growing shortages the alloy content of the special steels had to be lowered and less effective elements substituted for the scarcer ones. It was impossible to continue pro-

[26] See *Summation of Non-Military Activities in Japan*, SCAP-GHQ. No. 5, Tokyo. February 1946, p. 108; also *Nickel Deposits in Japan*, Natural Resources Section, SCAP-GHQ, Report No. 57, Tokyo, September 30, 1946. The latter declares: "The Oya, Okashibetsu, Bihoro, and Horoman mines produced 83,353 metric tons of crude ore between 1940 and 1945. After subtracting tonnages in stockpiles, a net total of 81,168 metric tons was available for concentrating. These mines actually shipped only 6,984 metric tons of concentrates, or about eight percent of the net total of available crude ore. This indicates the extremely low grade of the ore." (p. 7.) A very detailed analysis will be found in *Summary Report of Resources of Nickel in Japan*, by Kinoshita, K., publication of the Society for the Promotion of Scientific Research, Tokyo, 1945.

[27] See *Mineral Resources of Japan Proper, 1925-1945*, a Preliminary Report, Natural Resources Section SCAP-GHQ. Report No. 44. July 5, 1946. p. 48.

duction of high-speed steels formerly containing up to 16 percent cobalt. By 1943 chrome-nickel stainless steel had to be made without nickel and later it became necessary to reduce the chrome content to 13 percent. Structural steel, which normally contained molybdenum, had to be made without it, since molybdenum ran short and no substitute was available. The nickel content of gun-barrels, armor-plate, torpedo air-chambers, etc., had to be reduced sharply. Shipbuilding was hampered by low-quality plates which cracked under cold bending and performed badly in electric welding.

The decline in the quantity of alloy steel and in the quality of that available hit the aircraft industry particularly. It was the failure of supply of high-tensile strength alloy steels for engine production, landing gears, motor mounts and terminal fittings which presented the most critical aircraft production problems. It was the shortage of alloy steels which caused the decline in aircraft engine output from the spring of 1944 on and, as will be indicated in more detail in the following chapter, the shortage of engines was the limiting factor in aircraft output. Because of the strong cushioning effect of the high priorities assigned to special steels for the aircraft engine and propeller industries, the shortages struck very suddenly and caused acute "inspection" and production difficulties. A few examples of the changes at the Mitsubishi Aircraft Company may serve to suffice.

Critical shortages in cobalt, nickel and chromium in mid-1943 led to alterations in eleven specifications, in most cases involving the use of molybdenum and tungsten as substitutes. In late 1943 molybdenum and tungsten supplies began to give out, and by May 1944 the decline was so acute that no fewer than twenty additional changes resulted. Supplies of silicon-chrome steel used in valve making became low in July 1944 and vanished in December. Supplies of Si-Cr-Mo steels were exhausted in November 1944 and Cr-Mo steel in December 1944. As chromium became scarce, serious efforts were made to use larger quantities of carbon steels. Late in 1944, carbon steel engine-parts (crankshaft, propeller shaft, connecting rods, and cylinder barrels) were tested for a 450-horsepower engine. The extent of this substitution of high-carbon steel for alloy steel is indicated by the increasing proportions of high-carbon to total special steel produced, from 30 percent in 1941 to 52 percent in 1944.[28] Tests were reported to have been undertaken on non-nickel heat-resisting steel for exhaust turbines and rocket turbines but these never reached the production stage. Lower engine performance, loss in planes through failure of engines and landing gears and a host of minor difficulties resulted from the deterioration of steel.[29]

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[28] The "Special Steel Supply and Demand Regulations," January 28, 1944, broadened the "special steel" category to include high carbon steels formerly termed "ordinary." This classification change was in large part responsible for the large apparent increase in special steel output in 1944.

[29] See Corporation Report No. 1, *Mitsubishi Heavy Industries Ltd.*, Aircraft Division, USSBS, Washington, 1947, pp. 147 and 182. The report declared: "Shortages of

There were a number of ironies about the Japanese war effort as it related to steel. It was a remarkable feat for the Japanese to double their ingot steel capacity between 1937 and 1944 (from 6.7 to 13.6 million tons) but had they ever dreamed that actual production in 1944 (5.9 million tons) would be only minutely above 1937 ingot steel output (5.8 million tons), they would certainly have checked their militarists and expansionists. It was ironic too that with all their expansion plans and subsidy measures and great efforts from 1937 on, steel output in the ensuing seven years rose far less (+ 1.9 million tons from 1937 to peak 1943 production) than during the seven years preceding 1937 (+ 4.0 million tons from 1931 to 1937). It was also strange that, while they began by unbalancing the relationship between pig iron and finished steel capacity by fostering greater pig iron and less finished steel capacity on the continent and, conversely, less pig and more finished steel capacity in Japan proper, so that the continental pig iron would have to be shipped to Japan for fabrication and then, in keeping with traditional colonial theory, would either be sold at profit to the dependent areas or retained for the greater power of Japan, they ended by desperately dismantling some of their own finished steel plants and shipping them to the continent in order to maintain some finished steel production.

The first five-year production expansion program ran from 1938 through 1942. For steel, it involved expanding pig iron production threefold to 13.5 million tons, ingot steel capacity by 125 percent to 16.9 million tons and finished steel by 85 percent to 13.5 million tons. As stated previously, continental expansion of pig iron and home island expansion of steel output were stressed. The goal in 1942 in Manchuria was to be a 4.8 million ton pig capacity but only a 1.8 million ton finished steel capacity. In Japan, on the other hand, steel capacity was to be 4 million tons greater than pig iron. In 1944 pig iron capacity totaled 10.5 million tons (6.2 in Japan proper, 2.5 in Manchuria, 1.0 in Korea, and 0.8 million tons in China), ingot capacity was 15.2 million tons (Japan proper 13.6, Manchuria 1.3, Korea 0.3), while finished steel capacity was 10.6 million tons (9.7 in Japan proper, 0.75 in Manchuria and 0.15 in Korea).[30] Thus by 1944, though the 1942 goals had not been achieved, the Japanese had done well considering their involve-

raw materials as they affected valve production can be divided into three phases. There was, first, a deterioration in steel due to use of substitutes in hardening alloys (mid-1943 to June 1944) causing reduction in production and a large build-up in parts held in the production line. Secondly there was a temporary rise in production through solution of problems in the use of substitutes and the consequent clearing of the production pipe line (July to December 1944). Thirdly, a drastic decline in production occurred with the exhausting of special steel supplies (beginning in January 1945). The use of substitutes alone (first phase) was sufficient to play havoc with the Japanese aircraft industry because it struck at the heart of engine manufacture." p. 290.

[30] *Summation of Non-Military Activities in Japan*, SCAP-GHQ, No. 1, Tokyo, September-October 1945, p. 60.

ments. The lack of balance, however, is apparent. Japan proper had 59 percent of the pig iron capacity but 89 percent of the ingot capacity and 91 percent of the finished steel capacity, while the continent had 41 percent of the pig iron capacity but only 11 percent of the ingot and 9 percent of the finished steel capacity.

Now let us examine production. The pertinent statistics are presented in Table 13. From 1937 to 1941 pig iron production had grown by more

TABLE 13

STEEL PRODUCTION, JAPAN PROPER AND JAPANESE-CONTROLLED CONTINENTAL AREAS, 1937-45

(in thousands of metric tons)

Fiscal Year	*Pig Iron*			*Ingot Steel*			*Finished Steel*		
	Japan Proper	*Continent*	*Total*	*Japan Proper*	*Continent*	*Total*	*Japan Proper*	*Continent*	*Total*
1937	2,318	1,037	3,355	5,798	644	6,442	5,147	483	5.630
1941	4,198	1,759	5,957	6,837	730	7,567	5,120	445	5,565
1942	4,306	2.070	6.376	7.009	995	8,004	5,166	508	5.674
1943	3,813	2.335	6,148	7,821	1,017	8,838	5,609	676	6,285
1944—Total .	2.713	1.899	4,612	5,911	592	6,503	4,320	332	4,652
I	917	n.a.	n.a.	1,893	250	2,143	1,429	n.a.	n.a.
II	664	n.a.	n.a.	1,444	116	1.560	1,051	n.a.	n.a.
III ...	638	n.a.	n a.	1,470	135	1,605	1,059	n.a.	n.a.
IV ...	494	n.a.	n.a.	1.104	91	1,195	781	n.a.	n.a.
1945—I	340	n.a.	n a.	803	n.a.	n.a.	492	32	524

Note: Continent includes Korea, Manchuria, Kwantung Leased Territory and Occupied China.

Source: Compiled from data of the Iron and Steel Control Association.

than 80 percent but the output of ingot steel had increased by only 17 percent and production of finished steel was slightly smaller. Although pig iron production in 1941 was 72 percent of capacity, about the same as 1937, ingot steel output declined from 85 percent of capacity in 1937 to 64 percent in 1941. Thus by the beginning of the Pacific War there was growing excess capacity in the Japanese steel industry. This was partly due to two reasons. First, the increased pig iron output merely substituted for the imported scrap which had been cut off in 1941. Secondly, to operate the enlarged industry at full capacity would have required imports of iron ore close to 10 million tons, yet in 1941 the high-grade Malayan and Philippine ores had been denied the Japanese and they only succeeded in bringing in slightly more than half of their requirements. Despite this, capacity was increased further during the Pacific War. This was due to the fact that some of the construction had been underway prior to Pearl Harbor and was only completed later. It was also due to Japanese optimism during the first year that they would be able to consolidate their position in the areas they had overrun and exploit the acquired resources. Coking capacity increased 19 percent, pig iron capacity 7 percent, ingot steel capacity 27 percent, and rolling capacity 7 percent.

Peak output, as may be seen in Table 13, came in 1943, with the exception of pig iron which was highest in 1942. Several considerations are of

interest. While continental pig iron output was 61 percent of pig iron production in Japan proper, continental finished steel output was only 11 percent. Early in 1945, with steel production already very low and sinking at a drastic rate, the Japanese in desperation undertook to move a considerable amount of steel-making equipment to the continent, not to escape bombing but to reduce the burden of iron ore and coking coal imports on shipping. The most important single move was that of the Osaka plant of the Japan Iron Manufacturing Company to Seishin, Korea. The plant was completely dismantled in the spring of 1945. Part of the equipment reached Seishin, some was sunk, and at the end of the war some remained in crates at the old site waiting to be shipped. The Fuji plant of the same company was also dismantled to be shipped to Tangshan in Hopei province where one of the small blast furnaces had been erected. Other plants were scheduled for removal to Tungpientao and Anshan in Manchuria, as well as to Shihchingshan near Pekin in North China. Because of shipping losses, however, no plant was ever completely transferred to the continent though some were in crates and others in the process of being dismantled when the war ended. So scarce was scrap toward the end that some plants were cannibalized in the last months.[31]

Peak output came in 1943, the year before end-product production reached its peak. Even then, however, the industry in Japan proper was operating at only 58 percent of ingot and finished steel capacity. In 1944 output fell to 44 percent of capacity and at the production rate of the first quarter of 1945 was down to 21 percent. Output in the last quarter of 1944 was down to 51 percent of production in the peak 1943 quarter, while in the first quarter of 1945 the figure fell to 32 percent.[32] The decline in output added to the troubles over the quality of the products. Lower ratios of production to capacity for blast furnaces would have resulted in a poorer product even if the quality of the raw materials had not declined, as they had. As a result longer refining periods in the steel furnaces were required and this meant greater wear on progressively poorer quality refractories. By 1944 most of the imported refractory materials and prefabricated linings had been used up and poor-grade Japanese substitutes were being used instead. As a result the life of the linings was reduced from 50 to 60 percent; open-hearth furnace cycles were extended from around 8 hours to 13-14 hours per heat and the heat consumption per ton of ingot produced was sharply increased. At Hirohata, for example, approximately 1.5 million

[31] Fujihara, the second Munitions Minister, declared: "They just did not have the materials here in Japan. Even if they concentrated on a few of the biggest plants, there still would not be enough raw materials to operate them at full capacity. The situation was very desperate so that they even took the machinery in some idle plants and broke it up for scrap in order to get scrap for the steel industry. This happened just before the end of the war."

[32] *Mineral Resources of Japan, op. cit.*, pp. 82-83.

kilo-calories were required per ton of ingot steel in May 1944. By March 1945 the figure had risen to 2.6 and by August to 3.4 kilo-calories. Numerous refractory failures resulted which shut down equipment, and the lower-grade less uniform steel which was produced, in turn, caused trouble for rolling mill equipment which was already strained because of poorer lubricants and less accurate bearings.[33] As one Japanese official remarked, "In 1944-45 everything wrong seemed to happen to us at the same time."

The pattern of steel consumption changed materially during the nine war years. During the China War period the bulk of the steel, though a declining share, went to industrial construction and machinery uses as the production expansion program for the construction of new plant, machinery and industrial facilities was undertaken. As the following table shows, the percentage allotted to "civilian" facilities, however, declined.

FINISHED STEEL DISTRIBUTION, JAPAN PROPER, 1937-45

(in percent)

Fiscal Year	*Army Ground Forces*	*Navy Surface Forces*	*Merchant Shipbuilding*	*Airforces (Combined)*	*Industrial Facilities, Construction, Machinery & Tools, R.R., etc.*	*Total*
1937	4	11	6	3	76	100
1938	10	11	7	5	67	100
1939	11	11	6	5	67	100
1940	14	16	5	7	58	100
1941	19	21	7	9	44	100
1942	18	22	11	10	39	100
1943	21	22	17	10	30	100
1944	13	22	28	20	17	100
1945*	15	20	31	19	15	100

* First quarter only.

Sources: Iron and Steel Control Association; Japanese War, Navy, Munitions Ministry.

The increased allotments to the Army and Navy during the China War period were used in part for the expansion of arsenals and productive facilities as well as for munitions, ordnance and ships. The meager allotment (actually declining between 1938 and 1940) to merchant shipbuilding was indicative of complete lack of realization of the need to strengthen what later was to become the largest single steel-consuming category. In 1942 the total finished steel consumption was held to 4.8 million tons compared to 5.4 million consumed the previous year. Therefore the amount given to the Army was less than the one percent decrease would indicate and the amount going to the Navy was smaller by 9,000 tons in 1942 than 1941. The military felt the war was won in 1942 and did not think they would require much more steel. The Army ground forces reached a peak of steel consumption in 1943 and then took a sharp cut in 1944 as aircraft demands for special steels increased sharply and as did the allotment to shipbuilding. The Navy received a steady percentage allotment for surface forces,

[33] See *Technological Problems, op. cit.*, p. 12.

although the 22 percent in 1944 represented only 1.0 million tons as against 1.2 million for the same percentage figure in 1943. This was due to the decline in total consumption (4.7 million tons) in 1944 as compared with 1943 (5.5 million). The steady decline in the industrial allotment reflected not only the tapering off of construction and expansion but the actual decline in maintenance and replacement allotments as many industries were starved to make the very limited overall supply of steel stretch to include expanded merchant shipping, air, and military uses.

Late in the war a series of "maintenance" crises were reported—in petroleum in the fall of 1944, in coal in the winter of 1944-45, and in nitric acid in February 1945. Breakdowns of machinery became so frequent and so troublesome that a special "machinery emergency" allocation was finally provided in the 1945 allocation plan, but the amount was so limited in relation to the many demands that it proved of little value. The sharply increased allotment to aircraft in 1944 largely reflected the industry's need for special steels to permit peak output.[34] By far, however, the overriding need in the last two years of the war was for steel for merchant ships. It was really this demand which broke the back of industry coming as it did at a time of sharply decreasing total steel output. Despite the increased allotments of 1944 and 1945, however, the shortage of steel was the major reason for cutting the projected shipbuilding program from 2.6 to 1.9 million GRT in 1944 and to only a planned 566,000 tons in 1945.[35] Shortages of steel throughout the war denied the shipyards sufficient stock to permit prefabrication, and delays and uncertainty of steel delivery, in the last year of the war, forced hand-to-mouth operations and greatly disrupted production schedules.

The decline in Japan's steel-making power, and therefore in her ability to make war, was due to the impact of shipping losses on raw material supplies and not to air attack on steel plants or to the bombing of urban areas. The steel industry was selected as the first target system to be attacked when the air war advanced to Japan proper. China-based B-29's delivered two attacks in June and August 1944 against the largest steel plant in Japan, the Yawata Works of the Japan Iron Manufacturing Company. Most of the damaged facilities were completely repaired within a week, the rest of the damaged installations, with the exception of some coke ovens, were back

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[34] Special steel output rose to a peak of 1,181,000 tons in 1944. It was 27 percent of total steel output in that year compared to 9 percent in 1941, 12 percent in 1942, and 15 percent in 1943. Due to the classification change, mentioned in footnote 28, half of the 1944 total consisted of high carbon steel not classified as "special" before 1944. Actually, therefore, special steel output was slightly less in 1944 in the restricted sense than in 1943.

[35] *Revised Material Mobilization Plan for 1944* and *Preliminary Memorandum on Material Mobilization for 1945*, Total Mobilization Bureau, Munitions Ministry, Tokyo, June and December 1944.

in operation within a month. The Japanese decided not to repair the coke ovens because there was excess coking capacity as a result of coal shortages. Production was not lost as a result of the raids but merely postponed because in the October-December quarter, through the use of materials not consumed in the earlier quarter, production exceeded the allotted quotas by an amount greater than the losses during the bombing and damage repair period. A revaluation of American intelligence after these raids led to the conclusion that there was too much excess capacity in the steel industry to make attacks on steel plants profitable and when the Mariannas-based B-29's were activated they turned to other targets. When the urban area attacks began, some steel plants were hit and there was some spill-over damage from raids on higher priority targets, but the Japanese did not even bother to repair the damage. Where they had the raw materials, they simply turned to other idle, unused capacity of which there was an abundance in 1945. Two tables in one bombing survey report prove this conclusively by very evident statistics.[36] The following table shows annual rated capacity in thousands of metric tons before and after attack:

	April 1944	*September 1945*
Ingot Steel	13,644	11,696
Finished Steel	10,388	9,799

Since production in July 1945 was running at the rate of about a million tons a year, the Japanese still had a great deal of room to shift from damaged to undamaged capacity, if they had the materials. The second table presents an index (October-December 1944 = 100) of ingot steel production in all plants and in attacked plants in Japan proper:

	Attacked plants	*All plants*
Oct.-Dec. 1944	100	100
Jan.-Mar. 1945	75	71
Apr.-June 1945	55	54

Another bombing survey report quite clearly stated:

> The few air attacks directed against steel plants had little effect on Japanese steel supply. With the exception of China based B-29 operations, the steel industry was subject to air attack only through transportation. The comparatively [221 tons] light air bombardment of the Yawata plant by Twentieth Bomber Command in June 1944 caused only a negligible drop in production. Plant capacity, unused because of lack of raw materials, could be pressed into service to compensate for such bomb damage as was inflicted. . . . Mariannas based B-29's did not specifically attack Japanese steel plants, although the incendiary campaign against urban areas included attacks on all principal steel manufacturing centers from Tokyo south. By the time these occurred, however, steel manufacturing operations had been so restricted by lack of raw materials that what little steel production remained was not materially affected.[37]

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[36] USSBS, *Coal and Metals in Japan's Economy*, *op. cit.*, p. 84.

[37] USSBS, *The Effects of Strategic Bombing on Japan's War Economy*, *op. cit.*, pp. 45-46.

By the summer of 1945 [38] with stockpiles of raw materials exhausted, imports cut off, steel making cut from a peak of 7.8 million tons to an annual rate of only 1 million tons and dependent upon inferior domestic materials which it was by then difficult to mine, and even more so, to transport, Japan's war-making powers, to the extent that they depended on steel, had been effectively sapped. Although steel as a basic material is usually deep in an industrial economy, in Japan, since stocks were exhausted toward the end and pipelines were never filled, the sharp decline in steel production was reflected in end-product output with less and less time lag. In the final stages of the war the drop in both quantity and quality of output made steel the major limiting factor with respect to most tools of war. Since even at peak output there had not been enough steel for the enormous tasks at hand, the decline became a particularly effective and oppressive straight jacket for the war economy.

Oil

It was Fleet Admiral Nagano, supreme naval adviser to the Emperor, who declared:

> I think one of the large causes of this war was the question of oil. . . . Not only the two services but the civilian elements were extremely interested, because after the U.S., Great Britain and the Netherlands refused to sell any more oil, our country was seriously threatened by the oil shortage. Consequently, every element in Japan was keenly interested in the southern regions.[39]

Admiral Nomura, former Ambassador to the United States, added:

> We felt we could get resources from those islands; we depended on that. Our oil stocks were very limited and we must get oil from these islands; and therefore whether or not you initiated your attack quickly or slowly was the big question, the determining factor of the war. Most people thought if we could get supplies from those islands undisturbed we could go on for many years.[40]

Of all the resources in which Japan was deficient, few were in so short supply or so vital to the conduct of war as oil. Japan ranked twenty-second among the oil-producing nations of the world. Its output in 1941 was 1,941,000 barrels of crude oil, or less than 0.1 percent of the world's total. By way of contrast, the United States produced 1.4 billion barrels in 1941, over 700 times as much as Japan. Japan's 1941 production from wells and synthetic plants was less than 12 percent of her peacetime requirements. She

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[38] In late July and early August 1945, U.S. naval surface forces bombarded the two steel plants at Kamaishi and Wanishi, which, it will be recalled, were producing 40 percent of Japan's remaining pig iron output, using largely domestic raw materials.

[39] *Interrogations of Japanese Officials*, Naval Analysis Division, USSBS, Vol. II, Interrogation No. 392, November 20, 1945, p. 353.

[40] *Ibid.*, Interrogation No. 429, November 8, 1945, p. 388.

relied almost entirely upon imported oil, four-fifths of it from the United States. Another 10 percent came from the Netherlands East Indies and the remainder from such widely diverse sources as Mexico, Bahrein, Roumania, etc. Her 4,000 wells averaged about one barrel a day output while the more than 400,000 United States wells average 9.7 barrels per day per well. Japan's refining capacity had been built up far beyond what was required to handle her indigenous production. Refining capacity in 1941 was approximately 90,000 barrels per day, 17 times that required to process home production of crude. Sixty percent of this capacity had been constructed between 1934 and 1942.[41]

Japan was keenly aware of this vulnerability and had taken a variety of steps to minimize, insofar as possible, any sudden cessation of imports. Since the Japanese militarists, high Navy officials in particular, had always regarded their domestic supply as inadequate and negligible, they had concentrated, in the years before Pearl Harbor, on building up a large oil inventory, which reached a peak of 51 million barrels in 1939 (see Table 14)

TABLE 14

JAPANESE OIL POSITION, 1937-45

INNER ZONE—CRUDE AND REFINED

(in thousands of barrels)

Fiscal Year	Crude Petroleum			Refined Products			Inventories[a]		
	Imports	Production	Total	Imports	Production	Total	Crude	Refined	Total
1937	20,231	2,470	22,701	16,651	12,573	29,224	10,467	32,595	43,062
1938	18,404	2,465	20,869	14,044	13,142	27,186	12,465	31,891	44,356
1939	18,843	2,332	21,175	11,818	11,981	23,799	20,242	31,156	51,398
1940	22,050	2,063	24,113	15,110	10,806	25,916	19,901	29,680	49,581
1941	3,130	1,941	5,071	5,242	15,997	21,239	20,857	28,036	48,893
1942	8,146	1,690	9,836	2,378	16,674	19,052	12,346	25,883	38,229
1943	9,848	1,814	11,662	4,652	16,167	20,819	6,839	18,488	25,327
1944	1,641	1,585	3,226	3,334	9,615	12,949	2,354	11,462	13,816
1945[b] ...	0	809	809	0	1,933	1,933	195	4,751	4,946
1944—I..	994	419	1,413	893	2,866	3,759	2,354	11,462	13,816
II.	224	386	610	881	2,681	3,562	1,240	9,533	10,773
III	423	379	802	799	2,341	3,140	594	7,683	9,277
IV	0	401	401	761	1,727	2,488	490	5,944	6,434
1945—I..	0	406	406	0	1,441	1,441	195	4,751	4,946
II.	0	403	403	0	492	492	193	2,836	3,029

[a] At beginning of period.

[b] First half fiscal year.

Source: Japanese Army-Navy Oil Committee; Cabinet Planning Board; Fuel Bureau of Munitions Ministry.

but then declined, due to U.S., Dutch and British embargoes, to 43 million barrels on December 7, 1941.[42] The largest segment of the inventory at the

[41] For a detailed account of the growth of the oil industry in Japan, see *Petroleum Resources and Production in Japan*, Natural Resources Section, SCAP-GHQ, Report No. 80. Tokyo, June 25, 1947.

[42] Storage capacity was available for approximately 60 million barrels. See *Petroleum Storage Facilities*, Memorandum for the record, by Mark F. McAnally, Capt. CE,

outbreak of the war was the Navy's 21.7 million barrels of fuel oil, which was 75 percent of Japan's total refined inventories. Aviation gasoline stocks amounted to 4.2 million barrels. The Navy controlled 88 percent of the total refined stocks and 60 percent of the aviation gasoline. The 43 million barrel reserve would, at the estimated rate of consumption, last two years, by which time the Japanese leaders expected to have free and uninterrupted access to the great oil resources of the Netherlands East Indies and to have built up their synthetic oil production to substantial proportions.

Several versions of the original war plan, as it related to oil, are at hand. Since they are in rough agreement, that of the Cabinet Planning Board may be pertinent. The plan covered three years. It placed requirements, Army, Navy and civilian, at 35 million barrels per year.[43] The first year it was anticipated that supply would total 5 million barrels, with 1.5 million barrels to be obtained from domestic production and 1.75 million barrels each from synthetic production and from the occupied territories. The difference, 30 million barrels, would be drawn from the reserve. The following year it expected to obtain the same amount from domestic production, 4.5 million barrels from synthetic output and 16.0 million barrels from the conquered areas. The remaining 13 million barrels of the reserve would thus make good the deficiency. At the end of the second year reserves would have been exhausted. It was on this basis that naval officials testified that they had sufficient oil, they thought, to enable them to carry on for two years. The third year, the plan contemplated that domestic output would reach 2.5 million barrels, synthetic 9.5 million barrels and the occupied regions 30 million barrels.[44] Thus in the third year of the war—if it lasted a third year, which the planners doubted—there would be a surplus of oil over and above requirements. Let us see what happened.

The Planning Board had estimated 1942 domestic crude output at a much lower figure than actual 1941 production. It anticipated that output would decline because it would be necessary to ship almost all experienced oil field skilled workers and technicians to the southern areas to restore the wells and refineries, which it expected would be totally wrecked. As is shown in Table 14, 1941 output had been 1,941,000 barrels and, as anticipated, production in 1942 fell to 1,690,000 (compared to the 1.5 million barrel estimate). During 1942, approximately 4.000 oil field workers, or 70

Technical Intelligence Branch, SCAP-GHQ, Tokyo, February 26, 1946. (Available in the Library of Congress, PB 20392.)

[43] All figures were actually given in kiloliters. For the sake of uniformity, they have been converted at a rate of 6.29 barrels to a kiloliter. A postwar recapitulation of the Japanese oil position from 1930 to 1946, in kiloliters, is given in *Japanese Economic Statistics*, Economic and Scientific Section, Research and Statistics Division, SCAP-GHQ, Bulletin No. 9. May 1947, p. 13.

[44] *Estimation of Japanese Strength Before and After the Outbreak of the Greater East Asia War*, Cabinet Planning Board, Tokyo, December, 1941.

percent of the total labor force employed in the home islands fields, were shipped south, followed by an additional 600 workers in 1943.[45] For more than a year and a half following the acquisition of the East Indies, the Japanese proceeded to neglect their home fields. The wells were operated without repressuring; there was inefficient recovery. New well drilling fell off as the following figures indicate.

Fiscal Year	*No. of Wells Drilled*	*No. Successful*
1938	30	1
1939	120	3
1940	140	4
1941	0	0
1942	0	0
1943	20	4
1944	90	10
1945 (April-Sept.)	128	3
Total	528	25

That new well drilling was abandoned in 1941 in anticipation of the seizure of the Netherlands East Indies, no responsible Japanese would admit.[46]

So unconcerned were Japanese planners with home production that they set monthly quotas during 1942 and 1943 which proved in many cases to be lower than actual output. Oil was removed from the "essential industry" category and allocations of steel and other basic materials were drastically reduced. In 1942 and 1943 the oil industry was allocated only about 2 percent of the total carbon steel output and about 1 percent of the cast steel. Drilling equipment and maintenance materials were sent to the south. The industry recovered somewhat in 1943 from the 1942 labor removals and production rose slightly. By 1944, however, the impact of lack of materials allocated was felt and output fell to the lowest point in a decade. It went down to 1.5 million barrels in contrast to the 2.5 million contemplated in the original war plan. As tanker sinkings rose in 1943 and oil imports from the south began to fall, the Japanese hurriedly reversed their two-year policy and tried once again to stimulate domestic output. In December 1943, when it became apparent that southern supplies were being cut off, the price per barrel for crude was raised from 22 to 28 yen and producing companies were exempted from corporation and business taxes for a ten-year period. Well drilling was stepped up, an attempt was made to bring skilled personnel back from the south, and oil was again made an "essential" industry in 1944 plans. The impact of these measures was felt slowly. Output in the last quarter of fiscal 1944 was slightly higher than in the previous quarter and production in the first half of fiscal 1945 was

[45] Nine hundred technicians and skilled oil workers were lost enroute to the Netherlands East Indies when a United States submarine sank the *Taiyo Maru* in May 1942.

[46] For an account of Japanese problems in oil well drilling, see *Japanese Petroleum Drilling Methods and Equipment*, Natural Resources Section, SCAP-GHQ, Report No. 49, Tokyo, August 7, 1946.

higher than in the last half of 1944. (See Table 14.) The difference, though, was so small that it had absolutely no effect on the overall oil picture.[47]

With the passage of the Synthetic Oil Industry Law of 1937, Japan undertook a seven-year plan for synthetic oil production which pointed to a goal of 14 million barrels for 1943.[48] The plan was almost a complete failure. For the entire seven-year period, as may be seen in Table 15, the

TABLE 15

JAPANESE SEVEN-YEAR PLAN FOR SYNTHETIC OIL PRODUCTION, INNER ZONE, 1937-43

(in thousands of barrels)

Fiscal Year	*Planned Production*	*Actual Production*	*Percent Actual of Planned*
1937	550	31	6
1938	920	69	7
1939	3,073	135	4
1940	5,847	150	2.5
1941	7,816	1,222	15
1942	11,368	1,501	13
1943	14,046	1,048	8
Total	43.620	4,156	9

Source: Planned production from Synthetic Oil Industry Law of 1937; actual production figures from Imperial Fuel Industry Co.

Japanese met only 9 percent of the 43.6 million barrel target production. Peak output came in 1942 and, while it was only 13 percent of the seven-year plan target for that year, it was slightly less than the much more realistic Cabinet Planning Board war plan goal. The gulf between plan and performance widened much farther in 1943 when the Cabinet Planning Board estimated 4.5 million barrels of synthetic output while the seven-year plan called for 14 million barrels. As Table 15 indicates, only 8 percent of the goal was met for 1943. Synthetic output rose slightly in 1944 to 1,229.180 barrels, almost the same figure as 1941, but monthly output fell off sharply toward the end of the year and in 1945. Output in April 1945 was less than half the production of April 1944. Synthetic output never accounted for more than 5 percent of Japan's oil requirements, and since 55 percent of the synthetic capacity was located in Manchuria, the blockade in late 1944 and 1945 rendered even this relatively useless. Limitations of technical skill and the inability of the inherently limited economy to supply competing military and industrial needs for large quantities of high-grade steel and complicated equipment combined to prevent the construction of large-scale synthetic oil plants in Japan even before Pearl Harbor, and made it out of the question afterwards.

Synthetic oil in Japan was produced by three methods: from the low-temperature carbonization of coal; the hydrogenation of coal tar and shale

[47] For a detailed breakdown of home island production by districts, see *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Tokyo, No. 2, November 1945, p. 64.

[48] "The Synthetic Oil Industry," *Oriental Economist*, August, 1944, pp. 357-58.

oil distillates; and the synthesis from coal by the Fischer-Tropsch process. The seven-year plan provided for the completion by 1943 of ten hydrogenation plants, eleven Fischer-Tropsch plants, and sixty-six low-temperature carbonization plants. By the end of 1944, eight low-temperature carbonization plants, four hydrogenation plants, and four Fischer-Tropsch plants had been completed. Only one hydrogenation plant operated consistently on coal tar, a second processed shale oil distillate, and the remaining two were used, after failure to operate on coal tar, to process kerosene and gasoline from petroleum. Only two Fischer-Tropsch plants achieved production on a regular scale, the other two were used for test runs only.

The simplest of the three processes, low-temperature carbonization, was the most popular among the Japanese, as the plans indicated.[49] Lack of materials was the principal obstacle to the building of more plants. The allocation of steel to the industry actually declined after 1940 although large increases would have been essential to provide for the synthetic plant expansion scheduled in the seven-year plan. When oil was made an "essential" industry again in 1944, of the 17,400 tons of steel allocated to refineries and synthetic plants only 7,200 tons were delivered. Shortages ran the entire gamut from steelplate and pipe to wire, copper, nails, lumber and cement. By 1945 even bricks were unobtainable. Since hydrogenation is the principal method by which satisfactory aviation gasoline can be made from coal, coal tar, or shale oil, the Japanese were particularly anxious to obtain rights and information from the German owner of the Bergius process, the I. G. Farbenindustrie, A.G., but negotiations dragged on until January 1945 when Mitsubishi finally succeeded. The Japanese were never very successful in attempting to hydrogenate coal or even coal tar. While German hydrogenation plants specializing in production of aviation gasoline obtained yields as high as 80 percent of the primary oil processed, the Japanese never averaged better than 20 percent. The Japanese steel industry proved to be incapable of processing certain pieces of high-pressure equipment essential to the process. Only one plant, the Agochi Works of the Korea Synthetic Oil Company, with a daily output of 180 barrels, operated consistently on coal tar. The Fushun Works of the Manshu Synthetic Oil Company produced 2,800 barrels daily by processing shale oil. The remaining two hydrogenation plants, after unsuccessful attempts, abandoned the hydrogenation of coal and tar completely and turned to processing kerosene and gas oil from petroleum.[50]

Japanese rights to the German Fischer-Tropsch hydrocarbon synthesis process were acquired in 1936 by Mitsui from the German firm, Ruhrchemie,

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[49] See *Fuels and Lubricants*, ATIG Report No. 15, Tokyo, October 25, 1945. (Available in the Library of Congress, PB 16822.)

[50] See "Synthetic Petroleum," *Summation of Non-Military Activities in Japan*, SCAP-GHQ, No. II, Tokyo, November 1945, p. 86.

A. G. By the end of 1941 only one Fischer-Tropsch plant, the Omuta Works of the Japan Synthetic Oil Company, with a capacity of 700 barrels a day, had been completed. Actual production at the plant never exceeded 275 barrels a day, even though Ruhrchemie technicians stayed with the plant from start to finish, and were still in Japan at the end of the war. Although Germany shipped some equipment, the Japanese had to fabricate most of it themselves and the plant took four years to build. Even after it was in operation, difficulties multiplied rather than diminished. The coke ovens and water gas generators, for example, were designed for a better quality of coal than that available. The high sulphur content of the coal resulted in such severe corrosion that not more than three of the five water gas generators could be kept on steam and, consequently, not more than 75 percent of the design capacity of 15 million cubic feet of water gas per day was ever obtained. Because the coal ash had a relatively low fusion temperature which led to the formation of large clinkers, there was constant breakage of the mechanical grates in the generators. As a result it was necessary to reduce the operating temperature which reduced the capacity of the water gas generators and caused a higher content of impurities in the final product. A shortage of cobalt and thorium during the war led to substitution of nickel catalysts of low activity and this further reduced yields. Shutdowns were frequently due to the failure of operators to recognize the symptoms of trouble and to take precautionary steps. At the Omuta plant, the electrical control system was allowed to deteriorate through poor maintenance and was then replaced by dozens of men, each assigned to the task of adjusting a single valve.[51] It was for such reasons that daily output was not even half of capacity.

Japanese engineers simply lacked experience with fuel production and their techniques were poor. A butane hydrogenation unit copied from U.S. design was installed by the Mitsubishi Oil Company, but after being given a trial run this complex unit, essential for the production of aviation gasoline, was abandoned and later stripped of instruments and pumps to supply other units. At the Second Naval Fuel Depot tin equipment for handling hydrogen peroxide under vacuum collapsed because the design had not properly taken into account the tensile strength of tin. At the same plant a superfraction system was made by connecting several columns in series but satisfactory operation was seldom obtained because those operating it could not understand its complexity. Certain Japanese-designed cracking units never operated satisfactorily because of a number of basic errors in design including the use of steam for regenerating catalyst, a practice known to lower the catalyst activity.

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[51] See *Petroleum Production—The Japan Synthetic Oil Company, Ltd.* (Nihon Jinzo Sekiyu KK.). Military Intelligence Section, SCAP-GHQ, Tokyo. May 23, 1946. (Available in the Library of Congress, PB 27692.)

It was for such reasons that the synthetic fuel industry in Japan, in terms of its absorption of materials and manpower and its meager product, was more of a liability than an asset during the war. When its output was most needed, toward the end when supplies from the southern areas were cut off, it was least available, because 55 percent of capacity had been constructed in Manchuria to take advantage of the proximity and abundance of better-grade coal.[52]

In one aspect of their plan the Japanese almost succeeded. By the end of 1943 they had managed to restore oil output in the southern zone to almost its prewar level. As shown in Table 16, production of crude oil in

TABLE 16

PRODUCTION AND DISPOSITION OF CRUDE OIL, SOUTHERN ZONE, 1940-45

(in thousands of barrels)

Fiscal Year	*Production of Crude Oil in Southern Zone*	*Crude Oil and Refined Products from Southern Zone Received in Japan*	*Crude Oil and Refined Products Consumed or Lost in Southern Zone*
1940	65,100	.....	.....
1942	25,939	10,524	15,415
1943	49,626	14,500	35,126
1944	36,928	4,975	31,953
1945*	6,546	0	6,546

* First half of fiscal year.

Source: Rough estimates by Japanese Army-Navy Oil Committee in Tokyo and Fuel Bureau, Munitions Ministry. Due to the destruction of records at Singapore by the Japanese, the data are approximate. No division between consumed and lost in southern zone is possible. For detailed statistics on Japan's wartime oil position see Appendix C of "The Effects of Strategic Bombing on Japan's War Economy," USSBS U.S. Government Printing Office, Washington, D.C., December 1946, pp. 134-44.

the southern zone had totaled 65 million barrels in prewar 1940, then dropped to 26 million barrels in 1942, but was increased to a wartime peak of 50 million barrels in 1943. The Japanese had expected to find the wells completely out of operation and the refineries wholly destroyed. While this was true in some places, the Japanese were pleasantly surprised to find little or no damage in other areas. They landed drilling crews, equipment, etc., with their invading forces, and when they found some refineries undamaged they quickly brought skilled personnel from Japan proper. In anticipation of losing the refineries in the southern zone they had scheduled an expansion program designed to increase capacity in the home islands and by the end of 1944 succeeded in bringing it up to 116,100 barrels per day. (See Table 17.) The refineries in the southern area were quickly

[52] Another 5 percent was in Korea, 11 percent in Karafuto, 3 percent in Hokkaido, 12 percent in Kyushu and only 14 percent on Honshu.

TABLE 17

REFINING CAPACITY AND CRUDE OIL REFINED, JAPAN PROPER, 1941-45

Year	Refining Capacity Barrels per day	Total Crude Oil to Stills	
		Barrels per day	1,000 barrels per year
1941	89,300	42,500	15,515
1942	95,700	37,500	13,838
1943	114,100	39,700	14,489
1944	116,100	24,500	8,989
1945	28,000 *	4,700	950

* Estimated capacity remaining after bombing offensive.

Source: Fuel Bureau, Munitions Ministry.

restored and while their capacity was always adequate for the purposes at hand, they had some difficulty in continuous operation due to the need for spreading skilled personnel very thin, and to inability to obtain spare parts and replacement equipment from Japan. Refinery output in the southern area was concentrated upon aviation gasoline at the expense of motor gasoline and kerosene. In 1943 the Japanese were refining more aviation gasoline than had been produced in all refineries in the area in 1940, but motor gasoline output was only one-fourth and kerosene output only one-fifth of 1940 levels. While the motor gasoline could have been used in Japan proper, tankerage was not available to take it there, and it was in surplus supply in relation to the small number of vehicles on hand in the southern regions.

The Army and Navy divided the southern areas based on landing strength. Since the Army was numerically greater, it got much the bigger share, with approximately 85 percent of the oil resources falling into its hands. The Army seized the principal production fields and some six major refineries while the Navy obtained only the refinery at Balikpapan and the oil fields of Sanga Sanga and Tarakan. Since the Navy was the larger consumer and since both services operated their holdings as separate entities, the situation was embarrassing for the Navy. Fortunately, it held one trump; it controlled the tankers and the sea lanes. "But for this," one admiral declared, "the Army would undoubtedly have left the Navy without oil." A joint Army-Navy oil committee was formed which met at the Tokyo Officers Club while a parallel committee met in Singapore, once a month. Directives were sent by the Tokyo committee and at first more or less followed by the Singapore committee. Later, as ship sinkings rose, the Singapore committee acted pretty much on its own. All oil brought into Japan was under the control of the Joint Army-Navy Committee, which made the allocations, not the Munitions Ministry. Nor did the Committee tell the government what it brought in. In using civilian facilities in the home islands for refining crude brought from the southern areas, the Committee went direct to the refineries so that the oil did not come under government control. Its inspectors at the refineries stipulated how all crude should be refined.

By 1943 southern oil operations were going so well that Tojo announced that the oil problem had been solved.[53] Imports to Japan proper rose to approximately one-third the amount obtained from the United States during the thirties. There was no lack of oil in the southern regions and the fleet was able to fuel locally at will. Later in the year (1943), however, difficulty began to be encountered in getting the oil to Japan. Indeed oil imports reached their peak in the first quarter of fiscal 1943. A year later, in the first quarter of fiscal 1944, imports were less than half the comparable 1943 figure, while by the first quarter of fiscal 1945 they had vanished completely.

While oil output in the southern areas had risen beyond expectation, so had tanker sinkings. Japan began the war with 575,000 gross tons of tankers. By 1943 she appeared to be forging ahead and had increased her tanker tonnage to 834,000 gross tons, three-fourths of which was engaged in hauling oil from the southern zone to the home islands. But sinkings rose sharply from 4,074 tons in 1942 to 388,016 tons in 1943 and to 754,106 gross tons in 1944, far out-distancing ship construction. In two devastating raids on Truk and Palau in early 1944, carrier-based planes sank one-third of the tankers attached to the Japanese Combined Fleet. All subsequent fleet operations were affected. Tanker sinkings grew so bad that a Japanese naval captain testified: "Toward the end the situation was reached that we were fairly certain a tanker would be sunk shortly after departing from port. There wasn't much doubt in our minds that a tanker would not get to Japan." [54]

As a result of mine, submarine and air attack, Balikpapan and Soerabaja, the two chief oil ports, were abandoned in December 1944. The last tanker convoy bound for Japan left Singapore in March 1945 but never reached its destination. Thereafter no further attempts were made. A complete reallocation of shipping had been undertaken for the purpose of placing coal-burning ships in service in areas where coal was available and retaining motor ships for service in the south seas where bunkers could be replenished from local sources. Ships under construction were equipped with coal-burning boilers and many oil-burning ships were converted to coal. Available ships and tankers were overloaded and maneuverability decreased. Drums of all sizes and even fiber containers holding oil were loaded on the decks of freighters.[55] In a final desperate attempt to trans-

[53] *Oriental Economist*, February 1943, p. 63.

[54] USSBS Interrogation No. 468, Tokyo, November 29, 1945.

[55] One ingenious method was devised of transporting oil from the East Indies to Singapore in large rubber bags holding 300 to 500 barrels which were towed by tugs. The method failed because filling and emptying the bags was difficult and aviation gasoline, the priority cargo, attacked the rubber. In addition, towing difficulties decreased the maneuverability of ships and made them more vulnerable to air attack.

port oil to the home islands, submarines were used. A German Admiral in Japan testified that at the beginning of 1945 the Germans were refused permission to reservice their submarines at Singapore and were told that they would have to use Kobe, but that to acquire facilities at Kobe they must bring a full load of oil from the south. The Admiral declared that the Japanese were so economical with their oil and gave the German submarines such low-grade fuel for the trip from Kobe south that commanders told him they were constantly concerned lest they run out of fuel and become stranded.[56]

The drop in imports of southern oil was the governing fact in the Japanese fuel situation. The impact upon the economy and upon the war machine was tremendous. It will be recalled that the Planning Board had estimated that in the third year of war, inventories would have been exhausted and Japan would obtain thirty million barrels of oil from the occupied areas. Since only five million barrels, not thirty, were obtained, consumption was cut drastically to prevent inventories from disappearing altogether. The Japanese fully realized the gravity of their situation and took the few available but inadequate steps to meet it. Civilian consumption had been reduced sharply during the early part of the war. This was particularly true of motor gasoline. Before the war 80 percent of consumption was "civilian," but in 1941 drastic economics had been introduced. Almost all civilian motor traffic, including the operation of taxicabs, had been forbidden and a drive was started to equip essential gasoline-driven vehicles with wood or charcoal burners. Total civilian consumption (including essential business use) was cut from 6.3 million barrels in 1940 to 1.5 million in 1941.[57] This was further reduced until it totaled only 257,000 barrels in 1944, or 3 percent of the 1940 figure. Total consumption of motor gasoline in 1944, including military use, was 18 percent of the 1940 figure. By July 1945 the inventory of motor gasoline was down to 25 percent of total 1944 consumption. Even Army vehicles were converted from the use of gasoline. Since more and more freight was being shunted to the railroads toward the end of the war, because of the attack on shipping, the immobilization of transportation vehicles, because of lack of fuel, made transfer of goods difficult, caused materials, parts, etc., to pile up at terminals and added to the chaos of the time.

Pilot training was cut to thirty hours in 1944, or less than half the number of hours previously thought necessary, and at the beginning of 1945 all navigation training was eliminated. Pilots were simply expected to follow

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[56] USSBS Interrogation of Vice-Admiral Paul Weneker, No. 359. Tokyo, November 11, 1945.

[57] For details of the various restrictive measures, see sections on "Laws on Gasoline and Alcohol Consumption" and "Control Regulation on Fuel Substitutes," *Jidosha Nenkan*, 1943, Tokyo, pp. 58 and 126.

the leader to the target and few were expected to return. One of the basic reasons for the suicide flight was that it required fuel for one way only. Losses on combat missions were as high as 70 percent. Planes were delivered untested. The quality of gasoline was reduced from 92 octane to 87 and lower, and some gasoline was blended with considerable amounts of alcohol. On training flights 50 percent alcohol was used in 1944 and this was increased to 80 percent in 1945. An unwholesome combination of inadequately trained pilots, improperly tested planes, and inferior fuel raised non-combat ferrying losses to 40 percent. Reconnaissance flights and anti-submarine patrols were curtailed. According to the statistics available, the inventory of aviation gasoline fell to a million barrels in 1945, but it is probable that this is too high a figure. The confusion of the last months prevented the writing off of losses due to fire, bombing, sinking of vessels by mines, etc. All that U.S. authorities could discover when hostilities ceased were 190,000 barrels set aside by the Army and 126,000 by the Navy. These were hidden away in remote nooks, caves and countless concealed spots, in order to protect them from bombing and were to be used for suicide flights against the invasion forces. American military investigators were, however, completely puzzled as to how the Japanese would have been able to assemble their minutely-scattered hoards in time to service planes, in the event of invasion.

No decline was more drastic than the drop in the fuel oil inventory from its peak of 29,612,000 barrels on April 1, 1937, to 813,000 barrels on July 1, 1945. The decline in the inventory, almost to the vanishing point, was a good indication of the progressive immobilization of the Japanese Navy. By the time the inventory went below the one million barrel mark, naval ships had virtually ceased to operate. Shortage of fuel continually affected Japanese naval action and strategy. In the battle of the Mariannas, the second fleet, the battle fleet, was on hand but did not join the action because its fuel supply was low. The carrier force decided to approach directly rather than circuitously in order to conserve fuel.[58] The result was the famous " turkey shoot " of the Mariannas. Admiral Ozawa was asked:

Q. About what time during the course of the war was the operation of the fleet or the use of planes for training or operations first seriously inconvenienced by shortage of fuel?

A. About two or three months before the Mariannas Campaign we felt the shortage very keenly.[59]

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[58] Admiral Ozawa declared: "The plan was to go direct. *It would take too much fuel to take the longer route,* which had been considered, but we planned to go in straight and we did not change the plan during the approach."

[59] *Interrogations of Japanese Officials, op. cit.,* Interrogation No. 227, Tokyo, October 30, 1945, p. 226.

After the Mariannas battle the second fleet under Admiral Kurita went south to Singapore while that under Ozawa went back to the Inland Sea. Ozawa was asked:

Q. Where was the preferred base for your fleets at this time?

A. I thought the Inland Sea was the best base.

Q. If there had been no fuel shortage, both fleets would have been in the Inland Sea?

A. Yes.[60]

But by the summer of 1944 fuel stocks were so low that this was not possible. The fleet had to be divided so that one part could be fueled at oil sources. Rear Admiral Takata was asked a question which had puzzled American officers for a long while.

Q. Just one question of fact. On the morning of 25 October last year, why did not Admiral Kurita enter Leyte Gulf? [to attack General MacArthur's transports, which were at the time defended by only a very small U.S. naval task force of escort carriers. Kurita had approached within 40 miles of Leyte Gulf with a vastly superior fleet.]

A. Because of shortage of fuel.[61]

Many other phases of the complicated battle of the Philippines were affected by the lack of fuel. Takata was asked whether it was not the intention in the defense of the Philippines to combine Kurita's and Ozawa's fleet. He replied, "there was such a desire but it was impossible to do so for lack of fuel." The *Ise* and the *Hyuga*, two Japanese battleships, were unable to join the battle off the Philippines, though they came down from Japan to do so. Shortage of fuel prevented them from getting there in time. With fleet units separated, careful timing and coordination was essential but the Japanese cruiser force arrived in the Surigao Straits several hours late because speed had to be cut down to conserve fuel. Admiral Kurita's decision to take his battered fleet back through narrow San Bernardino Straits at night was also due to fuel shortage. Kurita declared, when asked what was the governing consideration for this disastrous action:

It was primarily fuel. Furthermore, if and when brought under air attack on the following day in the passage through the islands, I would have to use extra fuel in dodging and maneuvering. Therefore the fuel was very important consideration, the basic one.[62]

The Japanese committed their entire fleet to the Philippine action because they realized that if they lost it would mean the end of their fuel supply. Kurita declared:

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[60] *Ibid.*, p. 220.

[61] *Interrogations of Japanese Officials, op. cit.*, Interrogation No. 258, Tokyo, November 1, 1945, p. 266.

[62] *Interrogations, op. cit.*, No. 47, Tokyo, October 16-17, 1945, p. 47.

. . . if you seized the Philippines it would cut off fuel supply to the Empire and that all supply of fuel being severed, the war in all areas south of the Empire must end. The Philippines were vital to the continuation of the war.[63]

In February 1945 an order was issued that all home island-based vessels likely to consume more than 12,000 tons of oil per month were to be relegated to the inactive list. As a result the battleship *Haruna* and several carriers were taken out of service. In the face of the desperate need for bottoms, over 100,000 tons of oil-burning shipping in the home island coastal service were laid up early in 1945. By April 1945, naval stocks were so low that of five battleships left afloat, only one, the *Yamato*, was able to sortie against our forces invading Okinawa. Admiral Toyoda, chief of the Naval General Staff, declared:

The fleet fuel situation became very acute early in this year. Our surface units were restricted even as to their training activities, and any large-scale operation requiring heavy supplies of fuel became almost out of the question. On 7-8 April of this year when the battleship Yamato was sent with a dozen or more destroyers into Okinawa, we questioned whether there was a 50-50 chance. Even in getting that squadron together we had a very difficult time getting the necessary 2500 tons of fuel oil together. . . . That is how acute the fuel situation was in the early part of this year.[64]

Oil tanks all over Japan in 1945 were running dry and being torn down for scrap. Seven percent of all U.S. bombs dropped on Japan fell on the oil industry. Every important refinery on Honshu was hit; 85 percent of total capacity was rendered inoperative but for the most part the bombs fell on inactive plants. The capacity which remained after the attack was still ten times that necessary to refine the domestic output. A variety of "substitutes" were pushed. Oils from soy beans, peanuts, coconuts, and castor beans were processed for industrial use. Methanol, ethanol, and acetone were used to replace gasoline; butanol was employed both as a source of iso-octane and directly in gasoline; lubricating oil was made from all types of vegetables and fats. Civilian stocks of potatoes, sugar and rice wine were taken for conversion to alcohol; oil was distilled from crude rubber. In desperation the Navy undertook its fantastic pine root oil project. With the slogan "two hundred pine roots will keep a plane in the air for an hour," people all over Japan were set to work digging up pine roots. Some 34,000 kettles, stills, or small distillation units were readied, each capable of producing three to four gallons of crude oil per day.[65] Manpower requirements were amazing. The production of one gallon of crude pine root oil took 2.5 man-days of work. Since the Japanese hoped to obtain about

[63] *Ibid.*, p. 34.

[64] *Interrogations, op. cit.*, No. 378, Tokyo, November 13-14, 1945, p. 316.

[65] Pine root processing involved heating the kettles of pine roots for about twelve hours. About 50 percent crude was thus obtained.

12,000 barrels of crude per day when the project reached its maximum, this would require 1,250,000 persons per day. By June 1945 production of crude pine root oil had reached 70,000 barrels per month, but refining difficulties had not been solved. By the time the war ended only 3,000 barrels of gasoline intended for plane use had been produced and there was no indication that it had ever been tried in a plane. U.S. Army units tried it experimentally in jeeps and found that in a few days it gummed the engines beyond use. Traces of the pine root oil project were apparent when U.S. forces landed. Monumental piles of roots and stumps lined many of the roadways. Mountainsides were stripped bare of every tree and sapling and the crude stills were to be found in many Japanese villages.[66] Such were the limits to which the Japanese were driven by the sinking of their tankers and the severance of the oil line to the south. The significant report of Cabinet Secretary Sakomizu, surveying national resources as of June 1-10, 1945, discussed in the preceding chapter, declared:

> Hereafter Japan, Manchuria, and China will have to depend upon their own sources for fuel oil. With oil reserves on the verge of exhaustion and the delay in plans for increased output of oil, we are faced with an extreme shortage of aviation fuel. This, of course, will have a serious effect on the planning of future operations, especially after the mid-year.

The U.S. overestimated Japan's oil position from the outset and continued with a large margin of error until the very end. Estimates by various U.S. agencies of Japan's stockpile at the outset of the war ranged from 75 to 80 million barrels. A revision by the Joint Far Eastern Oil Committee, formed in March 1945, placed the figure at 57 million barrels. It will be recalled that it actually was 43 million barrels. In July 1945 U.S. estimates were over twice Japan's inventory at the time. Estimates of synthetic oil output had the largest margin of error ranging from seven to eight times actual 1944 output. Aviation gasoline reserves, however, were correctly estimated.[67]

Light Metals

Aluminum

Japan was wholly dependent upon imported bauxite for her aluminum output. Although the fabrication of aluminum began in the early thirties, using continental and domestic substitutes such as aluminous shale, alunite, alum clay, etc., high costs of production and technical difficulties soon led

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[66] Two of the stills were erected on the golf course of one of Tokyo's exclusive clubs and the members were expected to set a good example by spending spare time digging roots to keep the stills stoked.

[67] All estimate figures from Appendix A, "U.S. Economic Intelligence on Japan," *The Effects of Strategic Bombing on the Japanese War Economy*, USSBS, Washington, 1946, pp. 79-80.

to a shift to bauxite and the Bayer process.[68] The use of substitutes was never wholly abandoned. Indeed a subsidy was paid to enable producers using the substitutes to fare the same financially as those using bauxite. Japan never completely lost sight of her extreme vulnerability and of the possibility of bauxite supplies being cut off and toward the end of the war shifted back to the use of substitutes as bauxite imports vanished. But from 1937 to 1944 by far the main emphasis was on construction of plant capacity to process bauxite. It was upon this uncertain base that the great expansion of Japan's aircraft industry was built.

Early imports of bauxite were drawn from Greece, British India and the Netherlands East Indies. A pre-Pearl Harbor import peak was reached in 1939 when 352,458 metric tons of bauxite were imported. By this time most of the supply was being purchased from Bintan in the Netherlands East Indies and from British Johore and Malacca. Japan's potential victims were providing her with the means of aggression. Bauxite was discovered in the mandated islands in 1936 and by 1941 they provided a little over one-third of Japan's total bauxite imports. In 1941, due to foreign embargoes, bauxite imports fell to a low of 146,711 tons. (See Table 18.)

TABLE 18

ANNUAL IMPORTS OF BAUXITE TO JAPAN PROPER AND FORMOSA, BY REGION OF ORIGIN, 1936-45 *

(in metric tons)

Fiscal Year	*Palau*	*Bintan*	*Malaya, (Johore and Malacca)*	*Indochina*	*Others*	*Total*
1936	.....	9,192	958	.....	14,612	24,762
1937	.....	46,663	27,984	.....	26,502	101,149
1938	3,655	117,269	76,505	.....	23,049	220,478
1939	13,987	202,081	104,692	.....	31,698	352,458
1940	22,495	194,729	62,965	.....	.....	280,189
1941	59,297	58,059	26,140	3,215	.....	146,711
1942	103,907	274,449	55,831	15,947	.. ..	450,134
1943	84,940	594,589	138,555	2,450	.....	820,534
1944	4,488	287,782	55,065	.....	.....	347,335
1945	.....	1,800	.....	.....	.....	1,800

* By wet weight 1936-41; by dry weight 1942-45. Moisture content approximately 10 percent.

Source: Bureau of Mines, Ministry of Commerce and Industry.

[68] After bauxite is mined, it is generally crushed, washed, dried in rotary kilns, and screened prior to shipment. The first step in the manufacture of aluminum involves purification and concentration of the ore by the Bayer process. The bauxite is treated with caustic soda; the iron, silica and other impurities are removed from the solution; and the aluminum hydrate is then precipitated and dried. The concentrated product is aluminum oxide, a whitish powder known as alumina. The second step involves the reduction of alumina to aluminum, which is achieved by electrolysis. This is performed in a series of reduction cells. After cryolite has been dissolved by an electric current, alumina is added, the current breaking down the alumina into aluminum and oxygen. The oxygen combines with the carbon anodes, and the resulting carbon dioxide and carbon monoxide escape through the crust at the top, where the carbon monoxide burns. The molten aluminum is deposited at the bottom of the cells and runs into a ladle from which it is cast into pigs.

Not all of the bauxite imported prior to December 7, 1941, went into aluminum production. By December 1941 the bauxite stockpile totaled 254,740 metric tons, an amount slightly less than nine months' supply at the then current rate of utilization. However, in the light of actual realized increase in the rate of aluminum production necessitated by rising aircraft requirements, this bauxite supply was sufficient for less than seven months. Obviously, therefore, continued aircraft production in Japan depended upon the quick subjugation of the southern areas, after December 7, and their rapid exploitation.

The Japanese war plan with respect to bauxite came very close to success during the first year of the Pacific War. The Cabinet Planning Board estimated that Japan would require 480,000 tons of bauxite in 1942, of which 50,000 was to be obtained from the mandated islands, 350,000 from the Dutch East Indies and 100,000 from British possessions.[69] During 1942 Japan actually imported 450,000 tons. The yield from the mandates, as shown in Table 18, was double expectation. While the amount obtained from Bintan was 75,000 tons less than anticipated, it was nevertheless five times greater than the 1941 figure. The yield from the British possessions was half of that anticipated but double the 1941 figure. Since consumption was slightly higher than the 480,000 tons anticipated, Japan was forced to draw down her stockpile to the extent of some 45,000 tons. (See Table 19.)

TABLE 19

STOCKS OF BAUXITE, ALUMINOUS SHALE, ALUMINA, AND PRIMARY ALUMINUM INGOT IN JAPAN PROPER, FORMOSA, AND KOREA, 1941-45

(in metric tons)

Date [a]		Bauxite [b]	Aluminous Shale [c]	Alumina	Primary Ingot [d]
1941	December	254,740	3 650	5,500	.....
1942	March . .	191,174	6,520	4 190	7,000
	June .. .	172,620	1 522	7 293	8,100
	September	133,247	8,766	2,051	10 900
	December	209,427	9,572	3,002	12,500
1943	March .	209,607	11,855	2 897	10,400
	June ...	206,287	13,844	3 005	8,000
	September	201,648	13 635	22,256	5,500
	December	296,981	19,474	19,331	4,800
1944	March .	238,471	20,692	19 525	3,700
	June .	176,241	36,109	10,491	9 700
	September	36,196	37 664	11,376	6,900
	December	2,651	32,061	4 227	4,700
1945	March .	5,233	38 767	1 543	5,300
	June . .	..	55 168	998	5,700
	August .		33 705	. ..	4,129

[a] End of month

[b] Held in Japan Proper and Formosa

[c] Held in Japan proper and Korea

[d] Includes stocks at all reduction plants and in the hands of the Imperial Light Metals Control Company (Teikoku Keikinzoku Tosei Kabushiki Kaisha) but excludes stocks held at fabricating plants

Source. Light Metals Control Association (Keikinzoku Tosei Kai)

[69] See *Estimation of Japanese Strength Before and After Outbreak of Greater East Asia War*, Cabinet Planning Board, Tokyo, December 1941, Table 3, "Comparative Annual Supply and Demand of Essential Materials."

The year 1943 marked the peak of Japan's bauxite position. Imports almost doubled, reaching 820,534 metric tons. As much as 115,000 tons were imported in a single peak month of December and by the end of this month bauxite stocks had not only regained but were some 40,000 tons higher than the December 1941 stockpile figure. Imports from Bintan had more than doubled, reaching the unprecedented figure of 594,000 tons. However, even in 1943 signs of trouble were apparent. Imports from the mandated islands dropped off and those from Indochina almost vanished. The year 1944 saw a development typical of Japanese industry at this stage of the war. End-product output—in this case, aircraft—rose sharply and reached a peak late in the year, while the raw material base, in this instance bauxite supply, fell drastically. Bauxite imports were 58 percent less in fiscal 1944 than in the preceding year. Imports from Indochina ceased after March 1944, from the mandates after August 1944, from Malaya after January 1945, and from Bintan after April 1945. The last significant shipment, some 12,000 tons, was obtained from Bintan in February 1945. The decline in monthly imports of bauxite over the last year of the war may be seen in the following figures (in metric tons):

Year	*Month*	*Mandates*	*Bintan*	*Malaya*	*Indochina*	*Total*
1944	June	....	61,532	15,420	.....	76,952
	July	....	24,390	.....	.....	24,390
	Aug.	3,488	79,630	10,330	.....	93,448
	Sept.	....	8,525	9,455	.....	17,980
	Oct.	....	9,695	.....	.....	9,695
	Nov.	....	13,860	.....	.....	13,860
	Dec.	....	6,400	.....	.....	6,400
1945	Jan.	....	21,590	6,000	.....	27,590
	Feb.	....	11,927	.....	.....	11,927
	Mar.	....	615	.....	.....	615
	Apr.	....	1,800	.....	.....	1,800
	May	....	.....	.....	.....	.....
	June	.....	.....	.....	.....	.....
	July	....	.....	.....	.....	.....

The hard and governing fact for the Japanese was that after August 1944 they obtained only a trickle of bauxite, and after February 1945, for all practical purposes, none at all. By the end of December 1944 bauxite stocks were down to a mere 2,651 tons and by April 1945 they had vanished completely. (See Table 19.)

As the supply of bauxite fell off, the Japanese turned to the use of aluminous shale from North China. While some Japanese had been aware of the threat to bauxite supply and pressed for protective conversion measures, as one official pointed out: "The very favorable turn of events at the beginning of war made all Army, Navy, government authorities and business circles intoxicated with great joy, so that all of them were forgetful of the process-conversion problems in the summer of 1942." [70]

[70] Interrogation of Yoshida, Ichio, Managing Director, Light Metals Control Association, Tokyo, November 18, 1945.

After Guadalcanal, however, a committee composed of industrial and research specialists was appointed by the Prime Minister to investigate Japan's aluminum position. The Committee's report of July 1943, after discussing the danger to Japan's bauxite supply, recommended (1) the expansion of aluminous shale production facilities in North China; (2) complete conversion of existing Bayer process plants to the use of aluminous materials from North China and Japan; (3) expansion of continental production by construction of new plants and transfer of plants from Japan; and (4) the use of converted cement plants in Japan for production of aluminous clinker, in turn to be processed by alumina plants. No steps toward conversion were taken, however, until the beginning of 1944. During this year imports of aluminous shale were stepped up sharply as the following table shows:

IMPORTS OF NORTH CHINA ALUMINOUS SHALE INTO JAPAN PROPER AND KOREA, 1939-45

(in metric tons)

Fiscal Year	*Japan Proper*	*Korea*	*Total*
1939	32,040	3,950	35,990
1940	37,000	14,710	51,710
1941	25,465	19,500	44,965
1942	23,884	23,474	47,358
1943	25,811	24,688	50,499
1944	114,949	32,462	147,411
1945—Apr.	8,934	.....	8,934
May	25,768	1,188	26,956
June	1,724	.....	1,724
July	.....	.....	.....
Aug.	.....	.....	.....
Total (Apr.-Aug.)	36,426	1,188	37,614

Source: Bureau of Mines, Ministry of Commerce and Industry.

The plan for North China aluminous shale production for 1944 called for an output of 930,000 metric tons. Actual production was 426,000 metric tons. The major share of the output, however, piled up at the mines, rail heads and harbors, due to lack of rail facilities in North China, inadequate handling facilities at Tsingtao and Chinwangtao, and to the shipping shortage. The 89,138-ton increase in shale imports to Japan proper could hardly compensate for the 473,199-ton decline in bauxite imports, even if all other factors were equal. As it happened, they were not. While the alumina content of the shale, 50-58 percent, was as high as that of bauxite, its silica content averaged 17-20 percent and more, and was about three times as high.[71] The high silica content of the shale resulted in difficulties of separation and handling which were never fully worked out. Japanese experts stated that in time they believed they would have been able to work out the difficulties, but that conversion on a large scale was undertaken too late.

[71] See *Aluminum Industry of Japan*, Pt. 1, Special Report No. 9, SCAP-GHQ, Economic and Scientific Section, Research and Statistics Division. Tokyo, April 3, 1946, p. 5. (Available in the Library of Congress, PB 23602 and 23603).

Furthermore, the production actually accomplished was wasteful of the very limited shale supplies on hand in Japan proper. The following table compares actual raw materials used per ton of alumina with quantities which the Japanese Industrial Research Laboratory set as standard for Japanese alumina production utilizing aluminous shale.

Material	*JIRL Expectations*	*Actual Use*
Aluminous shale	2.3 tons	4 tons
Clinker	4 tons	6+tons
Soda Ash	260 Kg.	800 Kg.
Limestone	850 Kg.	950 Kg.

Source: Light Metals Control Association.

The "actual use" data in the table above were derived from operations which had been considered to have reached a stage of "efficiency." In earlier operations use of 6-8 tons of shale was not uncommon. From given supplies of shale the alumina derived was only 58 percent of that technically possible; or conversely, to produce given quantities of alumina, 74 percent more shale and 208 percent more soda ash were required than under conditions of expected efficiency. This was particularly serious in view of the shortage of soda ash.[72] A method of desperation was resorted to by the Japanese, which, though cumbersome and wasteful, was used to economize on soda ash. Aluminous shale was electrolyzed directly in aluminum reduction plants, producing a low-grade metal of 70-80 percent aluminum. The crude product, as well as various types of scrap aluminum, or "dross," was then put through the normal Bayer process, appearing as alumina, and finally electrolyzed again to produce virgin ingot. While aluminum produced in this manner was found satisfactory, the method was highly wasteful of synthetic cryolite, used huge quantities of electric power, and took much more time. Production of the crude metal from direct electrolysis of the shale, was as follows: (in metric tons)

Year & Quarter	*Japan*	*Korea*	*Total*
1944—III	560	...	560
IV	1,294	173	1,467
1945—I	3,566	159	3,725

Source: Light Metals Control Association.

Despite the elaborate attention paid to the processing of aluminous shale during the last year and a half of the war, the total quantity of alumina produced from non-bauxite sources, including aluminous shale, alunite, alum-clay and scrap was never large. As may be seen in Table 20, in 1944

[72] See *Oriental Economist*, November 1943, p. 527, and January 1944, p. 28.

TABLE 20

SUMMARY OF SUPPLY OF PRIMARY ALUMINUM IN JAPAN PROPER, KOREA AND FORMOSA, 1937-45

(in metric tons)

Fiscal Year	Production of Alumina			Production of Aluminum Ingot	Imports [b]	Total Aluminum Supply
	From Bauxite	From other than Bauxite [a]	Total Alumina			
1937 ..	24,316	7,181	31,497	13,979	13,701	27,680
1938 ..	38,656	9,618	48,274	20,736	23,847	44,583
1939 ..	53,956	11,240	65,196	29,559	36,701	66,260
1940 ..	81,837	15,650	97,487	40,863	n.a.	n.a.
1941 ..	136,837	15,046	151,883	71,740	n.a.	n.a.
1942 ..	212,558	13,623	226,181	103,075	2,000	105,075
1943 ..	304,734	13,757	318,491	141,084	3,000	144,084
1944 ..	190,585	34,626	225,211	110,398	4,205	114,603
1945 ..	1,621	14,598	16,219	6,647	1,070	7,717

Note: "n.a." indicates data not available.

[a] Includes production from aluminous shale, alum-clay, alunite, and scrap.

[b] 1942-45 imports obtained from Manchuria only.

Source: Light Metals Control Association.

only 35,000 tons of alumina were produced from these non-bauxite materials, or 15 percent of the total 1944 alumina output, and this was the equivalent of about 17,000 tons of aluminum. In the first quarter of 1945, however, because of the drastic decline in bauxite availability, such materials accounted for 89 percent of total alumina production. Early in 1945, however, even aluminous shale from North China was hit by the ever enveloping blockade and a study of the Foreign Ministry in February noted:

> Even if we estimate future transportation most realistically and look at the supply and demand for soda ash, which is necessary in the handling of alumina, we will see that it would be difficult to arrange for a great quantity of aluminous shale in Japan for the 1945 fiscal year. Rather it is necessary at this time on the part of Japan, by absolute decision, to devise a sufficient arrangement for producing alumina from white alunite, clay and other home raw products and to devise quickly a counter measure which will enable us to cease to depend on aluminous shale. Moreover, it is necessary, in managing the raw materials the best possible way, based on the estimates of the supply and demand of types of soda, to set up manufactures and techniques at this time by methods which do not require soda [i.e., the electric oven method and the sulphuric acid method] . . . moreover, it is highly necessary to stimulate at the same time methods of wood and metal plane construction which do not depend on aluminum.[73]

Thus by the time significant operational capacity had been converted to process shale, the blockade cut off the supply of shale. At about that time the Army started large-scale mining of alum-clay deposits, but while research in methods of treatment had been undertaken, no practical utilization of either local alunite or alum clay had been made by the end of the

[73] *Dependence of Japan on Continental Raw Materials*, Internal Economics and Raw Material Series, No. 16, Research Bureau, Foreign Ministry, Tokyo, 1945, p. 9.

war. The largest alum clay deposits, estimated at 100,000,000 metric tons, were located near Kurosawaziri in Iwate prefecture, Honshu. The Kokusan Keigin Company tried to exploit these deposits in 1943 but after seven months of irregular production of alumina the company was forced to close down because of technical difficulties in the extraction process. Operations were resumed in August 1944 and continued until the end of the war, but during its entire history the company produced only 496 metric tons of alumina. Another company, the Dai Nippon Kagaku, attempted to process alum clay but it too encountered processing difficulties and produced only 66 tons of alumina from November 1944 to June 1945. The Japanese had somewhat more success with alunite as a raw material. One company, the Asada Kagaku, used alunite as its source of alumina during the entire period of its operation.[74] On the whole, however, only a very small quantity of alumina was produced from such materials at high cost and there was no significant contribution to Japan's aluminum supply.

For some inexplicible reason, the Japanese continued to expand alumina capacity at a time when the supply of its raw material was declining sharply. The greatest expansion in capacity occurred during the years 1939-41, when alumina capacity increased by 144,200 tons and aluminum capacity by 73,600 tons.[75] This was largely the result of the stimulation provided by the passage in 1939 of the Light Metals Manufacturing Law which subsidized the industry. Of the 229,100 tons of alumina capacity at the outset of the Pacific War, 196,100 was in Japan proper, 9,000 in Korea and 24,000 in Formosa. There was an additional 20,000 tons of alumina capacity available in Manchuria. Of the 111,200 tons of aluminum capacity, 86,700 was in Japan proper, 7,500 in Korea and 17,000 in Formosa. There was an additional 10,000 tons of aluminum capacity in Manchuria. This was more than adequate to meet aircraft requirements at the time, and alumina output in 1941 was only 65 percent of capacity while aluminum production was 64 percent of aluminum capacity. Nevertheless, capacity continued to expand during the war years, though at a progressively slower rate. Alumina capacity was almost doubled with the increase confined almost entirely to Japan proper, while aluminum capacity rose 64 percent with a proportionately greater percentage increase in Korea than in Japan proper.[76] In 1944 alumina production was 56 percent of capacity while

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[74] *Mineral Resources of Japan Proper, 1925-1945*, a Preliminary Report, No. 44, Natural Resources Section, SCAP-GHQ, Tokyo, July 5, 1946, p. 17.

[75] "Broad Expansion of the Aluminum Industry," *Oriental Economist*, May 1942, p. 241.

[76] For a detailed statistical analysis of wartime alumina-aluminum production in Korea, see *Korean Mineral Industry Statistics*, a Preliminary Compilation, Report No. 23, Natural Resources Section, SCAP-GHQ, Tokyo, March 18, 1946.

aluminum output was 60 percent of aluminum capacity.[77] Had the bauxite been obtainable, aluminum fabricating capacity would have amply met the needs of the Japanese aircraft industry It is apparent that the Japanese problem was not one of capacity but of raw material supply.[78]

Japanese production of primary aluminum ingot doubled between 1941 and 1943, as may be seen in Table 20. Although 1943 was the peak year of output, the highest monthly rate was achieved in May 1944, when production totaled 15,080 tons or an annual rate of 180,000 tons, very close to maximum capacity Thereafter the deterioration of the Japanese aluminum position was rapid By December 1944 production was down to 44 percent of the May peak, monthly output was 6,702 tons or at an annual rate of 85,000 tons. By June 1945 output was down to 1,538 tons, 10 percent of the May 1944 figure, and the annual rate was only 18,000 tons The decline in output from May 1944, monthly through the end of the war, may be seen in the following table (in metric tons):

Year	*Month*	*Japan Proper*	*Korea*	*Formosa*	*Total*
1944	May	11 657	1,884	1 539	15.080
	June	10,931	1,508	1,526	13,965
	July	9,344	1 221	1,313	11,878
	Aug	8,662	1,207	1 065	10,934
	Sept	8,327	898	869	10 094
	Oct	8 078	1,100	399	9,577
	Nov	5,805	1,070	135	7,010
	Dec	5.090	940	672	6,702
1945	Jan	3,366	566	431	4,363
	Feb	2,646	387	158	3.191
	March	3,271	442		3,713
	April	2 349	479		2,828
	May	1,872	409		2.281
	June	1,183	355		1 538
	July	(combined 1 158)			1,158

In addition to the above figures there was a small amount produced in Manchuria. The original five-year plan of 1937 for Manchuria had set a goal of 15,000 tons of aluminum ingot per annum for 1941 but actual production reached only 8,000 tons. Thereafter sights were lowered somewhat, with a 10,000-ton goal set for 1942, 1943 and 1944. This was never achieved, the highest output being 8,557 tons in 1943. In 1944 output dropped slightly to 7,617 tons, of which 4,205 tons were shipped to Japan proper.[79] A goal of 12,000 tons was set for 1945, but based on first quarter output, annual

[77] Aluminum capacity figure used was the 1944 peak figure of 183,100 tons since damage to the Formosa plants which caused the reduction in capacity came late in the year.

[78] The Japanese Five-Year Plan of 1937 had set a goal of 175,000 tons of aluminum capacity for 1942 This was attained by 1944

[79] Data through 1942 from *Results of Manchukuo's Five Year Plan*, Cabinet Planning Board, Tokyo, July 1943 Figures thereafter from Tokyo office of Manshu Keikinzoku Seizo KK (Manchukuo Light Metals Manufacturing Co)

production would have been less than 5,000 tons and little could have been shipped to Japan. Thus the Manchurian contribution to the Japanese aluminum situation was negligible.

Parallel with the decline in quantity went a corresponding decline in quality and a greater use of scrap rather than primary ingot, which made the overall aluminum picture worse than the purely quantitative data suggest. As the amount of primary ingot production fell off, the Japanese had to resort to increasing quantities of processing scrap. In the second quarter of fiscal 1944 virgin ingot constituted 75-78 percent of aluminum entering the aircraft pipeline,[80] a fairly normal relationship compared with British and American experience, but thereafter the picture changed rapidly. During the third quarter the percentage of virgin varied between 30 and 50. By the fourth quarter pure primary ingot was the source of only 20 percent of the available supply, scrap accounting for fully 80 percent. When bauxite became critical and substitutes were more extensively employed, there was a marked effect on the quality of the aluminum produced. Aluminum purity began to dip under 99.0 percent in late 1944 and by the end of the war was down to 96-97 percent. Although castings of the strength and soundness required for aircraft are not satisfactory when produced from aluminum of this quality, Japanese plants used it to cast engine crankcases, cylinder heads, cylinder blocks, and other vital parts. Furthermore, the quality deterioration resulted in the breakdown of close control of composition in specifications for aluminum alloys. An examination of representative specifications of principal aluminum alloys for castings and wrought products selected from "Japanese Aeronautical Specifications," issued by the Technical Institute (Gijutsuin), in November 1944, indicated the breakdown of quality controls. Principal impurities were given liberal maxima and little attempt was made to set an overall impurity limit. Where such limits were established, they were so wide as to be practically meaningless. Progressive broadening of the ranges of the three principal alloying elements —copper, magnesium and manganese—and the larger tolerance of the principal impurities—iron, silicon and zinc—were striking. Furthermore, no limitation was placed on other impurities such as tin and lead. For example, the Toyama plant of the Showa Denko KK., which electrolyzed shale directly, produced an ingot containing about 7 percent iron, 11 percent silicon, 1 percent titanium and 81 percent aluminum.[81] Although some increased difficulty was experienced in aircraft parts and greater breakage of plane components toward the end of the war, as will be shown in the following chapter, since there was a six months lag between ingot production and completion of the plane, the greater proportion of the impure aluminum was in

[80] Ingot had to be supplied from 4.5 to 6 months before fly-away time.

[81] *Some Technical Problems in Japan's Aluminum Production,* Light Metals Control Association, Tokyo, November, 1945.

the pipeline, and its impact in accidents, breakdowns, etc., would have been felt more sharply in the last half of 1945.

The allocation records of the Imperial Light Metals Control Company (Teikoku Keikinzoku Tosei KK.) provide a fair indication of actual aluminum distribution, and these are presented in Table 21. It is apparent that

TABLE 21

PLANNED TOTAL NEW SUPPLY AND ALLOTMENT OF PRIMARY ALUMINUM TO ALLOCATION CATEGORIES, 1942-45

(in metric tons)

Fiscal Year	Planned Total Supply [a]	Allotment [b] Total	Allotment to Allocation Categories [b] (percent)			
			Aircraft	Army	Navy	Indirect Military and Civil
1942 ...	116,370	108,726	60.9	13.7	5.4	20.0
1943 ...	152,050	145,438	72.4	7.8	4.8	15.0
1944 ...	133,440	112,511	89.0	3.2	3.3	4.5
1945 [c] ..	16,000	10,200	100.0	...	..	...

[a] Mobilization plan for total allocations.

[b] Distribution program of Imperial Light Metals Control Company (Teikoku Keikinzoku Tosei Kabushiki Kaisha).

[c] First quarter.

Source: Light Metals Control Association.

in the period of confidence and optimism in 1942 and 1943, the Japanese permitted a significant percentage of aluminum output to be used in other than aircraft production. In 1942, of the total allotments of primary ingot, only 61 percent went into aircraft uses. In 1943 only 72 percent was devoted to aircraft. During this period aluminum was substituted for copper in a number of aircraft and electrical uses. As much as 20 percent of the copper required for wire and 90 percent of copper in air frames were replaced by aluminum. As late as the January-March 1944 quarter, as much as 17 percent of primary ingot was officially destined for other than aircraft uses. An additional leak developed in the handling of the scrap situation. Secondary aluminum production from "old" and "new" scrap was handled differently. Directly usable "old" scrap, after collection and remelting, was purchased by the Imperial Light Metals Control Company and distributed by allocation certificate to authorized consumers.

"New" scrap, however, that is, cutting and processing wastage largely within the aircraft industry (the loss ratio in processing fabricated shapes was estimated to be as high as 45 percent), was normally collected and returned to the three major fabricating companies for rechanneling within the industry and not subject to further allocation control. The Air Ordnance Bureau discovered that some aircraft companies were not above selling such scrap in the black market. Further non-essential uses, such as in kitchen utensils, were not eliminated until 1944-45.[82] While the total

[82] See Chart No. 14 in *Summation*, SCAP-GHQ, Tokyo, March 1946. No. 6, p. 123.

amount used in such fashion was not large it is indicative of lack of realization of the gravity of the situation and of loose administration. It was only in the last year of the war that Japan succeeded in channeling almost all of her rapidly vanishing aluminum output into aircraft uses.

Although the aluminum industry was highly concentrated in a few plants, no concerted air attack was attempted, with the exception of 197 tons of bombs dropped on the alumina-aluminum plant at Takao, Formosa,[83] (which was operating at only 34 percent of capacity due to lack of bauxite, at the time of the attack). Such incidental damage as the industry sustained due to the impact of the urban air raids occurred after June 1945, when the industry was operating at 10 percent of capacity due to lack of raw materials. The decline in aluminum output may therefore be attributed wholly to the blockade which cut off imports first of bauxite and then of aluminous shale. While there was enough aluminum still left in the pipeline to meet the low 1945 level of plane output until the end of the war, the Fall of 1945 would have witnessed the end of the production of aluminum aircraft in Japan due to the lack of raw materials.[84] At the end of the war Japan's aluminum resources consisted almost entirely of scrap and comparatively small amounts of finished materials in the hands of processors, plus the few thousand tons a year which could be eked out from the inferior domestic materials such as alum clay. The precipitous decline in aluminum production by 1945 may be seen in Chart 4.

Magnesium

The history of magnesium during the war paralleled that of aluminum except on a very much smaller scale.[85] The industry had its origin in the early thirties. The first plant was that of the Riken Metal Manufacturing Company at Ube, erected in 1933. Capacity rose from 1,500 metric tons in 1935 to 4,200 in 1941. Output rose by almost 600 percent from 379 tons to 2,559 tons. Of the eight plants built by the beginning of the Pacific War, six were in Japan proper, one in Korea and one in Formosa. By the beginning of the war Japan had developed a magnesium industry capable of pro-

[83] See *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Tokyo, February 1945, Vol. 5, pp 91-92; also USSBS, *Coal and Metals in Japan's War Economy, op. cit.*, p. 126.

[84] See *Report to the Diet Concerning Reasons for the Termination of the War*, Ministry of Commerce and Industry, Tokyo, September 1, 1945, p. 5.

[85] Magnesium is a silvery white metal, whose outstanding characteristic is its light weight per unit of volume. It is the lightest of all metals used for structural purposes, being only about two-thirds as heavy as aluminum and less than one-quarter as heavy as iron. It alloys well with aluminum in various proportions. As a result its principal wartime use was in aircraft construction. In the form of powder or ribbon, magnesium is very easily ignited and burns with intense heat and light. This property led to its early use in pyrotechnics.

ducing more than was required for immediate consumption. Production was only 60 percent of capacity in 1941. By 1944-45 capacity had been expanded to 10,500 tons, with most of the increase occurring on the continent as a result of the construction of five new plants in Korea and one in Manchuria. Japan proper accounted for only 45 percent of total magnesium capacity. Production followed capacity up and reached a peak in May 1944, when the annual rate of output was 6,000 tons. Although production declined thereafter, total output for fiscal 1944 was 5,125 metric tons, or double the 1941 figure. Output at the May peak was only 60 percent of capacity and for the year 1944 only 50 percent. Thereafter, while continental production was largely maintained, by the first quarter of 1945 production in Formosa had disappeared, that in Japan proper had been reduced by almost 50 percent, and the annual rate dropped below the 4,000 ton per year mark. Of the total output in 1945, 50 percent was being produced in Korea, 41 percent in Japan proper and 9 percent in Manchukuo. Japan maintained only working stocks of magnesium. At the end of the war she had on hand only 41 tons, compared to 50,000 in the United States.

Japan made two basic mistakes in the handling of the magnesium situation. In the first place she failed to utilize the source material which would have enabled much greater expansion of magnesium output and secondly, as a result, because her output was limited, the use of magnesium for aircraft purposes such as wheels, landing-gear housing, etc., was always restricted. The two basic processes of magnesium production which Japan used made her dependent upon continental raw materials.[86] She failed to use sea water as a source material, except in one plant on an experimental basis.[87] In contrast, the United States resorted extensively to sea water for wartime expansion of magnesium output, the Dow plant at Freeport, Texas, being an excellent example of a new wartime sea water plant. In

[86] *Oriental Economist*, September 1943, p. 429.

[87] In the U.S., when the war increased the demand for magnesium metal, the industry turned to sea water as an unlimited source of raw material. Sea water contains about 0.48 percent of magnesium chloride. Although this degree of concentration is far less than in brines and potash-waste liquors, the U.S. technique of recovery applied to sea water resulted in costs which were about the same range as those of extracting magnesium from brines and waste liquors. The sea water process consists in first precipitating the magnesium content of the water as a hydroxide by the use of calcined lime or dolomite and then separating the precipitate from the liquid. The hydroxide may be converted into magnesium oxide (magnesia) by calcination, or into concentrated magnesium chloride by treatment with chlorine gas or hydrochloric acid. Converted into oxide, the material is suitable for the production of magnesium metal by the thermal-reduction process or it may be used in refractories, as in cement and in chemical manufacture; converted into the chloride, it may serve as feed for the electrolytic recovery of magnesium. For a detailed description of the various processes of magnesium production, as well as an account of the development of the industry in the United States, see *Magnesium*, U.S. Tariff Commission, War Changes in Industry Series, No. 10, Washington, March 1945, especially pp. 14-18.

Japan, Riken's Ube plant began experimenting with the extraction of magnesium from sea water in 1941 and production by this process was first reported in July 1942. By the end of 1944 and early 1945, 30 percent of the Ube plant's output was produced from sea water. But the difficulties encountered and the lack of experience with the method made the Japanese reluctant to attempt it on a large scale and as a result Japan remained dependent upon imported materials such as magnesite, magnesia, bitter brine and salt, obtained mostly from the continent. Officials of the Bureau of Mines and of the Light Metal Control Association indicated that as a result magnesium output in Japan was always limited and the decline, when it set in, was due to failure to obtain these imported materials in adequate amounts.

When, during the Battle for Britain in the spring of 1940, it was found from captured equipment that German airplanes contained considerably more magnesium than the planes of other belligerents and thus were able to carry heavier bomb loads, a vast expansion of magnesium output in the United States was planned. Whereas U.S. magnesium production in 1939 was only one and a half times Japanese output, U.S. peak production in 1943 was 36 times Japanese peak output in 1944. While the United States made extensive use of magnesium alloys for aircraft engine housing, rudder pedals, wing brackets, wheels, panels and doors, ailerons, instrument housings, gun turrets, and in many other parts, Japan failed to follow suit, because her very limited magnesium output would not permit it. Thus while the Japanese testified that there appeared to be enough magnesium for alloying use in relation to the aluminum available for conventional aircraft purposes, their basic shortcoming was in their limited and outmoded concept of conventional use.

Coal

While Japan's coal supply improved materially during the decade before the Pacific War, the war years witnessed a steady decline which quickened, toward the end, into collapse. As may be seen in Table 22, the early 1941-

TABLE 22

Coal Supply—Japan Proper, 1940-45

(in thousands of metric tons)

Fiscal Year	*Production*	*Imports*	*Production plus Net Imports*
1940	57,309	10,123	65,941
1941	55,602	9,585	63,448
1942	54,178	8,748	61,330
1943	55,538	6,029	60,467
1944	49,335	3,135	51,756
1945—I	10,877	188	11,003
II	5,238	.....	5,238

Source: Coal Control Association (Sekitan Tosei Kai) and the Japan Coal Company (Nippon Sekitan Kaisha).

43 decline was due more to the cut in imports than to the decrease in domestic production. By "high grading," domestic output was sustained through 1943. Overworking of the mines, however, inadequate mine maintenance, and repair and insufficient equipment replacement due to underallocation of steel, cement and lumber, finally took their toll and production dropped six million tons during 1944 at a time when blockade operations cut imports by 50 percent. The cutting of new galleries essential for sustained production was neglected. The coal-steel relationship developed in a vicious circle. Competing demands for a share of the dwindling supply of the latter meant that the coal industry received less and less adequate allocations of steel for maintenance, and coal output in turn declined more sharply.

Japan was almost as limited in coal resources as she was in puny steel output. She possessed no anthracite and, as we have seen, was dependent upon imports for coking coal. Nearly all her coal was medium-to-low-grade bituminous and practically none was suitable for making good metallurgical coke unless blended with imported coals. Her total coal reserves were small, 16 billion tons compared to 3.4 trillion tons for her two principal opponents, the U.S. and U.K., and her output in 1941 was only one-quarter of Great Britain's and one-ninth that of the United States.[88] A severely limiting factor, insofar as vulnerability to enemy action in war was concerned, was the fact that the principal coal fields of Japan proper were not located near the chief industrial centers of east central Honshu. Honshu's wartime coal output was the poorest quality of all; it was never more than 15 percent of the total production in Japan proper and furnished only about one-fifth of the coal used on that island. Japan was dependent upon water transportation to bring her coal from Hokkaido and Kyushu to Honshu consuming centers. In 1941, 97.8 percent of all coal shipped from Kyushu and Hokkaido went by ship. Aware of her vulnerability to interdiction of nearseas and coastal shipping lanes by possible enemy action, Japan's war planners had moved to avert this possibility by constructing a railroad tunnel under the Shimonoseki Straits, linking Shimonoseki in Honshu with Moji in Kyushu. The Kammon Tunnel was opened in mid-1942. The principal coal fields in Japan were in northwestern Kyushu and in Hokkaido. Yamaguchi prefecture in western Honshu had limited reserves of lower-grade bituminous, lignite and semi-anthracite while the Joban fields of northeastern Honshu had some sub-bituminous and lignite.

The coal mines of Kyushu were the oldest and had been worked for centuries. The seams were thin and sharply inclined and many of the mines were deep and necessitated continuous pumping. Due to depth and to poor ventilation, temperatures in the mines were very high. Safety standards

[88] *The Natural Resources of Japan*, Natural Resources Section, SCAP-GHQ, Report No. 73, revised edition, Tokyo. April 15, 1947, p. 44.

and measures were primitive by American comparison. The newer mines of Hokkaido were better engineered but had great gas hazards and the very low winter temperatures imposed a serious seasonal handicap. The Japanese have always exhibited an extreme personal dislike of working in the mines and when better paying jobs in war industries became available it became difficult to retain Japanese miners. The importation of Koreans to work in the mines had begun even before the Pacific War started.

Because coal was an old and well developed industry in Japan, whereas hydroelectric power, despite a 600 percent increase in generation between the first and second world wars was relatively new, two-thirds of the total energy consumed by Japan during the war was derived from coal. In 1943, for example, total coal consumption in Japan proper was 59.7 million tons while the coal equivalent of hydroelectric power generated was 25.3 million tons, about a 70-30 relationship. By comparison, in 1943 coal contributed approximately one-half of all available energy in the United States, and nine-tenths of that used in Germany.

The coal industry was characterized by two extremes: there was a concentration of output in a few large mines and mining companies, and there were also a great number of small mines producing from a few tons to as much as 50,000 tons a year. In 1943, 13.6 percent of the mines produced 76.4 percent of the coal (in Japan proper) while 73 percent of all mines (those producing less than 50,000 tons a year) accounted for only 8.8 percent of total production. Four Zaibatsu companies, Mitsui Mining, Mitsubishi Mining, Sumitomo Mining and Hokkaido Tanko Kisen (Hokkaido Colliery and Steamship Company—Mitsui controlled) accounted for almost 50 percent of output. Subsidies to the industry to stimulate output rose from 22.4 million yen in 1940 to 928 million yen in 1944. In addition, distribution subsidies, to hold down final sales prices, amounted to 172 million yen in the latter year.[89]

Japan's plan for utilization of coal involved heavy exploitation of her own resources during the period that those in her acquired areas were being developed. The Five Year Plan drawn up in 1937 called for output of 70 million tons a year, a goal which coal industry officials protested was impossible of fulfillment even with adequate labor and material supplies. They told the government that output of even 60 million tons a year would deplete and ruin the mines. The government's attitude was that during the war period, until resources in Manchuria, North China, Karafuto, etc., could be fully developed, the maximum possible exploitation of mines in Japan proper was necessary.[90] As a result there was a drive for production at any

[89] *The Coal Industry of Japan in Recent Years*, A Preliminary Statistical Report, Natural Resources Section, SCAP-GHQ, No. 21, Tokyo, December 22, 1945, p. 27.

[90] USSBS Interrogation of Matsumoto, Kenjiro, president of the Coal Control Association (Sekitan Tosei Kai), Tokyo, October 17, 1945.

cost. Each year more and more low-grade, ill-equipped and poorly engineered mines were brought into production. In 1936, 76 new mines were opened, in 1937, 80, and in 1938 the number rose to 137. Over the decade 1931-40, 640 mines were opened or reopened and only two had an "expected annual production" of more than 300,000 tons. Only 22 were expected to yield between 150,000 and 300,000 tons per year.[91] The galleries of the high-grade mines were pushed deeper and deeper. The pressure for immediate production made it necessary to work equipment to the limit and sacrifice sound long-range development policy. Output rose from 45 million tons in 1937 to a peak of 57 million tons in 1940. At the latter level output was running at a rate of almost 5 million metric tons per month compared with an average rate of 2.6 million tons per month over the period 1925-33. During the 1937-40 period average production costs doubled.[92]

Japan had considerable success in her efforts to develop coal production in acquired areas. Output rose 52 percent in Formosa between 1937 and 1940; 131 percent in Korea; 69 percent in Manchuria and 155 percent in Karafuto, between 1937 and 1941, and 150 percent in North China-Inner Mongolia between 1938 and 1942. (See Table 23). While this was not

TABLE 23

PRODUCTION OF COAL IN KARAFUTO, KOREA, MANCHURIA AND NORTH CHINA-INNER MONGOLIA, 1937-44

(in 1,000 metric tons)

	Karafuto	*Korea*	*Manchuria*	*North China-Inner Mongolia*	*Formosa*
1937	2,536	2 936	14,281	n.a.	1,856
1938	3,435	3.419	15,988	9,959	2,199
1939	4,993	5.171	19,496	15.272	2,608
1940	6.465	6,096	21.132	17.966	2,827
1941	6.471	6.803	24,147	23,968	2,770
1942	4,910	6,645	24,169	24,878	2,311
1943	4,979	6,574	25.390	21,735	2,324
1944	2,678	7.037	25,627	20,333	1,653

Source: Japan. Manchukuo. China Coal Federation (Nichi Manshi Sekitan Remmei).

quite up to what Japanese planners had hoped for in some cases—output in Manchuria in 1941, for example, was 76 percent of planned production—it was a significant achievement in view of the capital, equipment and technical limitations involved.[93] As a result of the growth of production in these

[91] *Report on New Mining Establishments*, Fuel Bureau, Ministry of Commerce and Industry (Sekitan Ka, Nenryo-Kyoku, Shokosho), Tokyo, November 1945, p. 7.

[92] For example, production costs at the Shakanoo Mine of the Furukawa Mining Company in Kyushu rose from 7.2 yen per ton in 1937 to 16.6 yen per ton in 1940, while at its Shimo-Yamada Mine, costs rose from 6.5 yen to 14 yen over the same period. *Our Production Problems During the War*, report of the Furukawa Mining Company to SCAP, Tokyo, November 1945.

[93] For an excellent description of the difficulties involved in the development and exploitation of one area in Manchuria, see *Fushun Coal Field, Manchuria*, Report No. 68, Natural Resources Section, SCAP-GHQ, Tokyo, February 17, 1947.

TABLE 24

COAL IMPORTS INTO JAPAN PROPER, 1939-45

(in 1,000 metric tons)

Fiscal Year	*Karafuto*	*Korea*	*Manchukuo*	*Formosa*	*North China-Inner Mongolia*	*Indo-China, etc.*	*Total*
1939	2,542	1,011	848	255	3,042	587	8,285
1940	3,228	1,467	773	263	3,800	492	10,123
1941	3,310	1,078	687	39	4,120	351	9,585
1942	2,198	910	642	175	4,539	284	8,748
1943							
1/2 ...	1,414	319	293	5	1,967	75	4,073
2/2 ...	236	177	121	...	1,422	...	1,956
Total ...	1,650	496	414	5	3,389	75	6,029
1944							
Apr. ..	....	28	50	...	185	...	263
May ..	104	41	69	...	185	...	399
June ..	314	27	54	...	193	...	588
July ..	348	30	45	...	174	...	597
Aug. ..	35	14	37	...	128	...	214
Sept. ..	6	16	53	...	123	...	198
Oct. ..	....	15	56	...	156	...	227
Nov. ..	....	26	39	...	127	...	192
Dec. ..	....	10	49	...	92	...	151
Jan. ..	....	12	55	...	84	...	151
Feb. ..	....	18	41	...	34	...	93
Mar. ..	....	15	13	...	34	...	62
Total ...	807	252	561	...	1,515	...	3,135
1945							
Apr. ..	....	15	12	...	53	...	80
May ..	....	12	16	...	35	...	63
June ..	....	5	8	...	32	...	45
Total ...	....	32	36	...	120	...	188

Source: Japan Coal Company (Nippon Sekitan Kaisha).

areas, Japanese imports of coal rose from 6.4 million tons in 1938 to a peak of 10.1 million tons in 1940. It was little wonder, then, that the Japanese in 1941, in reviewing the statistics of 1940 coal results, should have felt very optimistic and confident about their coal position. Both imports and domestic output had reached heretofore unequaled levels. They had, of course, at the time, no way of knowing that this was the high-water mark.

At the peak in 1940, 37.5 percent of Japan's coal imports came from North China-Inner Mongolia, 32.9 percent from Karafuto, 14.5 percent from Korea, 7.6 from Manchuria, 4.9 from French Indochina, etc., and 2.6 percent from Formosa. The high-grade coking coal of North China, as we have seen, was essential to Japan's steel industry and throughout the Pacific War made up 50 percent of Japan's total coal imports. After 1940, imports fell off almost as sharply as they had risen. In 1943 the total fell below the 1938 level (see Table 24) and in the following year slumped to 3.1 million tons, a drop of 70 percent from the 1940 peak. In the first quarter of fiscal 1944 monthly imports averaged 416,000 tons. By the third quarter the average had fallen to 190,000 tons and to 102,000 in the last quarter. In the first quarter of 1945 they averaged only 62,500 tons or 15 percent of the comparable figure in the previous year. After June they ceased entirely.

Because of shipping losses the Japanese had been forced to choose in 1943 between coal from Karafuto and coal from North China. Their shipping resources did not permit them to import both. Since they needed the North China coal for metallurgical coking purposes, their choice was obvious. Imports from Karafuto were cut drastically and discontinued altogether in September 1944. Production of coal in Karafuto in 1944 was only 41 percent of the 1941 level but the decline in output did not cause the drop in shipments to Japan proper. The cause and effect relationship was the reverse. Production was deliberately reduced when it was found that shipping was not available to transport the coal to Japan proper. Consumption requirements in Karafuto averaged only 2.2 million tons during the Pacific War years and, when shipments were cut sharply in the second half of 1943, output was reduced to 2.6 million tons (the peak was 6.4 million tons in 1941) in 1944. During 1944 surplus miners and mining equipment were transferred from Karafuto to Japan proper. In all 7,354 miners, 1,958 loading coolies and 347 staff were transferred.

The supply of coal consumed in Japan proper was 14 million tons less in 1944 than in 1940-41. This was 30 percent of the actual 1944 coal consumption. The loss was due almost equally to the reduction in imports and to the decline in domestic output. It is probable that the decline in imports had the most severe impact since it involved mostly a loss of essential coking coal. Admiral Toyoda, head of the Iron and Steel Control Association and the last Munitions Minister, when asked, "What was the major cause of the drop in steel production?." replied, "The most damaging cause was the decrease in the importation of coke and coal from North China."[94]

Domestic coal production was 8 million tons less in 1944 than in 1940. Over the last year and a half of the war, domestic output fell from an average monthly figure of 5,113 tons in the last quarter of 1943 to 2,712 tons in July 1945. Production plus net imports in July were equivalent to an annual rate of 32.5 million tons compared to the 1940 peak figure of 65.9 million tons. Domestic output in the first quarter of 1945 was two-thirds of peak wartime quarterly output. A number of factors were responsible for the decline. The labor situation during the war had deteriorated rapidly. While this will be discussed in detail in Chapter 5, a few salient points may be mentioned briefly here. Military conscription of coal miners, despite repeated protests by mine operators,[95] was not halted until early in 1945. As a result the composition of the coal mining labor force was severely weakened. The percentage of full-time miners fell from 83.6 percent in 1940 to 58.7 percent in 1944. While Koreans constituted 16 percent of the labor force in 1940, the proportion of Koreans, Chinese and POW's in the labor

[94] Interrogation of Toyoda, Teijiro, No. 10, Tokyo, October 5, 1945, p. 7.

[95] *Oriental Economist*, "A War of Coal," April 1944, p. 166.

force rose to 36 percent in 1945. In an effort to hold employees[96] wages were increased and the average for male employees rose from 3.08 yen per day in 1940 to 5.67 yen per day in 1944. While the total number of employees in the coal mining industry rose from approximately 300,000 at the end of 1940 to 420,000 at the beginning of 1945, output fell and as a result per-capita coal output dropped from 173 tons per employee per year in 1940 to 119 tons in 1944.

Not all of the decline in per-capita output was due to the watering of the labor force. The increased scarcity of essential mining and maintenance materials, and inability to replace equipment as it wore out, contributed to the decline in efficiency and was an important reason for the overall drop in coal output. Government allocations of materials were below the industry's requirements and actual receipts, especially of steel and cement, seldom totaled up to the official allocation.[97] As the war was extended and materials became increasingly scarce, the disparity widened. For example, in 1941 the industry stated that it required 185,000 metric tons of rolled steel. It was allotted 163,000 tons and actually obtained 111,000 tons. In 1942 it cut its stated requirements to 150,000. Its allotment, however, was slashed to 94,000 tons and it obtained only 66,000. After the president of the Coal Control Association, just before the 1943 allotment, warned the Cabinet that if undermaintenance continued coal output would drop sharply, the industry's request for 169,000 tons was reduced to 164,000 tons in the allotment but it was actually able to acquire only 63,000 tons. In 1944, the steel shortage became so acute and shipbuilding and aircraft demands so urgent that the industry's request for 159,000 tons was slashed to 92,000 in the allotment and it was actually able to obtain only 33,000 tons. The industry's cement requirements met the same fate. Whereas in 1942 its stated requirements were 120,000 metric tons, its allotment 100,000, and the amount actually acquired 90,000 tons, in 1944, because of the sharp decline in cement output, due oddly enough to the cement industry's inability to secure coal, the coal industry's stated cement requirements of 100,000 tons were slashed to 55,000 in the government allotment and the industry obtained only 36,000 tons of cement. Even the industry's tiny requirements for rubber, totaling only 800 tons in 1944, were reduced in the government allotment to 305 tons and only 256 tons were acquired.

As a result of such undermaintenance, machinery and equipment breakdowns multiplied. It was reported that in 1944 such breakdowns were six

[96] Officially, labor was frozen, but indifferent enforcement permitted large turnover. The Army, to get labor to build airfields and other facilities, not only offered comparatively high wages but never inquired too closely into the laborer's previous employment. See Chapter 5.

[97] *Economic Controls in the Japanese Coal Industry*, Natural Resources Section, SCAP-GHQ, Report No 52, August 21, 1946, p. 20.

times the number in 1940, and that the increasing number of accidents "greatly dampened the enthusiasm of the miners."[98] An interesting instance of the simultaneous development of declining productivity, increasing breakdowns of equipment and diminishing receipts of materials, was that furnished by the Mitsubishi Mining Company for 13 of its largest mines. These mines in 1940 produced 13.5 percent of the total coal output of Japan proper. The figures were as follows:

Fiscal Year	Materials Received*		Labor Employed	Coal Produced (add 000)*	Average Output per Employee*	Equipment Breakdowns
	Rolled Steel	Cement				
1940	10,499	11,132	37,546	7,712	205	2,631
1941	11,916	14,567	37,193	7,808	210	3,454
1942	11,706	9,541	42,678	7,581	178	4,521
1943	6,414	10,087	43,129	7,541	175	6,000
1944	3,030	4,272	57,763	6,710	116	15,989

* Metric tons.

On an index basis (1940 = 100) rolled steel receipts fell from 114 in 1941 to 29 in 1944, cement from 131 in 1941 to 58 in 1944, labor employed rose from 100 in 1940 to 154 in 1944, coal produced fell from 100 to 87 over the same period, while equipment breakdowns rose from 100 to 608. A number of mines closed down toward the latter part of the war due to exhaustion of seams, excessive cost of production, collapse of shafts, inability to maintain equipment in operating condition after repeated patchwork repairs. The Fuel Bureau reported that 234 mines, mostly small ones, ceased operations in 1944. Inability to obtain special materials such as manganese steel, used to weld and repair dipper teeth on power shovels, accounted for thousands of lost man and machine hours on all types of equipment throughout the coal fields.[99] Not only did output fall as a result of such developments but average costs of production rose from 13.78 yen per ton in 1940 to 54.26 yen per ton by 1945.[100]

Since coal mines were not located in attacked urban areas, and in view of the fact that only two instances of air attack directly on coal mines oc-

[98] "Japan's Coal Situation," by Uyemura, Koshiro, General Director of the Coal Control Association, in the *Nippon Times*, Tokyo, September 18, 1945, p. 4. The Japanese were responsible for the worst coal disaster in world history. On April 26, 1942, an explosion at the Honkeiko Colliery of the Manchuria Coal Mining Co. caused the death of 1,527 Chinese miners. All account of the disaster was suppressed during the war until records of the explosion were uncovered by SCAP investigators. The most serious previous mining disaster occurred forty years earlier, on March 10, 1906, when a mine explosion at Courrières, Pas de Calais, France, killed 1,110 miners. See *The Honkeiko Colliery Disaster*, Natural Resources Section, SCAP-GHQ, Report No. 29, Tokyo, April 18, 1946.

[99] See *Basic Problems of the Coal Mining Industry in Japan*, Natural Resources Section, SCAP-GHQ, Report No. 3, Tokyo, November 14, 1945.

[100] Based on weighted average costs of all 80 members of the Nippon Coal Company. Excludes profit and interest on loans. *Summation of Non-Military Activities in Japan*, No. 4, SCAP-GHQ, Tokyo, January 1946, p. 206.

curred, both during the final weeks of hostilities, the decline in coal output in Japan proper cannot be attributed to strategic bombing.[101] The reduction in overall coal supply was naturally felt more sharply in Honshu. While the total amounts of coal available in Hokkaido and Kyushu declined by only 2 and 12 percent respectively between 1940 and the first quarter of 1945, the supply in Honshu dropped by almost 50 percent over the same period. This condition stemmed, of course, from the fact that Honshu's output of low-grade coal never accounted for more than one-quarter of its total coal needs.

The pattern of coal shipments from Kyushu and Hokkaido changed materially during the war. The progressive diminution of Japan's shipping capacity forced a larger and larger portion of coal to be shipped by rail rather than by vessel. The opening of the Kammon tunnel and the increase in the rail ferries between Hakodate, Hokkaido, and Aomori, Honshu, from 7 in 1941 to 12 by 1945 made this possible. The percentage of all coal shipped by rail increased from 2 percent in 1941 to 39 percent in 1944 and then rose to 54 percent by June 1945. While it was less expensive and much more convenient to transport coal by ship, the attack on shipping forced the change. In March 1944, for example, total Hokkaido coal arrivals by sea at Tokyo, Yokohama and Kawasaki, had been reduced to about 20 percent of the monthly average maintained during August-December 1942. By the end of 1944 they had almost disappeared.

With Tokyo Bay thus practically closed, the Japanese turned to the use of the smaller ports such as Funakawa, Sakata, Niigata, Fushiki of Western Honshu on the Japan Sea. But unloading and coal-handling facilities were so poor that shipping piled up and since the government took no remedial action, little was accomplished by the use of these ports. Most of the Hokkaido coal therefore was shipped to Aomori by ferry and thence down the eastern Honshu coast to the main consuming centers by railroad. Shipments by rail ferry rose by over 1,000 percent between 1942 and 1945. Coal from Kyushu normally moved by ship through the Moji-Shimonoseki Straits, through the inland sea to the Hiroshima, Kobe-Osaka-Amagasaki and Nagoya areas. The shipping attack and particularly the mine-laying campaign drove this traffic onto the railroads. By the first quarter of 1945, 61 percent of Kyushu coal was being shipped by rail via the Kammon tunnel[102] and an additional 26 percent was moving via small vessels, other than steamships. Only 13 percent was moving via steam vessels. Of the total freight moving through the Kammon tunnel in the first half of calendar 1945, coal constituted 72 percent. Oddly, while this shift made the Japa-

[101] For details of the air attacks, particularly on the large Miike Mine at Omuta in west-central Kyushu, see USSBS, *Coal and Metals in Japan's War Economy, op. cit.*, pp. 51-55.

[102] A second tunnel was completed in October 1944, parallel to the first. Each tunnel had only a single track. Coal moved via the tunnels rose from 400,000 tons in 1942 to 6,429,330 tons in 1944.

nese much more dependent upon their railroads, it did not impose a much greater burden on the roads in fiscal 1944 compared to 1943, because of the decline in total coal supply and because of the decline in total tonnage of all commodities moved. The fact that a bulk commodity like coal had to be moved all the way from Kyushu to central Honshu by rail, increased the length of the average haul of the railroads from 133 to 160 miles between 1942 and 1944, and consequently freight train miles rose from 212 million in 1942 to 247 million in 1943 and to 269 million in 1944. The decline in tonnage carried in 1944, however, held ton miles to 29.6 million in 1944 compared with 29.1 million in 1943 (23.1 million in 1942).[103] It is probable, however, in view of the growing shortage and deterioration of equipment and lack of repair materials, and in view of the fact that the Japanese had already resorted to various devices to increase the net tonnage per car, such as strengthening cars with a third axle, increasing the minimum load, and plain overloading, that this was the maximum that could be carried.

An attack upon the railroads in early 1945 would have complemented the campaign against shipping and cut off coal supply from the major consuming centers and thereby produced industrial shutdowns on an enormous scale. The Japanese had been expecting such an attack because of the vulnerability of their railroad system due to geographic conditions[104] and were surprised that it had not materialized by the end of the war. They had paper plans to replace a number of key bridges with wooden spans but that was about all. When questioned on this point, Hoshino, Cabinet Secretary and economic planner for Tojo, stated that had coal and food from Kyushu and Hokkaido been cut off by interdiction of the railroads, further resistance would have been impossible. Lt. Col. Iwakeshi, Japanese Imperial General Staff, Supply Officer, said that the General Staff had been surprised at the failure of the U.S. air forces to attack the railroads instead of the factories and that surrender would have come earlier if they had.[105]

As a result of transportation difficulties, stocks of coal awaiting shipment at mines and ports increased and by the end of the first quarter of 1945 reached 4,036,000 tons.[106] Since this occurred in Hokkaido and Kyushu

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[103] *Summary Report on the Operation of Japanese Government Railroads During the War,* Transportation Ministry, Tokyo, November 1945, p. 17.

[104] Because of topography in the building of the railroads, the construction of a large number of bridges (35,000 roughly), retaining walls and cuts were necessary. There were a number of outstanding bottlenecks and, except in the urban areas, only one or two alternate routes for the main traffic flow. See *The War Against Japanese Transportation,* USSBS, Washington, 1947.

[105] A carrier strike in July 1945 put ten of the twelve Hakodate-Aomori rail ferries out of operation permanently. In addition a number of motor-driven luggers which had been used to transport coal were sunk. The total monthly loss in coal transported across Tsugaru Strait as a result of this carrier strike amounted to 120,000 tons. In July 1945 a command decision was made awarding top target priority to Japanese railroads and this was about to be implemented when the war ended.

[106] *Summation, op. cit.,* No. 5, Tokyo, February 1946, p. 86.

mainly, Honshu's coal position was more difficult than overall production or import figures for Japan proper would indicate. If, to the quantity of coal produced on each island, there is added the amount received from other islands and from abroad and, in addition, that shipped out either to other islands or abroad is subtracted, the plight of Honshu becomes more apparent. Whereas the available supply of coal in Hokkaido (calculated as indicated above) actually was 2 million tons greater in 1944 than in 1940 and in Kyushu was 2.5 million tons less in 1944 than in 1940, in Honshu the available supply dropped from 41 million tons in 1940 to 27 million tons in 1944. Thus it is clear that the brunt of the decline in coal supply was, because of the transportation situation, borne by the industries of Honshu. A minor result of the decline of shipping was the drop in coal exports from Japan proper (mainly to Korea) from 1.7 million tons in 1941 to 714,000 tons in 1944. In the first quarter of 1945, coal exports were only 62,000 tons.[107]

Coal consumption in Japan proper, which had risen from 51.1 million tons in 1937 to 66.5 million tons in 1940, declined steadily throughout the ensuing war years and in 1944 totaled 52.1 million, or 14.4 million tons below the 1940 peak. (See Table 25). While the textile industry was the

TABLE 25

COAL CONSUMPTION, JAPAN PROPER, BY INDUSTRIES, 1937-44

(in 1,000 metric tons)

Industry	*1937*	*1940*	*1941*	*1942*	*1943*	*1944*
Iron & Steel	6,639	11,439	13,171	13,315	13,652	11,282
Gas & Coke	2,564	3,945	4,080	3,946	3,804	3,666
Elec. Power & Light	3,747	5,898	4,207	5,261	5,077	3,475
Ceramics	4,287	4,665	3,779	3,457	2,929	2,107
Chemicals	3,958	7,150	6,572	5,803	6,158	4,982
Fibers & Textiles	6,968	6,724	4,926	3,080	2,109	999
Food	1,428	1,503	1,527	1,218	958	757
Salt	702	625	355	374	362	448
Railroads	4,126	5,568	5,105	6,300	6,960	7,682
Liquid Fuel	....	387	603	1,012	1,234	1,820
Briquettes	1,430	2,206	1,780	1,358	1,035	303
Domestic	4,295	3,897	4,183	3,757	2,934	3,345
Government (Civil)	188	694	505	664	700	468
Army & Navy	857	2,290	3,325	3,761	3,564	3,486
Shipbuilding	863	1,970	2,024	2,196	2,459	2,676
Metal Mining	725	857	952	778	714	583
Coal Mining	3,649	2,920	2,915	3,195	3,031	3,000
Ship Bunkering	4,701	3,804	2,931	2,517	2,010	1,078
Total	51,157	66,542	62,940	61,992	59,690	52,157

Source: Japan Coal Company (Nippon Sekitan KK.).

major coal consumer in 1937, with steel ranking second, by 1940 the steel industry's consumption of coal had almost doubled and it accounted for one-sixth of total Japanese coal use. Consumption in the chemical industry had more than doubled and it too now surpassed textile consumption which declined slightly. Use in electric power generation reached what was to be

[107] *The Coal Industry of Japan in Recent Years*, *op. cit.*, p. 10.

its wartime peak, in 1940. Shipbuilding use of coal more than doubled and Army and Navy consumption almost tripled. The decline in the use of coal in ship bunkers was only the beginning of a steady downward trend that carried throughout the war. In 1944 consumption was less than one-quarter of the 1937 level, reflecting the decline in Japan's merchant fleet. Domestic consumption declined slightly between 1937 and 1940 and by 1944 experienced a further moderate reduction. Since civilian coal consumption in Japan was already low, it could hardly be slashed further, particularly since uses classified as "domestic" included heating of hospitals, schools, office buildings, etc. The per-capita level of civilian consumption of coal in Japan was only about one-fifth that in the United States, due to the fact that in Japanese homes central heating was almost unknown.[108] Railroad coal use rose and in the later war years, in contrast to most other categories, continued to increase, due as we have seen to increased reliance upon the railroads as the shipping position deteriorated.

The largest decline in coal consumed during the Pacific War years occurred, as might be expected, in the textile industry whose output fell to almost nothing.[109] Coal consumption by the textile industry in 1944 was about one-seventh of its 1940 consumption. Briquette consumption was also slashed drastically and substantial declines were also registered in the food and ceramics (mostly cement) industries. On the other hand, maintenance of coal supply for those essential war uses which required it was attempted. The allocation to and consumption in shipbuilding was gradually increased. Supplies for the Army and Navy were largely maintained and those for the railroads, as was indicated, increased. Coal mining, as was to be expected, retained the output it needed. The 1944 cut in supply, however, was largely borne by the iron and steel, electric power and chemical industries. In the case of the first and last, the decline was due largely to the cuts in imports of high-grade continental coal, particularly for coking purposes. The decline in consumption of the electric power industry was due to a deliberate attempt to save coal by generating more hydroelectric power, even to the extent of drawing down storage reservoirs below hitherto legally permissible limits.

The annual total for 1944 consumption fails both to indicate the quickening of the decline during the latter half of the year and early 1945 and to reflect the fact that with the drop in imports and the difficulty of shipment to Honshu, the quality of the coal consumed declined materially. Consumption dropped from 4.5 million tons in June 1944 to 3.5 million tons in January 1945 and then to 2.2 million tons in July. Furthermore, consumption in the industrial areas of eastern Honshu fell more rapidly than the average for Japan proper. In June 1944 1,025,000 tons were used (exclud-

[108] Movable braziers, known as hibachi, were used for the most part for home heating and their consumption of coal was relatively small.

[109] See Chapter 6, pp. 387-406.

ing railroad consumption), in January 1945, 593,000, and in July, 281,000. The decline in quality of the coal used made it necessary to burn increasing quantities to obtain the same energy requirements as had been secured in previous years with a smaller amount of coal. This was particularly true in the iron and steel and chemical industries. It was upon these two industries (and upon cement output) that the growing coal shortage had its most serious impact.

Electric Power

The decline in coal output had a strange effect upon an electric power system primarily dependent upon hydro generation and not upon steam plants. By March 1945, in a vain attempt to compensate for the sharp drop in output of steam plants, the meager storage reservoirs were drawn down to a point where no further energy could be obtained from them. Only the advent of an abnormal rainfall and the elimination of a considerable segment of demand, as industries ran out of materials and due to urban air attack, brought supply and demand back into balance at a new low level.

The Japanese total of all electric generation reached a peak of 38.4 billion kwh. in 1943, compared with top output of 230.7 billion kwh. in the United States in 1944.[110] Thus Japanese output at its highest was only 16 percent of the United States peak. This was a relative loss of position because in 1936 Japanese power generated was 21 percent of U.S. output. In Japan, 78 percent of the power was hydro generation and 22 percent steam in contrast to the reverse situation in the United States where 70 percent was steam generated[111] and 30 percent hydro.

The mountainous character of most of the country and the relatively poor quality of its coal were mainly responsible for the greater development of hydro generation facilities. There are a large number of small rivers in Japan and the hydro stations are, for the most part, stream-flow plants, although four groups of installations which are fed from seasonal storage reservoirs are the exceptions. There are no large rivers and as a result most of the hydro plants are small. The largest hydro station in Japan proper is a stream-flow plant on the Shinano River. It has a capacity of 165,000 kw., the largest annual generation of any hydro plant in Japan proper, but accounted for only 2.7 percent of total annual power output. In contrast, the Suiho development on the Yalu river had an installed capacity of 600,000 kw. The public utility hydroelectric system in Japan in 1945 consisted of some 1,438 hydro stations with a capacity of 5,921,464 kw., or an average capacity of 4,118 kw.[112]

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[110] Detailed statistics on power generated by districts in Japan may be found in *Hompo Keizai Tokei*, Vol. II, Bank of Japan, Tokyo, January 1947, p. 39.

[111] Including internal combustion.

[112] There were, in addition, 69 private hydro plants with a capacity of 236,635 kw. See *Summation of Non-Military Activities in Japan*, Tokyo, No. 3, December 1945, p. 102.

The main island of Honshu has noncoincidental water conditions on either side. Of a total precipitation of from 40 to 100 inches per year, the greater amount falls in the form of snow in the mountainous regions of the western side of the island during the winter and early spring, from about November through March. On the other hand the eastern, industrialized, side of the island receives its maximum rain during the summer and autumn and has a three months dry season, from about January through March.[113] Because of this dry season and the lack of developed water storage, to supply industrial consumers with power throughout the year in this area, it was necessary to supplement the hydro system by steam plants. Principal steam-electric power plants are located in the Kanto-Tokai-Kinki areas, around Tokyo, Yokohama, Nagoya, Osaka, and Kobe. There were 117 steam-generation plants in the public utility system, and these provided 2,903,277 kw. of electric capacity.[114] Steam-electric generation by the public utility plants, however, was only 18 percent of the energy produced by the system in 1943. Steam generation in Japan, perhaps because of the poorer quality coal, was less efficient than that in the United States. A metric ton of coal in Japan in 1943 produced 1,624 kwh. while in the United States it generated 2,086 kwh.

Developed water storage was unusually small for several reasons. The building of reservoirs was retarded because of the reluctance to sacrifice arable land in the use of river valleys for water storage. There was also fear of impounding large volumes of water in regions subject to severe and frequent earthquakes. Furthermore, irrigation, which is used extensively throughout Japan, prevents the full utilization of reservoir storage capacity because it has prior rights to water diversion and requires the maintenance of reservoir levels. As a result the reservoir capacity was small, representing only stored energy of some 800 million kwh., or only 2 percent of annual generation if fully used once a year. The capacity of all plants utilizing stored water was 350,000 kw. or 6 percent of installed hydro-electric capacity.

The facts of the previous paragraph will help in part to provide answers to questions such as, "Why did the Japanese not develop their water power resources further during the war years?" and "Why did they not extend the use of hydroelectric power in war plants to reduce the demand for coal?" There are other answers as well. In few other fields did performance fail so markedly to come up to planning as in electric power. The Japanese were greatly encouraged by their power expansion during the thirties and in 1938-39 laid plans for a doubling of output over the ensuing five years. Generated electric power from all sources had risen from a little over 15

[113] See *Hydrology of Japan*, Natural Resources Section, SCAP-GHQ, Report No. 43, Tokyo, July 1, 1946.

[114] In addition there were 165 private industrial steam-electric plants with 1,045,990 kw. capacity in Japan in 1945.

billion kwh. in 1930 to 35 billion kwh. by the end of 1939. Output had doubled by early 1937 and the Japanese reasoned that if it were possible to double output in six years without much government assistance, it would be possible to double it once again in five years with government stimulation. As a result, a detailed plan was worked out to expand capacity to permit production of 60 billion kwh. by 1943. The goals of the 1938 plan were enlarged in 1939 but as a result of the drought and power shortage that year, the revision of the plan in 1940 reduced the anticipated new capacity by one million kw. Even so, the 1940 plan contemplated the use of 830,000 tons of steel, 32,000 tons of copper, 15,000 tons of aluminum, 49,000,000 tons of coal (9.8 million tons per year) and 3,620,000 tons of cement in planned expansion over the ensuing five years. By early 1943 even the reduced program was far behind because of lack of materials and manpower.[115] Cement was short and in great demand by higher-priority industries. The Munitions Ministry refused to allot any aluminum or copper to the power industry for new construction and the program was abandoned at the end of 1943. At the time, plants aggregating 672,072 kw. capacity were under construction, some of which were almost completed. Subsequently the Ministry relented and permitted a few of the plants which were almost finished to be completed. A number of reservoirs were also under construction at the time. They would have permitted a power increase due to storage (on the assumption that all effective storage would be utilized once a year) of 859 million kwh. They remained classified as "under construction" at the end of the war on the records of the Electric Power Bureau of the Ministry since they would have required 13.3 million man-days of labor to complete, as well as 25,300 tons of steel and 1.2 million tons of cement.[116]

The growth of generating capacity in Japan is shown in Table 26. It

TABLE 26

ELECTRIC GENERATING CAPACITY[a]—JAPAN PROPER, 1937-44

(in 1,000 kw.)

Year	*Hydro*	*Thermal*[b]	*Total*
1937	3,977	3,299	7,276
1938	4,245	3,315	7,560
1939	4,677	3,637	8,314
1940	5,127	3,960	9,087
1941	5,368	4,090	9,458
1942	5,652	4,156	9,808
1943	5,886	4,116	10,002
1944	6,057	4,063	10,120

[a] Includes public utility, railway, and private plants.

[b] Thermal includes Diesel (approximately 100,000 kw. in 1944).

Source: Electric Power Bureau, Ministry of Commerce and Industry.

[115] See *Hydroelectric Power in Japan*, Natural Resources Section, SCAP-GHQ, Report No. 39, Tokyo, June 12, 1946.

[116] *The Five Year Electric Power Plan*, a summary by the Electric Power Bureau of the Ministry of Commerce and Industry, Tokyo, 1945.

is to be noted in interpreting the figures in this table that there were two million kw. of hydro and 700,000 kw. of steam capacity under construction at the time the plan was inaugurated and completion of these had nothing to do with the fulfillment of the plan. It was just as well that material restrictions prevented the carrying out of the plan since a large part of the anticipated increased industrial demand upon which it was based never materialized either. On the other hand greater availability and use of hydro power (assuming a corresponding increase in reservoir storage capacity) would have lessened the industrial demand for coal.

At the height of its wartime growth in 1944, generating capacity in Japan proper was 10.1 million kw., or 68 percent of total capacity of the empire. Outside the home islands, in Korea, Manchuria, Occupied China, and Formosa, the Japanese controlled power facilities with 4.1 million kw. capacity, 2.2 million hydro and 1.9 steam, which generated in 1944 an estimated 13.2 billion kwh., or 41 percent of home islands' production. Power resources available in 1944 in the overseas areas, including the Yalu River, which divides Korea from Manchuria and supplies power to both countries, was as follows: [117]

Area	*Hydro Capacity (1,000 kw.)*	*Thermal Capacity (1,000 kw.)*	*Million kwh. generated*
Formosa	250	55	1,340
Korea	1,110	30	2,887
Manchuria	316	1,070	3,900
Yalu River plant	600	....	3,279
Occupied China	....	750	1,838
Total	2,276	1,905	13,244

Since the goal of the five-year development plan, for Manchuria alone, inaugurated in 1937 and subsequently revised, was 2.6 million kw., and since the Suiho project was to generate 640,000 kw. by the end of 1942 and over 1 million kw. by 1945,[118] it is clear that goals on the continent were not met any more than they were in Japan proper. However, in view of the fact that anticipated demand, such as that in the synthetic oil industry, for example, did not materialize either, this had no effect on the war program. As a matter of fact, the Chief of the Tokyo Branch of the Manchuria Electric Company stated that due to the slower-than-anticipated industrial development in Manchuria during the war, excess power was available.

In Japan proper, the Japan Electric Generation and Transmission Co. (Nippon Hassoden), a national policy company, accounted for 67 percent of electric power generation in 1943.[119] Its subsidiary distribution com-

[117] Estimated by Electric Power Division, USSBS. See *The Electric Power Industry of Japan*, Washington, 1945. Appendix 1, "Electric Power in Japanese Territories Outside the Home Islands," p. 94.

[118] For a detailed description of plans for the Suiho project, see *Oriental Economist*, November 1941, p. 563, and June 1943, pp. 268-69.

[119] The Electric Power Control Law (No. 77) of April 6, 1938, gave the government authority to control the generation and transmission of electric power. A na-

panies (the nine "Haidens") also had generation facilities and accounted for 22 percent of the total. Private industrial plants accounted for 10 percent and the Imperial Government Railways for the remaining 1 percent. The Hassoden was controlled by the Electric Power Bureau of the Munitions Ministry and heavily subsidized by the government. This was done to hold rates down, encourage the consumption of power and lessen dependence on coal. The extent of the subsidy may be seen in the following table (in thousands of yen):

Fiscal Term 6 Months Ended	*Earnings Without Subsidy*	*Government Subsidy*	*Earnings with Subsidy*
Sept. 30, 1939	-14,759	.....	14,759
Mar. 31, 1940	- 7,783	21,207	13,424
Sept. 30, 1940	14,801	.....	14,801
Mar. 31, 1941	- 3,087	16,478	13.390
Sept. 30, 1941	17,339	3,639	20,978
Mar. 31, 1942	34,538	7,360	41,898
Sept. 30, 1942	46,556	.....	46,556
Mar. 31, 1943	14,623	31,671	46,294
Sept. 30, 1943	46.557	.....	46,557
Mar. 31, 1944	22,363	31.232	53,595
Sept. 30, 1944	14.254	39,815	54,069
Mar. 31, 1945	-22,791	78,039	55,247
Sept. 30, 1945	-37,964	81,928	43,981

Source: Nippon Hassoden.[120]

Yet despite this degree of subsidization the outstanding feature of electric power consumption during the war years was its failure to grow. In a period when American power sales were climbing from 140 billion kwh. in 1941 to 186 billion kwh. in 1943, the year that Japan reached the height of her consumption, the use of power in Japan remained relatively constant. The comparable Japanese figures were 30 billion kwh. consumed in 1941 and 31 billion kwh. in 1943. In percentage terms over this period, American sales climbed 33 percent; Japanese consumption grew 3 percent. American growth continued through the following year, 1944; Japan, however, never regained the 1943 peak, and her power use declined in the year ending March 31, 1945, to a point slightly lower than its 1941 position. Japan could have increased her production of kilowatt hours over the 1943 level insofar as the capacity of her hydro generation was concerned. One of the factors, which made Japanese industry reluctant to convert to power even in the period when production was expanding and it would have been possible, was the scare of a power shortage in late 1939-40, and the psychological impact of the government's subsequent curtailment program. A drought in the winter of 1939, which forced water in streams and reservoirs to new low levels, coincided with administrative difficulties encountered by

tional policy company, Nippon Hassoden, was established and began operation in April 1939. The government required utility companies to surrender generating and transmission facilities to Nippon Hassoden in exchange for its securities.

[120] For a description of the early financial problems of Hassoden, see *Oriental Economist*, February 1943, pp. 66-67.

the newly-organized Nippon Hassoden in securing sufficient additional supplies of coal to provide steam-generated power to meet the deficit. A program of voluntary conservation was initiated. It was the opinion of U.S. engineers who surveyed the scene in Japan after the war that Japan was not in serious danger of an electric power shortage after 1939 until the closing months of the war, when there was an extensive draw-down of water storage, in an effort to save critical coal. Nevertheless, the Japanese administered their power system all through the war as though a shortage was imminent.

Voluntary curtailment was shortly replaced by an ordinance which empowered the Minister of Commerce and Industry to regulate the use of electric power. Two approaches were adopted to curtail consumption: one was to prohibit some uses such as neon lights, advertising signs, air conditioning, elevators (except hospitals, freight and in buildings over five stories), etc., while the other was to establish monthly quotas for ordinary electric lighting in all places, and for heating and electric motor uses in shops, restaurants and amusement places, where such uses were necessary to continue business, such as photo studios, theatres, etc. Enforcement of this quota system was by imposition of a penalty charge for each kwh. in excess of the quota. A preferential group of industries was established consisting of munitions, shipbuilding, aircraft, coal mining, light metals, and a second priority group of all "planned" industries not in the first group. No curtailment of power was required in either case but both were notified of the degree of reduction that would be expected in the event of emergency shortages.[121] Concurrently, the power companies undertook a revision of their principal power supply contracts setting up emergency clauses which permitted the electric utility to cut specified proportions of the load in times of shortage. In the face of such actions, there seemed to be little purpose in switching to the use of electric power.

Only 130 miles of Japanese railroads were electrified, the sections between Tokyo and Numazu (a distance of 78 miles) and between Kyoto and Akashi, just west of Kobe (a distance of 52 miles).[122] The paradox of a country potentially abundant in hydro-electric power and with a rail profile ideally suited for the use of power, utilizing instead steam power almost exclusively, is to be explained partly on the grounds of military necessity and partly because of fear of recurrent power shortages. Railroad officials testified that they had tried to electrify their main trunk lines but that the military had opposed such plans because of fear that the rails would be that much more vulnerable to interdiction and that the Cabinet had upheld the military, adding as a reason that power supply was too dependent on rainfall.

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[121] See "Procedures Regulating the Adjustment of Electric Power" by Shige, Tatsuo, *Keizai Toseiho Nempo*, 1942, Tokyo, p. 250.

[122] *The War Against Japanese Transportation, op. cit.*, p. 74.

In the peak year of power consumption in Japan, 1943, the largest user of electric energy was the iron and steel industry, with 17 percent of the total. The chemical industry was second with 13 percent, aluminum third with 10 percent, and coal fourth with 7 percent. This is in slight contrast to the United States where in 1943 the chemical industry ranked first with iron and steel next. Reflecting the comparative lack of change in energy consumption as a whole, categories of use in Japan did not shift significantly. Some increases occurred, however, in shipbuilding, aircraft, steel and aluminum. Shipyard consumption (which includes repair) rose from .69 percent of the whole in fiscal 1941 to 1.32 percent in fiscal 1944. Aircraft use climbed from 2.10 percent in 1942 (1941 figure not available) to 5.93 percent in 1944. Due principally to the growing proportion of special (electric) steel to total steel output, the steel industry's requirements rose from 13.20 percent of power consumed in Japan in 1941 to 20.36 percent in 1944. Aluminum and other light metals took 6 percent in 1941, increased to 10.4 percent in 1943, and then fell to 8.9 percent in 1944 reflecting the decline in aluminum output. The decline in consumption in the cement industry from 2.3 percent in 1941 to 1.4 in 1944 reflected the inability of the industry to obtain coal, though power consumption by the coal industry remained stable. The decline in the use of power in the chemical industry was due to the drop in the output of chemical fertilizer. Aside from the slight increase in total consumption which occurred between 1941 and 1943, the gains noted came largely at the expense of "other large consumers" which included textile companies, food processing companies, etc., and small consumers and electric light service.

The Japanese, with hydro capacity installed for full utilization of rainy season stream flows, were limited by the ability of the hydro plants to generate energy during the dry season rather than by ability to carry maximum peak loads. It was for this reason that steam plants were installed around the principal industrial areas. Measured on the basis of power consumption, these were the Kinki and Kanto districts of Honshu. Honshu accounted for 77 percent of the power consumed in Japan proper in 1943, and the Kinki and Kanto areas accounted for over 50 percent of the power consumed in Honshu. The distribution of steam plants corresponded to this pattern. By capacity 75 percent were in Honshu and of these 50 percent in Kinki [123] and 19 percent in Kanto. Coal for the Kinki plants came from Kyushu via ship through the Inland Sea to Osaka or Kobe. With the interdiction of shipping the Japanese were forced to ship it by rail via the Kammon Tunnel. Fuel for the Kanto area came by ship from Hokkaido to Yokohama. Coal consumption in the drought year of 1939 reached a record high of 6.4 million tons. In 1943, the year of greatest wartime generation,

[123] The three Amagasaki steam plants alone had a capacity of 765,000 kw. or one-quarter of the capacity of all steam plants in Japan. (Amagasaki is located on Osaka Bay, between Kobe and Osaka.)

it totaled 5.0 million tons. The growing shortage of coal brought this down to 3.4 million tons in 1944. Coal in storage at all Hassoden plants was 1.1 million tons in May 1942—a three months supply at the average monthly rate of consumption in 1942—while in February 1945 stocks were down to 224,000 tons, which represented only two weeks supply at the then existing rate of consumption. Whereas in March 1944 the steam plants consumed 524,561 tons of coal and generated 637 million kwh., in March 1945 they consumed 115,909 tons and generated 129 million kwh.[124] Maximum wartime load of Japan is estimated to have been approximately 6.5 million kw., of which nearly 6 million kw. was carried by the public utility system. During dry seasons (January-March) steam electric stations of Nippon Hassoden were called upon to carry approximately 1.5 million kw. of load, which decreased to less than 800,000 kw. in the wet season. At the height of the dry season in March 1945, the steam plants were able to carry only half their customary load. To compensate for this, the hydro storage reservoirs were drawn down to maintain power output. They were drawn down to the minimum licensed levels and then the government granted permission to reduce them to the lowest necessary levels regardless of the effect on irrigation and fish resources. With a maximum storage capacity of 813 million kwh., the reservoirs held 685 million kwh. in December 1944 and this was drawn down to 85 million kwh. in March 1945. This compares with a draw-down to 294 million kwh. in March 1944. Only the advent of early heavy rains and a greater decline in demand forestalled a power shortage.

In August 1945, coal consumption by steam plants was only 20,815 tons and output 19 million kwh. This was only 3 and 2 percent respectively of the 676,015 tons of coal consumed and 850 million kwh. of power produced in the peak month of January 1943, or for purposes of seasonal comparability, 7 and 5 percent respectively of the coal consumed and power output in August 1943. The decline in the load curve for public utility hydro plants during the first half of 1945 was particularly severe. Total generation was down to 45 percent of August 1943. An index of the *Economist*, recalculated after the war, indicated power output in August 1945 at 58.5 (1935 = 100).[125]

The electric power system of Japan was never a primary target of air attack. Although 1.5 million kw. (one-seventh) of its generating capacity was destroyed by bombing and strafing, almost all of this loss was a by-product of attacks on urban areas. Damage to the generating stations was

[124] Perhaps as significant as the decline in supply was the decline in quality of coal obtained. When plants were forced to switch from the better-grade coal of Hokkaido and Kyushu to the lignite of Honshu, repair requirements increased but steel for boiler parts could not be obtained. See *Quality and Uses of Japanese Coal and Lignite*, Natural Resources Section, SCAP-GHQ, Preliminary Report No. 3, December 31, 1946, p. 8.

[125] Adjusted for seasonal variation. *Oriental Economist*, February 2, 1946, p. 57.

concentrated in the steam electric field, since these were the larger plants nearer or in the cities, while the hydro plants were smaller and scattered. More than a third of all steam electric capacity in Japan was put out of service, but there was no coal to operate this capacity anyway and, moreover, by the time the damage to the generating stations occurred, the demand for electricity had declined so sharply that by August 1945 Japan had at least twice the generating capacity required to carry her reduced loads.[126]

Chemicals

Under the triple stimuli of greatly increased consumption of fertilizer, increased textile output and military demands, the chemical industry expanded sharply during the thirties. Monthly output of ammonium sulphate rose from 22,167 metric tons in 1931 to 103,500 metric tons in 1941. Ammonia production expanded seven-fold and nitric acid production eight-fold over the same period. Sulphuric acid production rose from 60,000 metric tons per month to over 200,000 tons from 1931 to 1940. Output of explosives increased twenty-five-fold. Production of methanol rose from 26,000 gallons to 7,080,000 gallons; of toluol from 154,000 gallons to 2,257,000 gallons. The outbreak of the Pacific War, however, brought this period of overall expansion to an end. Thereafter, for reasons to be made evident in the following pages, output of basic chemicals, particularly those used for fertilizer, declined, while chemicals essential to production of explosives, propellants, fuel, etc., were maintained and in a few cases raised until 1944. Chemicals which serve essential peacetime purposes, such as textile dyes, are at the same time basic to the production of explosives.[127] Chemicals serving as fertilizers may, with slight changes in processing, be quickly converted to many wartime needs. In adaptability, the chemical industry led most others in the ease with which the shift from peacetime to wartime production was accomplished.

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[126] See *The Japanese Electric Power Industry, op. cit.*, p. 27.

[127] The export boom of the mid-thirties led to a sharp expansion in the production of dyestuffs since they were utilized in cotton and rayon goods production. The principal raw materials of dye production are identical with those used in the manufacture of three of the most important military explosives—TNT (Trinitrotoluene), tetryl (Trinitrophenylmethylnitramine), and picric acid (Trinitrophenol). The high explosive, picric acid, is, in fact, also a fast yellow dye for silk and wool. Dimethylaniline and dinitrochlorobenzene, which are both easily convertible to the high explosive, tetryl, are at the same time very important dye intermediates. Other dye intermediates may be used directly as explosives. In similar fashion dye technology and aromatic-explosive technology are almost identical. Unit operations such as nitration, sulfonation, chlorination, hydrolysis, and acid recovery are common to both dye and explosive plant practices. Dye plants can also supply plasticizers and stabilizers for use in compounding smokeless powders. It is not strange, therefore, that the government through subsidy and protection favored the dye industry even after the production of textiles began to be severely restricted. It is known now that this industry served as the training ground for development of Japanese chemical warfare technology.

Despite the rapid growth of the Japanese chemical industry in the thirties,[128] at the outbreak of war in 1941 it was small compared with that of the United States. Only in two basic fertilizers did Japanese output in 1941 exceed United States. Japan produced 184 percent of U.S. output of ammonium sulfate and 108 percent of our calcium carbide production. She produced only 37 percent of the sulfuric acid, 21 percent of the caustic soda, 5 percent of the soda ash, 28 percent of the nitric acid, 36 percent of the organic high-explosives, 14 percent of the industrial explosives, 6 percent of the toluol and benzol, 11 percent of the methanol and ethyl alcohol, and 15 percent of the chlorine output of the United States. This was particularly significant in view of the fact that the U.S. chemical industry in 1941 had yet to experience its wartime expansion whereas the Japanese chemical industry on the whole reached its high-water mark in 1941 and declined thereafter. Furthermore, the Japanese chemical industry lagged technologically behind the United States. Much of its more specialized equipment had been imported and when it wore out later in the war it could not be replaced. During the Pacific War the chemical industry's steel allotment was cut to 10 percent of its pre-war requirements and equipment deteriorated. Early in the war the Japanese built hydrogen peroxide concentrators of stainless steel, at Yokkaichi, only to have the metal decompose the hydrogen peroxide. Later in the war a lack of corrosion-resisting metal forced substitution of ordinary steel in nitric acid production and the resultant severe corrosion of the equipment led to a decline in nitric acid output. Japan required 1,012 man-hours to produce a ton of single base smokeless powder. The United States required 5.5 man-hours. Japanese TNT plants required 11 hours per operating cycle; United States plants gave higher yields in 40 minutes. They required 272 man-hours per ton of TNT; the United States needed only 10. In 1941, with a total autoclave capacity almost equal to that of the United States and a larger operating staff, Japan's tetraethyl lead industry never exceeded 5 percent of U.S. production.

Essential to production of fertilizer, and explosives as well, is the fixing of nitrogen. The fixation of atmospheric nitrogen is accomplished by causing the nitrogen to react with calcium carbide to form calcium cyanamide or with hydrogen to form ammonia, the two procedures being known as the cyanamide and the synthetic ammonia processes, respectively. Normally, most of the ammonia was converted, in Japan, to ammonium sulfate, by the use of sulfuric acid. Almost all the ammonium sulfate, as well as the calcium cyanamide, was used as fertilizer. The remainder of the ammonia is converted to nitric acid, the basic chemical in the production of explosives. Nitric acid was originally obtained entirely by the treatment of imported

[128] See "The Rise of the Chemical Industries in Japan," by von Waldheim, H., in *Far Eastern Survey*, September 9, 1936.

sodium nitrate with sulfuric acid, but with the growth of the synthetic ammonia industry, ammonia became the chief source of nitric acid.[129]

It is apparent that there is implicit in these relationships a basic conflict between civilian (agricultural) and military (explosives and propellants) use of nitrogen should the total supply shrink below the level necessary to supply both adequately. This condition developed in both Japan and Germany during the war. A catastrophic drop in nitrogen output in Germany, largely as a result of air attack, brought production by early 1945 down to less than 15 percent of the pre-raid level. Monthly production was reduced from 86,100 tons to 8,000 tons in 10 months. Yet the Germans continued to allot a substantial percentage to agriculture. Late in 1944 the Speer Ministry drew up a list of minimum requirements for nitrogen, calling for a monthly allocation of 45,000 tons, of which 20,000 were to be used for explosives and powder, 17,000 for fertilizer, and 7,500 tons for a variety of needs in essential industry. At the time, because of the invasion, Germany was in great need of explosives. Yet in every month after June 1944, when powder and explosives plants were getting less than their 20,000 ton requirement, agriculture continued to receive substantial amounts of nitrogen.[130]

In Japan, on the other hand, there was little debate. The issue was resolved wholly in favor of the military. They obtained what they needed despite a sharp decline in total supply, and agriculture took what was left. The Agriculture Ministry protested periodically but it did no good. As a matter of fact, the Army seized a substantial part of the potato crop in the last year of the war, when the food supply was critical, to produce ethyl alcohol, when sugar from Formosa was cut off. Civilians were offered the waste fibers, which remained after fermentation, as food.

The total nitrogen supply fell from a peak of 429,026 tons in 1941 to 244,992 tons in 1944, a decline of 44 percent. Output fell from 116,837 tons in the first quarter of fiscal 1941 to 33,402 tons in the first quarter of fiscal 1945. Since the decline was a steady one throughout the war years, it cannot be attributed to air attack. Deterioration of equipment and lack of steel and replacement seem to have been major factors in the decline. In addition, the shortage of coke and the lack of shipping played a part. Japan's chemical industry was concentrated largely in a hundred-mile circle on the shores of northern Kyushu, southern Honshu and southwestern Shi-

[129] To conserve space and to prevent long deviations from the basic account of wartime developments, only very brief statements of chemical interrelationships and processes, essential to an understanding of the statistics presented, are given. For a detailed discussion see *Chemical Industries of Japan*, Foreign Economic Administration, Washington, April 1945, declassified by authority of C. C. Stelle, Department of State, January 8, 1947; also Davis, L., *Chemistry of Powder and Explosives*, John Wiley & Sons, New York, 1943.

[130] *The Effects of Strategic Bombing on the German War Economy*, USSBS, Washington, October 1945, pp. 85-90.

koku.[131] Ships plied back and forth between Yawata, Nobeoka, Niihama, Ube, Shimonoseki, Minamata, Omuta, etc., with raw materials, intermediates and finished products. The growing stringency of shipping obstructed production. As total nitrogen supply fell, the amount of ammonia used to produce nitric acid increased from 19 percent in 1941 to 43 percent in 1945, while the share used for ammonium sulfate fell from 81 percent to 57 percent over the same period.

Production of 98 percent nitric acid in Japan proper rose from 8,676 metric tons in 1931 to 98,385 in 1941, and then reached an annual peak of 125,968 tons in 1943.[132] On a monthly basis the peak came in March 1944. At that time 90 percent was being allotted to the Army and Navy and 10 percent to so-called "civilian" uses, which were, of course, mainly indirect military uses. Peak Japanese output was less than 35 percent of U.S. production and for the entire year, 1944, was only 21 percent of the U.S. total. Production in Korea and Manchuria combined was only 2 percent of that in Japan proper. An elaborate five-year production expansion program for nitric acid had been adopted in early 1942 which contemplated an average monthly output in 1944 of 23,800 tons of 98 percent nitric acid. This was to be based upon a 21,100-ton allotment of steel in 1944 and since only 14,500 tons were allotted, though not delivered, to the entire chemical industry that year, it is not surprising that actual production was only 40 percent of that planned. Production fell off after the March peak. A year later, in March 1945, it was 7,238 tons, and 2,196 tons in July or 17 percent of the previous year's peak. The Chemical Industry Control Association attributed the decline from March 1944 to April 1945 to corrosion of equipment and lack of replacements, and the drop thereafter to general economic disruption. A "maintenance" crisis occurred in February 1945 and at the time the Army promised more steel from its allotment, but the promise was never kept.

Most of the high explosives used by the Japanese were made by the action of nitric acid on organic compounds, such as the coal tar derivatives, benzol, toluol, picric acid, napthalene, cellulose made from wood pulp or short staple cotton, etc. Nitroglycerine, made by nitration of glycerine, was used as a component of double-base powders and as a component of dynamite. Formaldehyde, obtained from methanol (methyl alcohol), with ammonia forms an intermediate product which on nitration yields the explosive, hexogen. Formaldehyde with acetaldehyde, derived from acetic acid, calcium carbide or ethyl alcohol, forms an intermediate which is nitrated to produce the explosive PETN. Such explosives are of significance

[131] With the exception of sulfuric acid plants which were scattered all over the home islands.

[132] *Hompo Keizai Tokei* (Economic Statistics of Japan), Bank of Japan, Vol. II, Tokyo, January 1947, p. 34.

because they have important military use but are not based on coal-tar derivatives.

Production of these various chemicals essential to powder and explosives production was maintained in essentially the same fashion as the common ingredient, nitric acid. For example, the output of methanol (methyl alcohol), essential to the production of the high explosives, hexogen and trinitroanisol (TNA), used in the production of plastics, and usable as an aircraft fuel, rose to a peak of 10,760,000 gallons in 1944.[133] The monthly peak was reached in April 1944. The decline thereafter was attributed to lack of supplies of high-pressure pipe, compressors, and other equipment. Since methanol was being used as a fuel for trainer aircraft to compensate for the lack of aviation gasoline, when the decline in methanol output set in, a large synthetic ammonia plant was converted to the production of methanol and a secondary peak in its output was reached in November 1944. Lack of coke, however, resulted in a subsequent decline in output.

The coal tar derivatives, benzol and toluol, were used in Japan in peacetime as the basis for an extensive series of dyes but during the war benzol was used as a raw material in the manufacture of the explosives picric acid, hexyl, tetryl, and TNA, while toluol was used in producing TNT. Both were derived from high-temperature carbonization of coal, or coking principally in conjunction with iron and steel plants and gas works. There was no new construction of such by-product coke ovens during the war for chemical purposes though greater attention was paid to the recovery of derivatives essential for explosives production. Output of benzol rose from 8,441,000 gallons in 1940 to an annual peak of 10,317,000 gallons in 1943. The peak quarterly output came in the period January-March 1944 and the decline thereafter, due largely to decreased coking activity, brought production in the January-March 1945 quarter down to one-half of the previous year's peak. Production of toluol rose from 154,000 gallons in 1931 to 1,869,000 gallons in 1940 and then to an annual peak of 2,776,000 gallons in 1943. Peak monthly output came in March 1944, and the decline thereafter was also attributable to the decrease in availability of coke. Output in March 1945 was a little less than half of the peak a year previously and by July 1945 output was only 15 percent of the 1944 peak. At the monthly peak in 1944 output of both benzol and toluol were only slightly more than 2 percent of U.S. production. The drop in toluol and benzol output threatened explosives production but apparently did not actually affect it until April 1945. Benzol could be used as liquid fuel and production at peak levels would have been of marked usefulness in supplementing dwindling aviation fuel supplies. In June 1945 the Japanese army belatedly requested

[133] A detailed tabulation of the statistics of the Japanese wartime chemical industry may be found in Appendix C, Tables 57-89, of *The Effects of Strategic Bombing on Japan's War Economy*, published by the U.S. Government Printing Office, Washington, December 1946, pp. 145-72.

the steel industry to operate all coke ovens at full capacity regardless of coke demands, in order to provide benzol and toluol, but of course the decline in coal output and delivery made this impossible.

Most of the basic expansion in the production of explosives and powder was accomplished prior to the beginning of the Pacific War, as may be seen from the following table:

PRODUCTION OF POWDER AND EXPLOSIVES, JAPAN PROPER, 1935-45

(in metric tons)

Fiscal Year	*Smokeless Powder*	*Organic High Explosives*	*Explosives*
1935	1,824	4.320	6,144
1936	2.148	4,116	6,264
1937	5,232	14,688	19,920
1938	12,252	21,524	33,776
1939	12,768	24,828	37,596
1940	13,632	26,328	39,960
1941	14 208	36,756	50,964
1942	18.408	43,656	62,064
1943	20,952	44,880	65,832
1944	24 637	44.473	69,110
1945*	6,431	9,161	15,592

* April-July only.

Source: Chemical Industry Control Association, Japanese War and Navy Ministries.

Peak production was reached about a year after the output of the basic chemical ingredients began to decline. Peak monthly output came in March 1945. Japan's wartime expansion was dwarfed by the growth of U.S. production. Although Japan produced a greater amount of organic high explosives than did the United States in 1940, in 1944 U.S. output was 26 times Japan's output and in 1945 (until the end of the war) 61 times. The Japanese Army and Navy both produced most of the powder and explosives in their own arsenals—in the case of the Army 85 percent was produced in its arsenals and in the case of the Navy 60 percent—and with far less efficiency than in the case of the United States. Comparative production per line[184] in Japan and in the United States may be seen in the following table (in lbs. per 24-hour day):

Product	*Japan*	*United States*
Smokeless Powder	8.800	140,000
TNT	4,400	120.000
Tetryl	166	7,500
Hexogen	2,200	30,000

Sources: Japan, Chemical Industry Control Association; U.S., War Production Board.

Thus over the same time and with the same equipment as the United States, Japan obtained only one-sixteenth the smokeless powder, one-twenty-

[184] A "line" is a series of buildings for carrying out a complete reaction. For example, a TNT line consists of two nitrator buildings. the sellite (sodium sulfite treatment) refining house, and either a flaker or a crystallizer house.

seventh the TNT, one-forty-fifth the tetryl and one-thirteenth the hexogen obtained by the United States.

There is no evidence that the Japanese were ever troubled by shortages of powder or explosives. As a result of the attack on shipping, individual theaters may have been isolated and deprived of supplies at times but it appears that explosives were available for shipment in the home islands. Whether stocks would have been ample in the event of an invasion of Japan proper, accompanied by extended fighting over a period of time, is doubtful, particularly since production would have ceased by the time of invasion. Since the Japanese plan, in the event of invasion, contemplated having the best units retire to the mountains and wage guerrilla warfare, it is difficult to estimate just what the overall needs would have been in the event of invasion. By and large, non-military testimony charged that the military obtained greater allocations of chemicals for explosives than they were able to use. Had the military ever been short it is probable that they would have forced greater diversion of ammonia from ammonium sulfate output to nitric acid production. From the March 1945 peak, output of powder and explosives dropped 55 percent by July. This was attributed to the dispersal program undertaken but not completed by the military and to the shortage of railway tank cars to transport acids. At the end of the war the Transportation Ministry reported that there were 776 chemical tank cars of which 30 percent had been damaged by the air attack. Since output of nitric acid had dropped 83 percent, however, explosives plants would shortly have had to adjust their output to the current availability of nitric acid and production would probably have soon dropped far more than the 55 percent it did until the end of the war.

In contrast to the attempted wartime maintenance of the output of chemicals essential to explosives production, output of chemicals for fertilizers declined steadily throughout the war years.[135] It was a case of robbing Peter to pay Paul. Japan's economy was just not large enough, her supplies of steel, coke, salt, etc., would not go far enough, to meet both demands at the same time. In the decade before Pearl Harbor, Japan had gone a long way toward self-sufficiency in the chemical nitrogen fertilizer field. In 1928, 62 percent of her consumption of ammonium sulfate had been imported; by 1941 this had been cut to 4 percent. Ammonium sulfate was made by combining ammonia and sulfuric acid. It was made in synthetic ammonia plants by scrubbing the ammonia-laden coke oven gases with sulfuric acid. Since the output of coke, ammonia and sulfuric acid all declined steadily during the war years, and a larger and larger percentage of ammonia was used to produce nitric acid, it was only natural to expect the output of ammonium sulfate to drop. Production declined steadily and in

[135] Interrogation of Kakide, S., Chief of Fertilizer Section, Ministry of Agriculture and Forestry, Tokyo, November 13, 1945.

1944 was less than half the 1941 figure. In the first quarter (April-June) of fiscal 1945, output was slightly less than one-fifth the production in the first quarter of fiscal 1941.

The two major demands for sulfuric acid dropped as ammonium sulfate output declined due to the diversion of ammonia, and as rayon production was sacrificed to conserve caustic soda (which depended on dwindling salt imports) for aluminum reduction and chlorine output (needed as an intermediate for explosives). As a result more than enough sulfuric acid became available for munition needs and no new plants were constructed during the war. Since the Japanese obtained most of their sulfuric acid by the roasting of pyrites, of which ample deposits were available in Japan proper, under pressure, the supply of sulfuric acid not only presented no problem but was actually in excess.[136] Production dropped from a 1937 peak of 208,000 tons per month to a rate of 23,000 tons per month in July 1945.[137]

The output of the other principal nitrogenous fertilizer, calcium cyanamide, also declined, but since the chemical also had some industrial uses, it was not allowed to fall as sharply as ammonium sulfate. Ammonia may be obtained by treating calcium cyanamide with steam, and some of the cyanamide produced during the war was so converted. From a peak in 1937 of 381,138 metric tons output decreased to 163,451 tons in 1944. Production in April-June 1941 quarter was 77,291 metric tons, in April-June 1945 quarter, 30,192 tons. Limestone, coal and coke are essential raw materials needed in the manufacture of calcium cyanamide and this is also true of the production of calcium carbide, which is necessary for the fixation of nitrogen. The output of both declined due to the growing shortage of coal and coke. Calcium carbide is manufactured by heating a mixture of coke and lime in an electric furnace at about 1900° C. Aside from its use in nitrogen fixation it yields acetylene, which is used in mining for lighting purposes and for welding and metal cutting, and in turn acetylene derivatives such as acetone, used as a solvent in making smokeless powders and in the manufacture of organic glass, and butanol, employed in the production of octane and iso-octane. Calcium carbide output dropped from 431,700 metric tons in 1937 to 291,900 tons in 1944. It fell more sharply in 1945 as a result of poor coal deliveries and the use of low-grade home island coal in place of that mined on the continent. Output of acetone also declined after reaching a peak 14,130,000 pounds in 1942. Production in 1944

[136] Unlike the United States, Japan did not use refined sulphur in manufacturing sulfuric acid. Sulphur was reserved for the rayon and paper pulp manufacturing industries and Japan used pyrites to produce her sulfuric acid. See *Sulphur Resources of Japan,* Natural Resources Section, SCAP-GHQ, Report No. 66, Tokyo, February 10, 1947, p. 9.

[137] *Japanese Economic Statistics,* Research and Statistics Division, SCAP-GHQ, Report No. 9, Tokyo, May 1947, p. 20.

dropped to less than half this figure and all of the output was reserved for the production of " organic " glass.

" Organic " glass is the translation of a Japanese term which covers all transparent plastics such as lucite and plexiglas. To produce 1,000 lbs. of organic glass it required 3,600 lbs. of sodium cyanide, 13,500 lbs. of sulfuric acid, 3,000 lbs. of acetone, and 420 gallons of methanol. The use of organic glass was restricted to aircraft. Approximately 97 percent of the output was used in aircraft windows, the remainder in wing-tip and tail lights, and electrical instrument parts. Although output was raised from 139,600 lbs. in 1938 to a peak of 2,256,000 lbs. in 1944 (peak monthly output came in December 1944), it was never sufficient to meet the needs for aircraft windows and instruments, and at times organic glass was used only for nose windows while all other openings were covered with ordinary window glass.

Butanol (butyl alcohol), which was used to make the high octane component of aviation gasoline, was made by two methods in Japan. The first was the fermentation process very similar to that used for ethyl alcohol and utilizing the same raw materials, either sugar base materials such as molasses, sugar cane or sugar beet, or starchy materials such as potatoes and grains. The second method was by the synthesis from acetylene (derived from calcium carbide). Butanol output was raised from 780,000 lbs. in 1940 to 13,210,000 lbs. in 1943. Early in 1944 the military was forced to make a difficult choice between butyl and ethyl alcohol production due to the interdiction of shipping from Formosa, and although both were needed badly, chose to convert most butanol plants to the manufacture of ethyl alcohol. As a result butanol output in 1944 dropped to only 1,570,000 lbs.

In 1937 Japan adopted a seven-year plan aimed at increasing ethyl alcohol production to 39 million gallons in 1941 and to 64 million gallons in 1943. This was part of the campaign, along with increased production of synthetic oil, which aimed to lessen Japan's dependence on foreign sources for fuel. Japan's ethyl alcohol production was to be based on the sugar of Formosa and the potatoes of the home islands. While ethyl alcohol has a large variety of uses, including synthetic rubber, high explosives and propellants, dyestuffs, lacquers, antifreeze, etc., its primary use in Japan was with gasoline as motor fuel and aviation gasoline. A series of government decrees required that ethyl alcohol be mixed with gasoline to the extent of 20 percent.[138] Home island production rose from 17,810,000 gallons in 1941 (less than 50 percent of the planned amount for that year) to 35,670,000 gallons in 1944. Imports from Formosa, South Seas and Sakhalin, which totaled 14 million gallons in 1942 and 1943, fell to 8.4 million in 1944. So-called " civilian " consumption, including industrial and fuel uses, fell from 22.5 million gallons in 1941 to 4.1 million gallons in 1944, while military use rose from 3.7 million gallons in 1941 to 40.1 million in 1944. Stocks of 2.2

[138] See *Jidosha Nenkan, 1943, op. cit.*, p. 87.

million gallons on hand at the time of Pearl Harbor were reduced by 1945 to 320,000 gallons. The tug-of-war between the Ministry of Agriculture and the military over whether potatoes were to be used for food of for alcohol production was resolved largely in favor of the military. It was only the sharp decline in 1945 in availability of gasoline with which to blend the alcohol which forestalled military seizure of the whole potato crop for alcohol production.

Tetraethyl lead was an essential chemical component of aviation gasoline. Throughout the war two plants produced 90 percent of the total supply. Output rose from 85,100 lbs. in 1940 to a peak of 7,024,400 lbs. in 1944. The peak month of production was September 1944, when 834,200 lbs. were produced. By March 1945 output had fallen to 256,100 lbs. In mid-April one of the two major plants was subject to a bombing attack and production for the month fell to 174,500 lbs. The Japanese simply closed down the bombed plant and increased production at the unbombed one, and increased output in June 1945 to 328,900 lbs. While production was small compared to U.S. output, and never exceeded 5 percent of U.S. production, the supply of tetraethyl lead was never a limiting factor. Output was allowed to drop after September 1944 because of the decreased availability of aviation gasoline.

A large segment of the chemical industry, including soda ash, caustic soda, chlorine, rubber, superphosphates, etc., was dependent upon imported raw materials such as salt, phosphate rock, rubber, etc., for its continued operation. Both soda ash and caustic soda, the two alkalis most commonly used by industrial nations, are made from the same raw material—salt. Japan produced some salt at home. In the peak year of salt consumption, 1939, when 2.7 million tons were consumed, domestic production accounted for 18 percent and imports for 82 percent. Salt was obtained both in Japan proper and on the mainland by the solar evaporation of sea water. In Japan proper, however, flat land suitable for solar evaporation basins was too scarce and too valuable for food production. It was much more advantageous to import salt from the continent. So confident was Japan of being able to continue to do this that she permitted stocks of salt to be drawn down from 412,300 tons at the end of 1937 to a mere 64,400 at the end of 1941. Domestic output of salt reached a peak of 701,100 tons in 1939 and then fell to 395,700 in 1944. Imports fell from a peak of 2 million tons in 1939 to 1.1 million in 1944. The real cut in imports, however, came in 1945, when they fell to half the 1944 rate. In contrast to most other aspects of the economy, most of the decline was absorbed by industrial users rather than by cuts in civilian food requirements. In 1939, 58 percent of the salt consumed was used industrially while 42 percent was consumed as food. In 1944, only 39 percent was consumed industrially while 61 percent was used for food needs. A Japanese study in February 1945 noted:

Salt is indispensable for humans and its demand is therefore more or less inflexible. In addition to this the soda industry, together with sulfuric acid and ammonia, constitute the foundation of the chemical industry. Salt also is used extensively in the manufacture of light metals, oil refining and every phase of munitions manufacture and food. Thus it would not be an exaggeration to say that cessation of salt supply would bring to a halt every phase of production. . . . Due to the rationing of manpower and fuel, an increase in the production of salt on a large scale in Japan proper to the extent of self sufficiency, seems extremely difficult. On the other hand, salt produced in Kwantung, Manchuria and North China is mostly being stored away at the site of manufacture, owing to the poor transportation facilities. These places, however, produce about 1,500,000 metric tons and every effort should be made to bring about the maximum increase in the shipment in order that a stockpile of salt may be built up in Japan proper. In addition, there is an immediate necessity of formulating complete plans along the following lines: (1) technical plans to economize the use of soda (for example, to find a method of manufacturing aluminum without using soda), (2) to establish definitely the minimum amount of salt required for human subsistence, and (3) plans to bring about an increase in the production of salt in Japan proper.[139]

One of the methods adopted to increase home island salt production was to relax the control of the Monopoly Bureau of the Finance Ministry and permit anyone to produce and sell salt. Previously, only those licensed by the Monopoly Bureau were permitted to produce salt and were required to sell it to the Bureau.

The peak production of soda ash, caustic soda and chlorine coincided with peak production and importation of salt and came in 1939. The decline thereafter was steady and outran the decline in salt availability due to the additional factor of deterioration of equipment and lack of steel for replacement.[140] Output of soda ash fell from 56,000 tons in 1938 to 4,625 tons in 1945. In the thirties the basic uses of soda ash and caustic soda had been in rayon, paper, glass and soap production. During the war emphasis was shifted to aluminum reduction and petroleum refining. Soda ash was produced by the ammonia or Solvay process, while caustic soda was derived in two ways. In the caustication method, soda ash is dissolved in water and the solution treated with milk of lime. Half of the soda ash produced was converted to caustic soda by the caustication process. The second process was the electrolytic, in which an electric current is passed through an aqueous solution of salt to give a solution of caustic soda, which is then either evaporated or heated to give the fused product. Hydrogen and chlorine are by-products in the electrolytic method. In the thirties the causticating process was favored because it was cheaper, did not involve use

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[139] *Dependence of Japan on Continental Raw Materials*, Research Bureau, Foreign Ministry, Tokyo, February 1945, p. 17.

[140] *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Vol. I, September-October 1945, p. 62.

of considerable amounts of electric power, and did not result in a by-product, chlorine, for which there was then no great use. During the war, however, since the electrolytic method used less salt and less coal, was faster and yielded chlorine, which in the form of hydrochloric acid was desired in munitions production, it became the dominant process.[141] The decline in rayon, paper and soap output during the war helped to conserve soda but the supply nevertheless fell so sharply that it was a constant problem in the aluminum industry. By the beginning of 1945, two-thirds of the caustication capacity and one-half the electrolytic capacity were not being used due to lack of salt, need for repairs and replacements, etc. By August 1945, the caustication plants had shut down completely and output of the electrolytic plants was only one-ninth of the 1939 level.

Ironically, despite Japanese acquisition of large areas abundant in phosphate rock, in the drive to the south, the output of phosphatic fertilizers declined more sharply after 1940 than did the nitrogenous fertilizers described previously. The chief phosphatic fertilizer is superphosphate of lime, commonly referred to as superphosphate, obtained by treating ground phosphate rock with sulfuric acid. Phosphorus, which is made in an electric furnace by the reduction of phosphate rock with coke, is an important military "chemical warfare" agent. It is used in both shells and bombs for producing screening smokes and as a casualty agent for inflicting serious burns. The principal non-military use of phosphorus is in the manufacture of matches. Japan obtained much more phosphate rock from the South Sea islands, Ocean, Nauru, Christmas, etc., which she captured, prior to their seizure than afterwards. She also obtained more rock from her own mandated islands, Angaur, Pelelieu, etc., prior to Pearl Harbor than afterwards. Nauru, Ocean and Christmas Islands together provided 248,000 tons in 1940, nothing in 1942, only 4,000 tons in 1943, and nothing in 1944.[142] Angaur and Pelelieu provided 170,000 tons in 1939 but only 98,000 in 1943. Total imports of phosphate rock fell from 1,250,889 metric tons in 1937 to only 187,000 tons in 1944. Consumption of superphosphates in Japan fell from 1,288,600 tons in 1940 to only 15,400 tons in 1944.[143]

Imports of crude rubber reached a peak of 83,800 tons in 1943 and fell off thereafter. In the peak quarter January-March 1944, 32,100 tons were imported, but in the October-December quarter of 1944, imports dropped to 5,900 tons. In the April-June quarter of 1945 they were only 3,300 tons. "Civilian" consumption of crude rubber dropped from a peak of 68,300 tons in 1936 to 13,200 tons in 1944. Over the same period military consumption rose from 4,400 tons to 29,800 tons. The military seems to have

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[141] "Development of the Soda Industry," *Oriental Economist*, June 1944, p. 261.

[142] *Sources of Phosphate for Japan*, SCAP-GHQ, Natural Resources Section, Report No. 12, Tokyo, December 31, 1945, p. 13.

[143] *Oriental Economist*, January 26, 1946, p. 41.

mishandled the situation. Confident of a large supply of crude rubber, they made no effort to develop a large synthetic rubber industry. Since there was an ample supply of truck tires in Japan at the beginning of the war, the three largest factories were converted to the manufacture of aircraft tires. When in 1945 a shortage of truck tires and a surplus of airplane tires developed, a desperate plan was introduced to import truck tires from Manchuria, but the blockade prevented that. The shortage of motor-vehicle tires, which cannot be attributed to a shortage of crude rubber since at the end of the war the Army still had a hoard of 40,000 tons of crude rubber, kept out of operation 3,000 military vehicles and 5,000 civilian vehicles which were otherwise in running condition as of March 1, 1945.[144] In view of the great need for truck transportation in 1945 and the increased chaos caused by the lack of it, the handling of the rubber and tire situation was poor. Other than this, however, there appears to have been ample rubber for most essential purposes. Had the war been prolonged for a year after the blockade cut off all rubber imports, the failure to build a synthetic rubber industry would have been felt severely. Although a number of plants in Japan were used to produce various types of synthetic rubber, output in the peak year, 1944, was a mere 224 tons. Capacity was only 750 tons.[145] Synthetic rubber was used only in special products in which oil-resistant properties were of importance, such as gaskets in automotive and aircraft engines, flexible gasoline fuel lines, etc. That Japan had either the technical skill or a sufficiently large supply of chemicals to build and operate a large synthetic rubber industry is highly doubtful.

Despite the concentration of Japan's chemical industry (with the exception of sulfuric acid plants), less than 1 percent of the bombs dropped on Japan proper were aimed at it; three-quarters of the tonnage were dropped on the tetraethyl lead plant described previously. While the decline in output of chemical fertilizers had an impact on food supply, as will be indicated in Chapter 6, it cannot be said that the chemical industry provided any major bottleneck in the Japanese war economy. Its limited size caused a substantial portion of it to shrink in order to permit expansion of production of essential military chemicals. The decline in output of these from their peak in the first quarter of calendar 1944 may be attributed to a variety of factors, such as deterioration of equipment, lack of steel for replacements, impact of the blockade upon imported raw materials, etc. The chemical shortages were pervasive in many small ways, but with the exception of fertilizers, there was no major impact on the war economy.

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[144] *Summation of Non-Military Activities in Japan*, SCAP-GHQ, No. 1, Tokyo, September-October 1945, p 67.

[145] *Ibid.*, No. 2, Tokyo November 1945, p. 87.

THE TOOLS OF WAR

Q. Do you feel that the Japanese fighting forces suffered shortages of military supplies? And, if so, what specific supplies were most lacking?
A. Aircraft.
Q. What were the limiting factors in aircraft production?
A. Especially skilled workmen, light metals and special steel.
Q. Which specific light metals?
A. Duraluminum.
Q. What was the trouble with aluminum?
A. Lack of bauxite.
Q. Was it through lack of bauxite in the Empire or lack of shipping facilities?
A. Lack of shipping facilities.

—GOKO, HEAD OF MITSUBISHI HEAVY INDUSTRIES, LTD., INTERROGATION, TOKYO, OCTOBER 29, 1945.

At the end of 1941 the Japanese were committed to a war in which the Japanese Navy, with an uncertain oil supply, was pitted against the U.S. and British fleets[1] and the Army spread over the islands of the Pacific, the wide reaches of the southern regions, from New Guinea to northern Burma, most of China, along the Manchurian-Siberian border and over the Kuriles to the tip of the Aleutians. Nevertheless, so confident were Japanese militarists, that they actually planned to extend the perimeter of their operations. Part of this confidence was due to the fact that they had what was then considered an adequate supply of the tools of war, with replacements rolling off the assembly lines at much more rapid rates than then current consumption.

While there had been some difficulties in organizing production over the previous decade and some business leaders had been recalcitrant, munitions output had really exceeded expectations and current production was ample, particularly in view of the large stocks on hand. It was possible for the Japanese to sit back and contemplate the situation with keen satisfaction. The Army had 4,860 aircraft and the Navy 2,120. Production in 1941 totaled 5,088. Naval ship construction had increased from

[1] Admiral Soemu Toyoda, Chief of the Navy General Staff, testified: "Never in the history of our Navy were plans ever drafted which envisaged a war with Great Britain and the United States as allied enemies." *Interrogations of Japanese Officials, op. cit.*, USSBS Interrogation No. 378, Tokyo, November 13-14, 1945, p. 324.

a delivered tonnage of 22,500 in 1931 to 225,159 gross tons in 1941. Total tonnage delivered over the decade was 701,299. Output of tanks and other combat vehicles had risen from 12 in 1931 to 2,446 in 1941. Output of other motor vehicles had risen from 500 in 1930 to 47,901 in 1941. Stocks of ammunition on hand in 1941 totaled nearly five years' output at the 1941 rate of production. Stocks of weapons on hand in 1941 were sufficient to equip 95 divisions and 1941 production amounted to equipment for 15 divisions, according to War Ministry statistics. To wage the kind of holding war that the Japanese contemplated, their equipment and production seemed to them to be adequate.

After Midway[2] and Guadalcanal, plans had to be recast. Original plans seem to have been based on the experience in China and gave conventional land weapons, such as tanks and artillery, a major role. The conflict was seen to be primarily a sea and air war, for with the Japanese now on the defensive the choice of weapons had passed to the enemy. As a result there had to be a shift in emphasis in war production from the ordinary, pre-Pearl Harbor types of ground and surface weapons to aircraft, radio, radar, aircraft weapons and ammunition, carriers and small fleet units. With the unforeseen enemy submarine attack on merchant ships, small escort vessels proved more important than 60,000-ton battleships. The changes in the priority ratings of the following items indicate the gradual change in outlook and shift in production plans.

Item	*1941*	*1942*	*1943*
Submarine locators	D3	C3	A7
Air force weapons	C2	B5	A1
Air force ammunition	C3	B6	A2

Tanks dropped from an A rating in 1941 to a D rating in 1944 and then, when an invasion of the home islands became imminent, the rating was switched back to B in 1945. Despite Japan's dependence on foreign tankers to carry half her oil imports in 1941, no provision was made to stress tanker production in 1942. In 1943, however, highest shipbuilding priorities were given to tankers. When it became apparent in late 1944, however, that imports from the South would no longer be possible, tanker construction was discontinued in January 1945. In the case of aircraft, there was a shift from bomber to fighter production. In the radio and radar fields, the new demands were so far out of proportion to previous production that almost the entire industry had to be built from the ground up to supply the need. The trend away from conventional ground weapons may be seen from the following data showing relative shares of yearly war production for air, ground and water use (excluding Army production of communication and optical equipment which could not be subdivided in this fashion).

[2] The Japanese attributed their loss of the Battle of Midway, not to the superiority of the American fleet nor its tactics, but to their own lack of radar.

	1941 %	1942 %	1943 %	1944 %	1945 %
Air	32.2	39.0	46.8	48.3	51.9
Ground	28.9	20.5	12.4	8.2	7.6
Water	38.9	40.5	40.8	43.5	40.5

Naturally, such shifts tended to restrict mass output. Aircraft engineers complained that the Army and Navy were "model crazy" and changed plans so often that output was retarded. Thus the necessity for changing production plans during the course of the war tended to brake output almost as much as the complacency of the first year. This may be shown in several ways. The merchant shipbuilding plans drafted in March 1942 set a four-year schedule looking to a gradual increase from about 470,000 tons in 1942 to 820,000 tons in 1945. Eight months later, in November 1942, a drastic revision of these plans virtually doubled the original goal established for 1943, while scaling down 1942 output nearer to the levels then being actually achieved.[3] Armament output, measured in terms of 1945 prices, rose from 5.1 billion yen in 1941 to only 6.7 billion yen in 1942. Or, expressed in index terms as shown in Table 27, output for the fiscal year 1942 (ending March 31, 1943) was only 14 percent greater than output as of December 1941. When real expansion got under way in 1943, it carried output to a peak in September 1944, 194 percent over the December 1941 output. In value terms, output rose 9.0 billion yen between 1942 and 1944, in contrast to the increase during the first year of the war of only 1.6 billion. While the peak of total output came in September 1944, this only coincided with the peak in aircraft and naval ordnance. The peak in merchant shipbuilding came in January 1944, in naval shipbuilding in August 1944, and in Army ordnance in February 1945.[4] Motor vehicle output declined after December 1941. Within each broad category there was also considerable variation. Though Army ordnance reached a peak in February 1945, largely as a result of a wasteful last-minute outpouring of balloon bombs, production of tank and other combat vehicles reached its highest level in 1942. The same was true of ammunition production for the Army ground forces. Small arms production for Army use reached its peak in 1943 and remained at about the same level in 1944.

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[3] *Report on Present Production Conditions*, Navy Technical Bureau, Navy Ministry, Tokyo, November 20, 1942.

[4] Had it not been for the ill-conceived balloon bomb campaign which began in October 1944 and reached its peak in February 1945, the peak of Army ordnance production would have been in August 1944.

TABLE 27

THE EXPANSION AND DECLINE OF JAPANESE WAR PRODUCTION, 1941-45

(1941 = 100)

Category	Dec. 1941 Index	Second Level (Fiscal 1943)		Peak Level (Sept. 1944)		Last Recorded Month (July 1945)	
		Index	Percentage change from Dec. 1941	Index	Percentage change from Dec. 1941	Index	Percentage change from peak level
TOTAL	115	132	+14	339	+194	139	—59
Aircraft	126	171	+35	502	+298	221	—56
Army Ordnance .	116	130	+12	224	+ 93	127	—44
Navy Ordnance .	113	158	+39	581	+414	250	—57
Naval Ships	100	110	+10	233	+133	110	—53
Merchant Ships .	103	135	+31	461	+347	92	—81
Motor Vehicles ..	134	62	—54	35	— 74	9	—94*

* Percentage change from peak in December 1941.

Source: Calculated from data gathered by the Military Supplies Division, USSBS.

Army artillery production also reached its peak in 1943, although anti-aircraft artillery output continued to rise until 1944. Army explosives production stayed at the same general level from 1941 through 1944.

Although the peaks seem impressive in percentage terms this should not obscure the fact that the Japanese were never able to meet their overall requirements. This will be made clear in subsequent sections. The greatest deficiency was in merchant shipping. Losses far exceeded production. While approximately 3.2 million tons of steel merchant shipping were constructed during the war, 8.6 million tons were sunk. Aircraft production from 1942 on never reached a level sufficient to allow the Japanese to obtain air superiority in any of the contested areas. Since the growing fuel shortage, however, limited pilot training, there probably would not have been a sufficient number of trained pilots even if aircraft production had expanded beyond the levels it reached. Production of weapons and ammunition for ground troops was not sufficient to supply the widespread garrisons, to fill the long sealanes, and to maintain adequate stocks in reserve. This, however, was more a problem of supply than of production. Of the Army supplies sent overseas in 1943, 17 percent were lost due to ship sinkings; in 1944 this increased to 33 percent, and during the first half of 1945 to 50 percent. In 1944 half the supplies sent to the crucial area of the Philippines were lost. Certain naval ordnance items such as bombs, aircraft torpedoes, anti-aircraft guns, and anti-aircraft ammunition, machine guns for surface vessels, and electrical and navigational equipment for midget submarines, were in short supply. In some cases the lack of bombs forced the use of loaded shell cases instead. The shortage of surface vessel machine guns was felt in 1943 and 1944 with the increased production of smaller vessels, both merchant and naval. As a result ships were often equipped with less than half the number of guns planned. Motor vehicles were never in sufficient supply either in Japan or overseas.

The Japanese Army had, at the end of 1944, one truck for every 49 men in the overseas areas. This compared with one U.S. truck for every 13 men in the Pacific areas at the time. The shortage of trucks in the home islands was a very serious bottleneck at the time of the dispersal program in 1945. Plant capacity was available for greater vehicle output, but with a very limited steel supply available, and this diminishing monthly with the variety of urgent and pressing demands for steel, the motor vehicle industry was allotted a low priority.

Despite the overall allotment of a higher and higher percentage of steel to direct munitions production—increasing from 56 percent in 1941 to 85 percent in 1945—it became the overall limiting factor in munitions output. Army chiefs outside the home islands were told in the spring of 1944 that heavy artillery manufacture was being discontinued. Ammunition production was cut, and an order was issued early in 1944 practically forbidding the use of ammunition for training purposes. Output of the principal categories of combat vehicles fell as a direct result of the steel situation. Light tanks were virtually eliminated and medium tanks and armored cars reduced severely. Deliveries of steel began to fall off in the January-March quarter of 1944, and by the April-June quarter of 1945 were 34 percent of the 1943 peak quarter. The limiting influence of the steel situation on shipbuilding will be examined later. Steel was not a limiting factor in the communications equipment industry. Since output rose 1480 percent between 1941 and March 1945, supply was adequate, but quality was severely criticized, Admiral Toyoda, among others, declaring, "One reason for the difficulty in communications was the low efficiency of communications equipment." The difficulties that affected the industry prior to air attack were primarily technological ineptitude, a shortage of skilled labor, lack of silicon steel, and absence of such rare but essential materials as diamonds, quartz crystals, cobalt, tantalum and columbium. Aircraft engine output fell because of a shortage of ferro-alloys and production difficulties arising from changed alloy specifications as attempts were made to dodge shortages in certain of these metals.

Recruiting, training, and holding an adequate labor force caused the war industries many difficulties. Total employment in the aircraft industries increased 285 percent from 1941 to the end of 1944; in Army ordnance it increased 79 percent, in Naval ordnance 187 percent, and in merchant and naval shipbuilding 107 percent. Only in the motor vehicle industry was there no increase in the labor force. More important, however, than the overall increase in employment in war industries was the change in its composition. Practically all the workers in these industries in 1941 were Japanese males. By 1944 roughly half of the workers were Koreans, students, and women. Absenteeism, as will be shown in Chapter 5, was particularly severe during the last year of the

war. The percentage of workers absent from their jobs, for all causes, in Army and Navy ordnance plants in urban areas, increased from 18 percent in July 1944 to 40 percent in July 1945. For shipyards the comparable figures were 24 percent in July 1944 to 52 percent in July 1945. For the aircraft industry, the figures were 21 percent in July 1944 and 51 percent in July 1945.

Japanese war production was highly concentrated prior to 1945. Two navy yards and one commercial shipyard produced over 45 percent of tonnage of naval shipping from 1941 through 1945, and 15 yards, naval and commercial, produced 90 percent of the naval shipping over the same period. In merchant shipbuilding, 70 percent of the tonnage constructed during the war was done by 12 commercial yards. In aircraft manufacture, 33 percent of all air frames made during the war were turned out by six plants, 67 percent of all aircraft engines were made by four plants, and 75 percent of the propellers by two plants. Five naval arsenals and eight civilian companies accounted for three-quarters of the total value of output of finished naval ordnance items in 1944, and about 100 producers accounted for the entire finished output of naval ordnance. Over three-quarters of the finished army artillery was turned out by one Army arsenal, with four plants in two locations. Two factories produced approximately half of the tanks and other combat vehicles for the Army. Three optical equipment firms produced 85 percent of the finished optical equipment for both Army and Navy. About 80 percent of the Army aircraft armament manufacture was concentrated in the Kokura and Nagoya Army arsenals. Over 95 percent of the motor vehicles made during the war were produced by three firms, with four main plants. The vulnerability of such a war-production structure to air attack is apparent. The fact that dispersal was not undertaken prior to 1945 is incredible.[5]

A few international comparisons may serve to place the Japanese war industries in proper perspective. In the peak year of production of military supplies, 1944, Japanese production of airframes was 11.5 percent of U.S. total, of aircraft engines 14 percent, of naval ship tonnage 11.3 percent, of cargo and supply ship tonnage 17 percent, of tanks 4 percent, of trucks 8 percent, of mortars 4 percent, etc. By converting the Japanese production in units of each type of product into dollars, on the basis

[5] It may be partly explained by the fact that the military kept insisting and assuring the government that Japan would not be subject to wide air attack. For example, the Civilian Defense Division of USSBS declared: "Civilian defense authorities erred in estimating the potentialities of future air attacks because the military informed them that there could not possibly be any mass raids on the home islands; that, at most, not more than two or three planes might slip through and, then, only for the purpose of pin-point bombing of certain especially remunerative targets." *Final Report Covering Air-Raid Protection and Allied Subjects in Japan*, USSBS, Washington, 1947. p. 2.

of the Japanese percentage of American output of the same products, Japanese production was found to be about 10 percent of American output. Comparisons with certain British and German production categories reflect somewhat more favorably for the Japanese. Japanese aircraft production was 70 percent of German output in 1944 by number, and 63 percent by airframe weight; 106 percent of British output by number, and 52 percent by airframe weight. In shipbuilding, Japan produced 22 percent of German submarine tonnage output in 1944, but 160 percent of British merchant ship tonnage.[6] Output of Japanese tanks and other armored vehicles in 1944 was 7.6 percent of German and 8.0 percent of British output. Japanese output of trucks and cars was 18 percent of German and 20 percent of British output, in 1944. The comparison between the trend of German and Japanese armament output is striking. The peak in Germany[7] was reached in July 1944 (in Japan in September 1944). The decline to the last recorded month (March 1945) in the case of Germany was 55 percent; in the case of Japan, to the last month of full war production (July 1945) it was 59 percent.

When in early 1945 the decision was made to concentrate all forces and supplies in the home islands to guard against possible invasion and to abandon overseas installations to their own devices, new problems arose with respect to military supplies. It was practically impossible to bring back any stored supplies from overseas, but on the other hand, these areas no longer had to be supplied. Special attack weapons for close-quarter fighting came into demand. Training planes and obsolete types were added to the air force as Kamikaze (suicide) weapons. This brought total usable aircraft strength up though oil supply was a crucial problem. There were 10,700 Japanese Army and Navy planes in August 1945, of which 50 percent were combat aircraft and the remainder usable on Kamikaze missions. In the field of naval ship construction the emphasis was shifted almost entirely to the secondary fleet of small surface and underwater special attack craft. Battleship deliveries had ceased in 1942, cruiser construction was halted in early 1944, carrier construction was stopped at the end of the year, destroyers were cut out in June 1945, while work on standard submarines was sharply reduced. The Navy's fleet of small special attack vessels was on the increase. As far as merchant ship construction was concerned, tanker production was stopped and repair

[6] British peak merchant ship production came in 1942 when 1.3 million gross tons were turned out. In 1942 Japanese production amounted to only 361,639 gross tons. By 1944 British output had fallen to 1.0 million tons while Japanese had risen to 1.6 million gross tons. See *Build the Ships—The Official Story of the Shipyards in War-time*, HMSO, 1946, London; also *Statistics Relating to the War Effort of the United Kingdom*, London, HMSO, 1944.

[7] See "The German War Economy" by Kaldor, Nicholas, the *Review of Economic Studies*, No. 33, Vol. XIII, No. 1, London, 1946, p. 50.

operations on other tonnage became more important than new construction. Between February and August, merchant ship tonnage in need of repair jumped 80 percent. With the prospect of invasion, balloon bomb production, which had reached a peak in the January-March quarter, was eliminated entirely in plans for the subsequent quarter, and medium artillery and tank production became more important. Naval gun output was eliminated. Such shifts in emphasis and output involved change of plans and some retooling, and helped to retard output. In addition, the dispersal program cut production materially. The motor vehicle industry offers the most striking illustration of the adverse effect on production of a hasty, badly-planned dispersal. Motor vehicle output was already down to less than one-third of the 1941 rate of production in May 1945 when the dispersal started. While less than half of the machines in the three major firms were moved, they were the machines vital to finished production and the failure to carry through the dispersal successfully resulted in the almost complete disruption of production.

The principal forces operating to restrict Japanese war production, prior to the advent of intensified air attack, were shortages of steel and other raw materials, lack of local transportation, lack of skilled workers, and absenteeism. Japanese war production, with the exception of the aircraft industry, was not a target for concentrated air attack. In the field of merchant and naval shipbuilding, motor vehicle production, and most types of Army and Naval ordnance production, lack of steel was primarily responsible for the decline of output in late 1944 and early 1945. Excess capacity in these fields due to material shortages was greater than that destroyed by air attack. The drop in the output of aircraft through the end of 1944 was principally due to a lack of aircraft engines and this, in turn, was due to a failure of the supply of ferro-alloys and, to a lesser extent, to a lack of skilled workers. The Japanese aircraft industry was the first target system attacked on a large scale from the Mariannas. However, the tonnage dropped prior to March was minor. The weight of the attacks was about equally divided between airframe and aircraft engine manufacturers, with the attacks on engine plants concentrated in March and April and the attacks on airframe plants in June and July. Four companies producing 59 percent of the airframes and 87 percent of the engines made in 1944 were targets for 60 percent of the bombs aimed at the aircraft industry. In terms of frontline aircraft strength, bombing and dispersal due to bombing threat deprived the Japanese of an estimated output of 2,800 planes (only 10 percent of 1944 production) from December through July 1945. The decline in the availability of aluminum, however, as we have seen, would have prevented this production had it not been lost by air attack.

Machine Tools [8]

While the United States found it possible to concentrate the retooling and conversion to war production in the first year and a half of the war and thereafter to allow machine-tool production to taper off and skilled workers to transfer to other industries, the various shifts in emphasis in Japanese production, described previously, made it necessary to operate the machine-tool industry in Japan at a high level until the end of 1944. This may be seen by the following comparison of an index of unit production of machine tools in the United States and in Japan from 1941 to 1945.

	1941	*1942*	*1943*	*1944*
U.S.	100	171	151	63
Japan	100	110	130	116

As a result the machine-building industry remained a drain on Japanese material and skilled labor supply far longer than effective war planning should have permitted. It was only in December 1944 that the Munitions Ministry ordered the principal machine-tool plants to engage in the manufacture of airplane engines and as a means of enforcing its order failed to allot any further materials to them for the production of new machines.[9]

In 1937 production of machine tools totaled 21,888, valued at 50.1 million yen. The demand engendered by the China War led the government in its five-year production plan to set a goal of 50,000 machine tools for 1942. It also led very many small manufacturers to enter the field and jumped output in 1938 to 67,260 units valued at 204 million yen. Most of these machines were of questionable quality, having an average value of 3,000 yen per machine, and the government in the Machine Tool Industry Act of 1938 took steps to reduce the number of manufacturers in the field and improve the quality of output.[10] By 1941 the number of manufacturers had been reduced from 843 to 331, output of tools had fallen to 46,025 valued at 317 million yen. The average price per tool, however, had risen to 6,891 yen. In addition to the 331 licensed producers

[8] Since the Japanese experience in machine tools was quite typical of their whole capital-equipment position, only an analysis of the former is presented here. Machine-tool output was the first step (after basic materials) in the fabrication of the tools of war (planes, ships, tanks, guns, etc.), and since machine-tool plants produced parts for aircraft, shipbuilding and ordnance manufacturers and later completed aircraft engines, the output of the industry shaded almost imperceptibly into that of the primary producers of the tools of war.

[9] There was a long debate before the decision was taken. See "Machine Tool Production," *Oriental Economist*, October 1944, p. 450.

[10] Details of the Act as amended are given in "Important Machinery Manufacture Undertakings Law," in *Hompo Zaikai Josei*, Mitsubishi Keizai Kenkyu Kyoku, April 1941, pp. 8-9.

of authorized finished machines there were, in addition, some 4,000 small workshops or sub-contractors employing less than 10 workers each, who turned out machine parts and even unauthorized finished machines. A survey of the 22 principal producers of machines indicated that approximately 16 percent of the yen value of output during the war years was obtained from sub-contractors.[11] At the end of 1941 Japan had a machine-tool inventory of 689,163 units or 65 percent of the U.S. inventory.

Throughout the war, capacity expanded and was always underutilized in terms of actual production, which was limited by the shortage of materials and of skilled labor. Measured in physical terms, expansion in terms of floor space related to unit production was as follows:

Fiscal Year	*Productive Floor Space (1000 sq. ft.)*	*Increase in Floor Space (1000 sq. ft.)*	*Index of Floor Space*	*Index of Unit Production*
1940	6,588	....	87	126
1941	7,560	972	100	100
1942	10,368	2,808	137	110
1943	11,562	1,194	153	130
1944	13,107	1,544	173	116

Source: Precision Machinery Control Association.

The relatively greater expansion in floor space than in physical output measured in unit terms over the years 1941-44 is apparent. The reason for the inverse relationship, that is, the drop in unit output in the face of an expansion in floor space, was due to the government drive to improve quality production by decreasing the number of machines and increasing the value of those produced. Measured in value terms, however, the underutilization is still apparent. The following estimates were prepared by the Precision Machinery Control Association on the basis of known productivity per machine in the industry's inventory. They were used by the Machinery Bureau of the Munitions Ministry in screening orders and scheduling quarterly production. By capacity, the Japanese meant the value of machines which could be produced on a single 10-hour shift with existing machinery and plant facilities, assuming no material or labor shortages. The following figures were not deflated for price change because the Control Association used official prices and deflation would not change the relationship shown.

Year	*Capacity on a Single Shift (1,000 yen)*	*Actual Production (1,000 yen)*	*Percent of Capacity Utilized*
1940	320,000	312,979	97.8
1941	380,000	317,175	83.5
1942	440,000	428,997	97.5
1943	750,000	602,913	80.4
1944	830,000	723,378	87.2
1945	646,000	127,284 *	19.7

*First quarter of 1945.

[11] *A Survey of Sub-Contracting in the Machine-Building Industry*, Precision Machinery Control Association, Tokyo, November 18, 1944, p. 5.

Even on a single-shift basis, capacity was somewhat under-utilized. On the basis of U.S. standards of two or even three shifts, the amount of idle capacity was much larger. The Japanese explanation of why they did not utilize capacity to a greater extent was largely in terms of labor supply and to a lesser extent in terms of material availability. They did attempt to institute a second shift in 1944. On this basis capacity in yen terms was estimated at 1,275 million and therefore the degree of utilization in terms of actual production was only 56 percent. Only 30 percent of the plants were able to institute a second shift, and in most cases this was only in one or two departments. Only 5 percent of the total number of workers in the industry were on a second shift in 1944 and in 1945 the industry returned to a single shift basis.[12] The industry attributed the failure of the second shift to the fact that there were not enough skilled workers and supervisors available to make it possible. Skilled workers were not exempt from the draft. The percentage of skilled workers among all productive workers declined from 34 percent in 1941 to 22 percent in 1945. As the percentage of unskilled workers rose, the need for supervision increased and this further aggravated the shortage of skilled workers because they were diverted from actual production to supervision. The number of supervisors to total workers rose from 8.3 percent in 1938 to 13.5 percent in 1945. The number of workers per supervisor fell from 11.0 to 6.4 over the same period. In addition the percentage of workers in the machine-tool industry to total industrial labor fell from 4 percent in 1940 to 2.6 percent in 1944.

The expansion of productive capacity during the war years, despite the lack of full utilization of existing plant, was ascribed by the Japanese to the continuing and expanding backlog of unfilled orders for machine tools. These rose, as follows, for the 14 largest firms in the industry:

BACKLOG OF UNFILLED ORDERS FOR MACHINE TOOLS

End of Fiscal Year	*Orders Unfilled (1,000 yen)*	*Month's Production at Monthly Rate of Filling Orders in 1941*
1940	76,753	6.7
1941	168,922	14.8
1942	219,019	19.1
1943	363,632	31.7
1944	414,342	36.2
1945	346.661	30.3

As was indicated in Chapter 2, there was considerable duplication of orders and until the establishment of the Munitions Ministry most of those placed were approved in rubber-stamp fashion by the Machinery Bureau of the Ministry of Commerce and Industry. In 1943, for example,

[12] *Utilization of Capacity in the Machine-Tool Industry*. Japanese Precision Machinery Control Association. Special Memorandum for Capital Equipment Division, USSBS, Tokyo, November 1945, p. 8.

of the 939 million yen of orders placed, 918 million or 97 percent were approved by the Ministry. In 1944, however, there was somewhat more effective screening. Of the 1,042 million yen of orders placed, 757 million yen or 72 percent were approved. It was not possible to obtain any data on the extent of duplication of orders. The piling up of orders due partly to duplication and partly to the changes in war production led to the construction of capacity in excess of the effective demand in terms of material and labor.

The trend of production during the war years both in physical and in value terms may be seen in the table that follows. The value series has been adjusted in an attempt to eliminate the influence of price trends. Unfortunately, the Japanese did not, as did the Germans, keep statistics on machine-tool output by weight.

Fiscal Year	*Number of Machine Tools*	*Value (1000 yen)*	*Average Price*	*Value (1000 yen) Adjusted to 1941 Prices* [b]	*Average Price (Adjusted)*	*Index of Adjusted Average Price*
1941 ..	46,025	317,175	6.891	317,175	6,891	100
1942 ..	50,997	428,997	8.412	377,276	7.398	107
1943 ..	60,134	602,913	10.026	477,223	7,936	115
1944 ..	53,844	723,378	13.434	488,473	9.072	131
1945 [a] .	7,242	127,284	17,575	75,693	10,452	151

[a] To August 31.

[b] Adjustment is based on unit production and 1941 average price per unit. It is also weighted to allow for a legitimate one-third rise in average price per unit for new designs and improved quality machines from 1941 to 1945.[13]

Peak output in units came in the last quarter of fiscal 1943, which was the first three months of calendar 1944. Peak output in value terms came in the following quarter. Thus by mid-1944 (calendar), output in the machine-tool industry began to fall off. Prior to the outbreak of the Pacific War, Japan had produced almost entirely universal-type, general-purpose machine tools and had depended upon foreign sources for the harder-to-produce special-purpose machine tools. In 1941, of all machine tools produced, 45 percent were general-purpose lathes, that tool being most readily adaptable to any type of production. This situation was unfortunate for the Japanese because it requires more skill to use a general-purpose tool for a specific task, than it does to train a less skilled worker to operate a specific-purpose tool. As the shortage of skilled workers became more acute with indiscriminate drafting, the Japanese became conscious of this and made a late effort to shift production to special-purpose tools. Because such tools were, of course, more difficult to produce than general-purpose tools, the Japanese were not too successful. In 1943 only 1 percent of all lathes and 0.4 percent of all milling machines produced were special-purpose. In 1944 this rose to 30 percent for lathes and to 20 percent for milling machines. Of total output in

[13] See *The Japanese Machine Building Industry*, USSBS, Washington, 1946. p. 28.

1944, 15 percent were special-purpose machines. By the time the Japanese turned to the more difficult type machines, however, the quality of their product was deteriorating sharply. In 1944, they were forced to use Hokkaido coal exclusively, and because of the poor quality of the coke, castings deteriorated badly. Only a few of the largest companies made even a pretense of maintaining quality. The castings became too hard and brittle and increased in porosity. The deterioration in castings, both from this cause and from the reduction in artificial seasoning time, in turn resulted in difficulties in milling and heat treating. Eventually difficulties occurred in machining. Manufacturers made very low estimates of the initial life expectancy of machines produced during 1944 and 1945. The average estimate was from one to two years' initial productivity. One of the largest firms frankly placed its estimate at from six months to a year.[14]

It is difficult to present an exact picture of the material supply situation because the quantities which manufacturers obtained directly from the military were not reported. That some of the firms pleaded material poverty to the services and thus obtained special allocations, while at the same time hoarding stocks, is indicated by the fact that Tsugami Seisakusho, which had built up large stocks of special steel before the war, still had some left in September 1945. The 21 largest producers had 5,515 tons of special steel on hand at the end of the war. Planned and actual allocation of steel were identical only in 1942 when the industry officially obtained 21,000 tons. In 1943 the planned allocation was 30,000 tons, actual was 26,400. The gap widened in 1944 when planned allocation was 24,750 while actual was 18,600 tons. Thus the 25 percent increase in steel allocation was accompanied by an 18 percent increase in unit production between 1942 and 1943, while the 25 percent drop in steel allocation was paralleled by an 11 percent decline in unit output between 1943 and 1944. This 11 percent decline, however, was exactly equaled by a similar percentage decrease in the allocation of coke, which fell from 28,000 tons in 1943 to 25,000 tons in 1944. After 1944 there was no official allocation and production was permitted only from stocks on hand. This should have halted output but a field survey in October-November 1945 could not find a single plant which had either completely ceased or not turned out some tools in 1945. Stocks on hand, or those obtained from the Army and Navy or through the black market, enabled production to continue. Periodic shortages of coke had caused shut-downs between October 1944 and the end of the war, varying from two or three days to two months in duration.

The most important component parts purchased from outside the industry were bearings and electric motors. Shortages of bearings were

[14] See Interrogation of Tsugami, T., president of Tsugami Seisakusho KK., Tokyo, October 17, 1945, p. 5.

reported only rarely. Electric motors were scarce, however, and after January 1945 they often held up shipment of finished machines. By spring of 1945 many firms were shipping machine tools without motors. The motors were to be obtained by the buyer on the manufacturers' account. The buyers for the most part could not obtain the motors any better than the manufacturers and as a result many machines were never put into operation.

Between April 1943 and December 1944 there was a gradual voluntary diversion of machine-tool producers to aircraft and ordnance production; 87 firms diverted their total productive capacity. They represented 20 percent of the total number of authorized firms producing finished machine tools. The principal reason for the diversion appears to have been that there was more certainty of obtaining sufficient raw materials in aircraft and ordnance production. The decline in aircraft engine output in 1944 led the government in December to force the principal machine-tool producers to engage in the manufacture of aircraft engines, and no materials were allocated for the production of new machines thereafter. The only production not to be converted was the finishing of machines already started and continued production in a limited number of "favored" factories. As a result of this program, 230 companies with 247 factories were diverted to production of munitions, aircraft or items other than machine tools. This left only 49 firms remaining in the machine-tool industry. Yet the output of 7,242 machine tools, during the period April-June 1945, met the effective demand which had shrunk materially by that time. There was never any serious testimony that production was retarded because of the lack of machine tools. Aircraft expansion was carried out successfully and the huge backlog of machine orders which went uncanceled created a false picture of demand, which really helped manufacturers to supply the machines that war industry needed.

With respect to the repair situation, however, there was considerable complaint. In May 1944, at the instigation of the Munitions Ministry, the Precision Machinery Control Association established the Kosaku Kikai Seibi KK. (Machine Tool Repair Co., Ltd.). This organization, which had three branches in Tokyo, Nagoya, and Osaka, was charged with the repair of damaged machinery for companies engaged in war production. Under the national plan, companies which were damaged were to inform the local office of the Munitions Ministry. The Ministry would then direct member companies to send survey teams to the damaged plant. The teams made recommendations to the Munitions Ministry which, if approved, authorized the repair company to start operations.[15] In practice the system was ineffi-

[15] In the majority of cases the survey teams reported that the damaged machine tools could not be repaired. Under the conditions facing the Japanese there was some justification for this. Few motors or parts were obtainable; truck transportation was very limited; highly skilled labor, badly needed for hand-tailored repair work, was

cient and time consuming, and many firms frankly stated that they preferred to obtain repairs from private sources or make them themselves rather than become involved in official negotiations. The aircraft industry alone had a high enough priority to obtain effective aid through this channel. At its inception the company figured on repairing some 150,000 machines. In actual practice it repaired only 7,800 machines from its inception to the end of the war.[16] It employed only 630 persons. It found it difficult to attract really skilled workmen and as a result its repair squads were made up of workmen with inferior training and ability. The Munitions Ministry office at Osaka compiled the following data which shows the percent of machines repaired as against requests received:

	Percent
June-Dec. 1944	50
Jan. 1945	40
Feb. "	52
Mar. "	40
April "	5
May "	11
June "	20
July "	1

The machine-tool manufacturers did a small amount of repair work for their customers, but such use of capacity was of negligible importance, amounting in April 1945 to but 1 percent of tools and to 4 percent of workers.

By 1945 the Japanese national inventory of machine tools, after allowance for obsolescence and air-raid destruction, was down to 599,870, or 31 percent of the U.S inventory at the time. The Japanese total was distributed as follows:

"Civilian" industries	370,364
Army	43,806
Navy	17,593
Aircraft	163,568
National railways	4.539
Total	599,870

In the "civilian" category 50 percent was held by the machine-building industry, 12 percent by "civilian" producers of ordnance for the Army, and the remaining 37 percent included production for the Navy, motor vehicles, etc. One interesting comparison is possible. In Japan in 1945 there were 10.8 employees per machine tool for all manufacturing indus-

critically short. Preservative lubricants were not available, and as a result of lack of care, many machines were severely damaged by heavy rusting due to exposure. With the undamaged segments of the production capacity being strangled by shortages, it is understandable why so little effort was devoted to repair.

[16] See *Report on the Kosaku Kikai Seibi KK.*, Machinery Bureau, Ministry of Commerce and Industry to SCAP-GHQ, Tokyo, December 20, 1945.

tries. In Germany the comparable figure was 2.3. The Japanese aircraft industry had 6.1 employees per machine tool while the Germans had 4.2. This would appear to bear out the contention that Japanese industry, despite its rapid growth, was less mechanized than occidental industry.

The air attack, though it destroyed an estimated 28 percent of the capacity of the industry [17] and some 200,000 tools (thereby bringing the inventory down to 599,870), came too late to hinder the equipping of Japan's war industries. Government policy which, at the outset of the war (against China), had been to build up and expand the machine-tool industry, reversed itself toward the end of the war (against the United States) and diverted capacity, which it then considered excess, to aid the aircraft industry. Furthermore, the loss of the 200,000 machine tools due to the raids was not crucial because of the decline in the flow of raw materials, and the resulting general drop in industrial activity made the remaining machines adequate to process materials available.

Aircraft

In 1931 Japan produced 368 airplanes; Germany produced 13. In 1940 German production was up to 10,826 while Japanese output was only 4,768.[18] Moreover, in German planning the possibility of air attack was taken into consideration and as a result the industry was well dispersed over most parts of the Reich and the plants were frequently built in hitherto undeveloped areas and preferably in woods, a notable example being the Henschel engine plants in Kassel-Altenbauna. The layout of the buildings, as well as the location, was intended to minimize the effects of possible air attack. Structures were widely spaced and often built at irregular angles. Groups of buildings were made as self-contained as possible, and bombproofed cellars were provided. An effort was made to divide production of major components among factories in different towns of the same area. Despite the fact that this example was available to the Japanese, no attempt was made to follow it. Concentration in the Japanese aircraft industry was extreme; 72 percent of output came from plants within a 35-mile radius of the three big cities, Tokyo, Nagoya and Osaka. Four companies (Nakajima, Mitsubishi, Kawasaki, and Tachikawa) turned out more than two-thirds of all aircraft built between 1941 and 1945; three companies (Nakajima, Mitsubishi, and Kawasaki) produced three-fourths of all combat types during the same period. Three plants of two companies turned out 92 percent of the total propeller out-

[17] *Estimate of Bomb Damage to the Machine Tool Industry*, Machinery Bureau, Ministry of Commerce and Industry, Tokyo, October 1945.

[18] For an excellent account of the growth of the largest Japanese aircraft company, Nakajima Hikoki KK., between the two World Wars, and of government stimulation and subsidy, see *The Nakajima Aircraft Co., Ltd.*, Corporation Report No. 2, Aircraft Division, USSBS. Washington, 1947, 190 pp.

put, and the two largest plants were located at Osaka. The bulk of the engine assembly operation was carried out in the Nakajima Musashi plant near Tokyo and in the Mitsubishi plants in Nagoya. The Mitsubishi-Nagoya airframe plant totaled 4,250,000 sq. ft. of productive floor area, making it one of the largest aircraft plants in the world, while Mitsubishi's Nagoya engine works was 3,800,000 sq. ft. These concentrations alone represented two-thirds of the corporation's airframe- and more than half of its engine-manufacturing area. Activities of the Nakajima Company were centered around Tokyo. Its Musashi and Omiya engine plants, its Ogikubo engine parts plant, and three of its largest airframe assembly plants were located near there, while its fourth largest airframe assembly plant was at Handa in Aichi prefecture near Nagoya. It is little wonder, therefore, that the Japanese aircraft industry was the number-one target of U.S. planes.

Since the greatest portion of Japanese aircraft capacity expansion occurred during the Pacific War years, the Japanese expended enormous effort putting together an aircraft industry in one place only to have to tear it apart and cart (literally, cart = ox-cart) it away within six months after it reached its peak. Rarely in the annals of history has a group of military planners, who were privileged to elect the time and method of starting a war, ever exhibited greater stupidity. The growth of the Japanese aircraft industry during the war was creditable, the debacle which accompanied its downfall was incredible. In late 1944 the government ordered the industry to double its output, utterly ignoring the realities of the supply situation, and within three months ordered it to disperse. Even our most competent military intelligence experts were taken by surprise by the extent and rapidity of the decline in aircraft output.[19] In Germany it took some 90,000 tons of bombs over a period of two and a half years to beat down the aircraft industry. In Japan only 16,300 tons were dropped over thirteen months, with 80 percent coming in the last four months.

A comparison of the total number of aircraft produced in several countries during the war years may be seen in the following table and may serve to place the Japanese industry in proper perspective.

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[19] For the third quarter of 1943, the Military Intelligence Service's estimate of Japanese combat aircraft output almost coincided with actual production. The former figure was 1,162, the latter 1,160. From that point on, however, the gap between estimated and actual production was widened. The MIS estimate for December 1944 was 2,368 planes; actual output was only 1,685. For June 1945 the estimate was 1,628; actual was 966. Strangely, estimates made just before the surrender were less accurate than those made earlier. Actual average monthly production of combat aircraft for the fourth quarter of 1944 was 1,771. The MIS estimate, made on January 23, 1945, of production for this quarter was 2,042. The estimate prepared six months later, as of July 31, 1945, put it at 2,295. See *The Japanese Aircraft Industry*, USSBS, Washington 1947, pp. 167-68.

Country	*1941*	*1942*	*1943*	*1944*	*Total—4 years*
Japan	5,088	8,861	16,693	28,180	58,822
Germany	11,766	15,556	25,527	39,807	92,656
Great Britain	20,100	23,600	26,200	26,500	96,400
United States	19,433	49,445	92,196	100,752	261,826

While the use of number of aircraft rather than airframe weight tends to underemphasize increase of output somewhat in the U.S. and overemphasize it in Germany, in Japan the relationship between airframe weight and number of planes produced remained constant. In the United States, the shift to four-engined heavy bombers toward the end of the war tended to result in a decline in the monthly output of planes by number, whereas total weight produced increased. In Germany, the shift away from bombers to fighters resulted in an increase in number in 1944 while weight remained steady. In Japan, though there was a shift from bombers to fighters, the early bombers were very light while the trend in fighters was toward heavier, better protected types, so one balanced the other.[20] It is interesting to note that while Japanese production was 26 percent of U.S. output in 1941, the early vigor of the U.S. war effort, contrasted with the complacency of the Japanese, carried the percentage down to 18 for 1942-43, but with the intensified Japanese effort in the latter part of 1943 and 1944 the percentage rose again (for 1944) to 28.[21]

The trend in and relationship between Japanese airframe, engine and propeller output may be seen in the following table, which is on a calendar rather than a fiscal year basis.

	1941	*1942*	*1943*	*1944*	*1945**	*Total*
Airframes	5,088	8,861	16,693	28,180	11,066	69,888
Engines	12,151	16,999	28,541	46,526	12,360	116,577
Propellers	12,621	22,362	31,703	54,452	19,922	141,060

* First seven and one-half months.

Although the 1941 output was four times the 1936 production total, the real expansion came during the years 1943-44. Nearly six times as many planes were produced in 1944 as in 1941. Moreover, combat types, which were 60 percent of the total in 1941, rose to 75 percent in 1944. Yet when this expansion is examined, the origin of trouble may be seen. While airframe expansion was almost sixfold, engine output increased not quite four times. From 2.3 times airframe output, engine production fell below the 1.8 minimum requirement in April 1944 and by 1945 was down to 1.1. This was the first bottleneck.

[20] With 1941 = 100 for both, an index of airframe weight rose to 593 in September 1944, while for number of aircraft the index stood at 606 the same month.

[21] On a weight basis, however, U.S. output pulled sharply and steadily away from the Japanese. On this basis the percentage of Japanese output to U.S. production fell from 26 percent in 1941 to 8 percent in 1944.

While the relative decline in engine availability occurred because of material limitations and not because the Japanese planned it, the situation was partially saved by the relatively greater percentage of total production absorbed by single-engined fighters toward the end of the war, in contrast to the larger percentage of twin-engined bombers and transports earlier in the war. This may be seen from Table 28, which is on a calendar year basis. Fighter output rose from 21 percent of total output in 1941 to 49 percent in 1944-45, while bomber output declined from 29 percent to 17 percent of the total over the same period. Fighter production rose from approximately 500 in the first quarter of 1942 to a peak of 3,752 in the third quarter of 1944 (second quarter on Japanese fiscal year basis). Trainer production reached its peak of 1,812 planes in the second quarter of 1944, more than three times the production in the corresponding quarter of the previous year. Trainer production was continued even after the training of pilots was discontinued due to lack of aviation gasoline, because the military expected to use trainers against the invasion as Kamikaze planes. They were inexpensive in terms of materials to produce, could be flown by relatively inexperienced pilots, and had superior maneuverability and range in contrast to the Baka-type piloted bomb. Bomber production more or less leveled off beginning in the last quarter of 1943 but there was a trend toward single-engined

TABLE 28

JAPANESE AIRCRAFT OUTPUT BY FUNCTIONAL TYPES, 1941-45

Calendar Year		*Fighter*	*Bomber*	*Recce*	*Trainer*	*Other*[a]	*Total*
1941	Number	1080	1461	639	1489	419	5088
	Percent	21	29	13	29	8	100
1942	Number	2935	2433	967	2171	355	8861
	Percent	33	27	11	25	4	100
1943	Number	7147	4189	2070	2871	416	16693
	Percent	43	25	13	17	2	100
1944	Number	13811	5100	2147	6147	975	28180
	Percent	49	18	8	22	3	100
1945[b]	Number	5474	1934	855	2523	280	11066
	Percent	49	17	8	23	3	100

[a] "Other" includes flying boats, transports, gliders, and suicide aircraft.

[b] January 1 to August 15.

Source: Air Ordnance Bureau, Munitions Ministry.

bombers. The concentration of production on combat aircraft types using one engine began after mid-1942. Production of single-engine planes rose from 403 in the first quarter of 1941 to a peak of 4,195 in the last quarter of 1944, while output of twin-engined aircraft rose from 154 in the first quarter of 1941 to a peak of 1,399 in the third quarter of 1944. This trend was dictated partly by the decline in engine output after the spring of 1944 and by the increasingly defensive nature of the air war for the Japanese. They never placed as much importance on transport

aircraft as did the U.S., partly because they were never able to develop a good four-motor type and partly because, limited by their resources, they economized by using obsolete twin-engined bombers or even twin-engined trainers, as transports.

These shifts in emphasis, plus the fact that early Japanese models did not stand up in combat, plus Army and Navy rivalry, led the Japanese to adopt an excessive number of models. This, in view of the shortages of materials and skilled labor, disrupted planning, retarded production and lowered efficiency. In Mitsubishi's Zeke[22] fighter and Betty[22] bomber (both Navy), the Japanese thought they had planes capable of downing existing U.S. models at the beginning of the war. When it became evident, however, that these planes were highly inflammable and lacked fire power, the Japanese broke out with a rash of models. The Navy developed 53 basic models, having 112 variations, while the Army had 37 basic models with 52 variations, or a total of 90 models and 164 variations. All types, of course, were not in production at any one time, but as of the beginning of 1945 the Navy had in production three types of fighters, four dive bombers, two torpedo bombers, one medium bomber, five reconnaissance planes, one piloted bomb, one transport, one flying boat, and five types of trainers. The Army had four types of fighters, three bombers, two recces, one transport, one piloted bomb (different, of course, from the Navy's), and four trainers.[23]

Okana, director of aircraft production for Mitsubishi Heavy Industries Ltd., declared:

> When new foreign planes or data were obtained, the Army and Navy always insisted upon studying them first. The manufacturers received the model or data for study after the Army or Navy finished with it, and gross delays thus occurred. Furthermore, when the Army or Navy did turn over the foreign plane data to the manufacturer, only one manufacturer was chosen, the data given to it, and to all intents and purposes such new data remained a secret from all other companies. Many ridiculous cases occurred wherein both the Army and Navy turned over identical foreign aircraft to different companies for secret investigation, development, and production. . . . Even within any one company performing work for both the Army and Navy, two separate entities existed, one for Army work and the other for Navy work. Probably the outstanding example of Army-Navy cooperation was the development of the Shusui. KI-83 and Shusui were to have been a combined Army-Navy experimental job, but KI-83 was directed by the Army and Shusui by the Navy. Moreover, the Army undertook the design of an improved Shusui called the KI-202. The power plant for the Shusui was made the Army's responsibility, but the Navy, nevertheless, developed a separate engine of its own. This, allegedly, was close cooperation.[24]

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[22] U.S. code names for Japanese aircraft types.

[23] *Tabulation of Japanese Planes Produced and Used During the War*, Air Ordnance Bureau, Munitions Ministry, Tokyo, November 12, 1945.

[24] USSBS Interrogation of Okana, Yasujiro, Tokyo, December 6, 1945, p. 6.

The multiplicity of models was in contrast to the shipbuilding industry, where standardization was enforced, and the secrecy in contrast to the aluminum industry, where firms were ordered to make their process developments available to all other companies. With respect to standardization the U.S. Air Technical Intelligence Group declared: "It was planned to completely standardize the equipment [electrical equipment for aircraft], but except for settling on standard voltage and the use of common inverters, the standardization never got beyond the paper stage." [25]

The way in which very simple change-overs retarded engine production in the Atsuta Plant of Aichi Aircraft Company may be seen in Chart 5. The Atsuta plant was the only producer of inline engines for the Japanese Navy. From December 1941 through August 1945, a total of 1,623 inline engines was produced at this plant, compared with capacity of 3,247 and government orders for 3,850 engines.[26]

Tachikawa was called upon to work upon a bewildering variety of planes besides its Oscar and Hickory.[27] It attempted to put Patsy into production for fifteen months without success. In early 1944 there was trouble with its jig designs but in May 1944 one plan was found acceptable. It was hoped that skilled labor from the Oscar and Hickory lines could be partially shifted, but the Army would not permit it. The April air attacks damaged or destroyed 80 percent of the Patsy wing and fuselage jigs and in June 1945 the engine model was changed from HA 43 Model Ol to HA Model II. Altogether 3 Patsy's were produced in 1944 and 12 in 1945. Prior to 1944 Tachikawa produced KI-9 Spruce, KI-17 Ida (recce and trainer), KI-34 Thora and Thelma (transports). From January 1939 to March 1943 the company assembled an average of 40 Spruce trainers monthly except in December 1941 and January 1942 when all Spruce workmen were put on production of detachable fuel tanks for Oscar. Assembly of Spruce was discontinued in March 1943. In March 1942 Tachikawa received a government order for 145 KI-17's and these were completed by April 1943 when the type was discontinued. It alternated on production of Ida (KI-55) trainer and Ida (KI-36) reconnaissance from 1939 to 1944 according to government orders. The former was discontinued in April 1943 and the latter in January 1944. Thora production began in January 1939 and continued until April 1943 when the type was abandoned. A monthly production average of about 10 was maintained. Helen production was attempted in 1942 and 1943.

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[25] *Electrical Equipment and Accessories for Japanese Aircraft.* Air Technical Intelligence Group, Report No. 43. Tokyo, November 6. 1945. (Available in the Library of Congress, PB 16799.) See also Air Technical Intelligence Review Report No. F-1R-68-RF, Tokyo, June 27, 1946 (Library of Congress, PB 33118).

[26] *Aichi Aircraft Co.,* (Aichi Hikoki KK). Corporation Report No. V, Aircraft Division, USSBS, Washington. 1947, pp. 13 and 42.

[27] These were U.S. code names adopted to identify Japanese aircraft types.

Nakajima had designed the plane and Tachikawa built jigs in accordance with Nakajima drawings, but errors were made and the planes could not be assembled. The jigs were redesigned and rebuilt by May 1943 and a production of six planes a month was reached in July. At that time the Army reduced their orders for Helen in favor of Oscar and in January 1944 production of Helen was completely stopped.[28]

Another example of constant shifts and losses in production from poor planning was the case of the Hidaka Plant of the Ishikawajima Koku Kogyo KK. The Hidaka plant prior to its purchase in September 1943 by Ishikawajima was a branch factory of Chuetsu Textile Co. It was given an experimental order for 50 exhaust-driven turbo superchargers for the Navy. The production problem initially was the acquisition of the proper machine tools. There were a number of all-purpose tools on hand but production schedules demanded various special-type tools such as special grinders to finish turbine blades. The demand for these superchargers became pressing and in March the Munitions Ministry stepped up its order to 450 per month. Some 2,000 additional employees were recruited and because of the shortage of machine tools (special-purpose), a three-shift system was adopted. Production was scheduled to get underway at the 450-per-month rate in June, after the employees were trained. In July the Munitions Ministry suddenly ordered production of turbo-superchargers halted and experimental work began on a turbine rocket motor known as TR. Current production plans accordingly were dropped, and this resulted in a surplus of employees and trainees. To absorb this excess, the Hidaka plant in August took over some subcontract fabrication of fuselage parts of the fighter George for the Naruo plant of the Kawanishi Aircraft Company and also fabrication of bulletproof cockpit-frame windshields for the Navy. In order to obtain needed machine tools for the production of the TR turbine rocket motors, the Shibayama Steel Works in Wakayama was purchased in September 1944. This plant had been engaged in production of slotting machines, and this acquisition added about 100 machine tools, a large amount of stock parts and about 50 employees to the Hidaka plant rolls. The machine tools, however, were old and a period of time was required to convert them to TR production. At the end of December, when experimental work on the TR turbine rocket motor was nearing completion, the Munitions Ministry again suddenly ordered all work on this project stopped. The Ishikawajima Company then decided to concentrate all its Hidaka plant facilities on manufacturing parts for its own Tomioka plant and accordingly gave up its subcontract work for Kawanishi and bulletproof windshields for the Navy. Parts production was scheduled to begin in January 1945,

[28] *Tachikawa Aircraft Co.* (Tachikawa Hikoki KK.), Corporation Report No. X, USSBS, Washington, 1947, pp. 14-15.

but did not get under way until March. In April the Munitions Ministry's dispersal directive forced Hidaka to abandon completely all current expansion plans and on May 22 the iormal dispersal order was received and the Hidaka plant began to disperse.[29]

Further examples could be cited. The impact on production is obvious. The early lack of armor and fuel-tank protection forced changes and by the end of the war practically all models designed for tactical use were fitted with armor plate and self-sealing tanks. But by then all the best and experienced Japanese pilots had been lost and the newer ones were so poorly trained that operational losses rose to 50 percent. The irony for the Japanese was that when the good pilots were available they had to use inferior planes and were killed, while, by the time the better planes were available, pilot training had to be severely cut because of the fuel shortage.

Lt. Gen. Kawabe testified:

> Just to ferry the planes all that long distance was a very difficult task to be undertaken by the Japanese airforces of that time—from the technical inability standpoint. I want to add because I have had a particular interest in this phase of things, that the very first pilots who were sent down . . . were very good, excellent pilots, and to have them all killed was a very painful thing. . . .

As to the reasons for shifting planes from Manchuria to the Philippines, he noted:

> The airplane production in the homeland was satisfactory. It was on the up-grade at that time but the training of personnel was not adequate and that was the reason they had to call on such forces as from Manchuria.[30]

Commander Nomura, Staff Air Operations Officer of the 11th Air Fleet at Rabaul from November 1942 until July 1943, stated that pilots continually discussed the relative merits of the Japanese and American aircraft and were convinced in their own mind that they were flying greatly inferior aircraft. He said they "had a horror of American fighters" and that generally, while the Zero fighter was about equal to the U.S. P-40 and F4F, it was no match for the F4U and the F6F.[31]

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[29] *The Ishikawajima Aircraft Industries Co., Ltd.*, Corporation Report No. XIII, Aircraft Division, USSBS, Washington, 1946, pp. 7-8.

[30] *Interrogations of Japanese Officials*, Vol. II, Interrogation No. 447, Tokyo, November 26, 1945. Lt. Gen. Kawabe was Chief of the General Affairs Section of the Army Bureau of Aeronautics from the beginning of the war until April 1943, Commander of the Air Army in Manchuria, May 1943 to August 1944, and Deputy Chief of the Army Bureau of Aeronautics from August 1944 until April 1945.

[31] USSBS Interrogation of Nomura, Ryosuke, Interrogation No. 601, Tokyo, November 28, 1945.

Although most Japanese aeronautical engineers were trained abroad and were aware of technical advances elsewhere, it is estimated that their research was one to one and a half years behind that of other countries and application to production lagged another year. During the China War period Japanese reliance upon the United States for plans, models and techniques was particularly heavy. One source declares:

For assistance other than financial, the Japanese aircraft industry owed more to the United States than it did to its own government. It is sad, but true, that U.S. fighter and bomber pilots fought against aircraft whose origins could be traced back to U.S. drafting boards. Many Jap engines and propellers came from American designs which had been sold under license in pre-war years. Many top Jap aeronautical engineers could claim degrees from Massachusetts Institute of Technology, Stanford and California Tech. Their best production men had served apprenticeships with Curtis, Douglas, Boeing, or Lockheed. Here and there, war-time German influence was evident . . . but it can be fairly stated that the Japanese fought the war with aircraft on which the strongest influences in design were American.[32]

The country lacked the research capacity, materials and skilled labor to keep up to date. In propeller production, for example, the two principal types used throughout the war were the pre-war American "Hamilton Standard" and the early German VDM design, with little original work attempted. The Air Technical Intelligence Group estimated that Japanese propeller development was at least five years behind American progress.[33] While such advanced design features as pressurized cabins and cockpits, laminar flow wings, counterrotating propellers, turbo- and direct-driven superchargers, jet-assisted take-off units, etc., were found in Japanese experimental aircraft, few such machines ever reached the production stage.

An example of Japanese difficulties, when unassisted by foreign aid, may be seen in their development of suicide and jet-type aircraft. The

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[32] *The Japanese Aircraft Industry*, Aircraft Division, USSBS, Washington, 1947, p. 4.

[33] *Sumitomo Propeller Performance and Design*, ATIG Report 23, Tokyo, October 31, 1945. (Available in the Library of Congress.) In another report it was stated that: "In view of the increasing diameters it had been decided to turn to hollow steel blades to save weight and one such propeller following conventional Curtis practice had been built. The possibilities of greatly increased activity factor, by use of this method of manufacture, had not been considered. Blade flutter was considered a major problem and research was underway to find a vibration eliminator. It had apparently occurred to the Navy that something was lacking in their design studies on what was called 'power-propeller ratios'." *Future Production Plans and Military Requirements for Aircraft for the Japanese Navy*, ATIG Report No. 16, October 29, 1945. (Available in the Library of Congress.)

first Baka type[34] was the Navy's OKA-11. This baby aircraft, or piloted bomb, was powered by three solid-fuel rockets in the tail of the fuselage, but since the effective range of the rockets was almost nil, it was necessary to release the plane practically within gliding distance of its target. The Navy two-engined bomber, Betty, had been modified to carry the Baka by nestling it below the bomb bay, but since the Betty with the Baka was slow and cumbersome, it proved to be extremely vulnerable to the target. The Okinawa campaign quickly proved its ineffectiveness and production was stopped in the spring of 1945 after 755 had been produced. An improved version, the OKA-22, was planned to overcome these difficulties. The newer, faster, more maneuverable Navy plane, PIYI-Frances, was selected as a parent, but because of its more limited clearance it was found necessary to reduce the size of the OKA-22 and the war head was reduced from 2,645 to 1,320 pounds. In order to increase the range so that it could be released about seventy miles from the target, a Campini jet-type engine was installed. Parts were farmed out and in the confusion of early 1945 it was finally possible to test one completed plane in July. In the flight test, rockets installed under the wings to give greater driving speed went off unexpectedly just after release, causing a stall from which the pilot never recovered. OKA series 30-40-50 were projected. OKA-30 proved to be too heavy for its parent plane and was abandoned. The 50-series had been projected for launching from a tow plane. Runways, however, proved to be short to get the OKA-50 airborne and the series was dropped. Designed for shore defense, the OKA-40 series was intended to be launched from a land-based catapult. The first plane had not been completed as of the end of the war, but one large catapult had been built at Takeyama, west of Yokosuka, and was in use to instruct pilots in the launching operation pending completion of the weapon itself.

The Japanese attempted to develop the J8M1 Shusui (Navy) and KI-201 (Army) after the German jet-propelled fighter ME-163. A sample ME-163, together with other aircraft equipment and plans, was sent to Japan by ship. The plans were removed at Singapore and flown to Japan but the ship was sunk enroute and models and technicians lost. The Japanese attempted to produce the plane from the blueprints. Original plans contemplated the production of 155 planes by March 1945, 1,200 by September 1945 and 3,600 by March 1946. Power-plant development was, of course, much slower than planned and it was necessary to revise the program downward twice, once in April and again in July. The first plane complete with engine was finally assembled in July and it crashed on its first flight.

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[34] "Baka" was the U.S. code word assigned to the suicide plane. It is a Japanese word meaning "fool." It was first suggested by a Naval Intelligence Officer (Japanese language) on Admiral Nimitz' staff on Guam.

Okana declared:

Investigation disclosed that the engine failure was due to fuel feed stoppage. This was explained as follows: Because of the need for hurrying the test, Yokosuka Airfield was used. This was known to be too small for safety so a minimum of fuel was loaded. So small an amount was loaded that, with high acceleration and steep angle-of-climb soon after take-off, the fuel surface dropped below the outlet level and the flow of fuel failed. As a result of this finding the whole fuel system had to be redesigned. The drain part was relocated and enlarged and a jet pump was installed. Before the next prototype engine could be built, however, the Japanese surrender occurred.

While these are all isolated examples, added together they make a pattern, and it is one of relatively low efficiency for Japanese aircraft builders. Fortunately, it was possible to provide overall quantitative proof of this. During the war the United States Aircraft Resources Control Office of the War Production Board developed a formula which yielded comparative efficiency indices from which the relative performance of manufacturers could be gauged. These took into account all the known variables and resulted in a figure of pounds of airframe produced per employee per working day.[35] These comparative manufacturing efficiency indices for the

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[35] The steps taken to determine an index of relative efficiency of Japanese and U.S. aircraft production by the Aircraft Division of USSBS were as follows:

The pounds of weight produced for a three-months period were used to avoid fluctuations caused by shortages, weather, design changes, etc., which may have caused a drop in production one month only to be offset by an abnormally large production the following month. Pounds of weight were then converted to a common basis (that of fighter production). In order to reduce the results to a common unit, the pounds of weight produced in a given three-months period was divided by the number of working days in that period. This resulted in a figure for pounds per working day. In determining pounds per employee per working day the number of employees used was that of the first month of the index period. This was done to give consideration to "labor flow time," or the fact that parts produced in May would not be reflected in output until July, although a large portion of July final assembly work would show up in July acceptances. In this connection, pounds per employee per working day might have been used as a rough measure in estimating the relative differences in efficiency. The final step, however, modified this figure by taking into account variations in the scale of production undertaken. It was determined that each time the quantity to be produced was doubled the unit labor involved dropped to 80 percent of the amount required in the original quantity. (See "Factors Affecting the Cost of Airplanes" by T. P. Wright, *Journal of the Aeronautical Sciences*, February 1936.) Hence a basic 80 percent curve was developed as a means of measuring variation in output with consideration given to the quantity produced. In deriving this index a representative sample of Japanese companies and American companies was chosen for each period to be measured. Unit acceptance of these companies was modified to equivalent units of fighter planes and reduced to number of planes per company per day. The quantity factor (Qf) was then read from the 80 percent curve. Hence the index of efficiency: lbs./emp./Day $\times$ Qf = IE. The computation is shown in *The Japanese Aircraft Industry*, USSBS, Washington, 1947, pp. 27-28.

U.S., Germany and Japan, may be seen in the following table:

Year (July)	*United States*	*Japanese*	*Percent to U.S.*	*Germany*	*Percent to U.S.*
1941	1.42	0.63	44	1.15	·81
1942	1.88	0.63	34	1.30	69
1943	1.88	0.71	38	1.50	80
1944	2.76	0.71	26	1.25	45
1945	2.36	0.42	18	...	..

Thus it is apparent that although Japanese overall efficiency improved during the war, relative to the U.S. it sank from the low level of two-fifths to only one-fifth by the end and averaged about one-third of U.S. performance.

Part of this poor showing was due to the nature of the labor supply and while this will be considered in some detail in the following chapter it may be well to mention the essential facts briefly at this time. Employment in the aircraft industry increased fourfold between December 1941 and December 1944. The trend may be seen in the following table:

(in thousands of workers)

	Dec. 1941	*Dec. 1942*	*Dec. 1943*	*April 1944*	*Dec. 1944*	*April 1945*
Airframes & Assembly	200	400	600	614	800	831
Engines & Propellers	114	233	291	315	410	427
TOTAL	314	633	891	929	1,210	1,258

These figures do not account for all the many direct and indirect contributors to the industry among the subcontractors. A survey by the Air Ordnance Bureau of the Munitions Ministry, in February 1945, of a sample of 1,260 plants placed total employment in the entire industry, including parts, at that time at 2,020,000 (excluding light metal plants.).[36] Women constituted 30 percent of the total. Accurate detailed statistics are lacking for the whole industry, but a study of plant and corporation reports would indicate a rough classification of workers in the aircraft industry by the end of 1944 as follows:

15-40 percent regular, hired employees
20-30 percent conscripted labor
30-40 percent students
10-15 percent soldiers

The problem of production of high-precision parts and of the intricate mechanisms of the modern airplane with such a labor force is at once apparent. It is surprising that Japanese aircraft production rose to the level it did in view of the fact that a good percentage of its labor had no tradition of mechanical aptitude or training. Skilled workers were desperately lacking. The military refused to recognize the situation and continued indiscriminate drafting of eligible males regardless of skill.[37]

[36] See Chapter 5, p. 302.

[37] Even the largest aircraft producer in Japan in 1945, the Nakajima Co., was not exempt. In February-March, some 500 skilled male workers were drafted from its

High school boys, physically sub-standard college students and non-essential workers from other industries were drafted in large numbers to replace the regular aircraft workers who were drawn off to the military services. The demands of the military became so excessive in the spring of 1944 that the aircraft manufacturers protested to the government that the requirements of the Army and the Navy for aircraft could not be met in view of the excessive drain on manpower. The situation finally became so critical that some key personnel, both engineers and production men, were released from the services to their former civilian jobs and a certain number of skilled workers were detailed to private industry out of Army and Navy arsenals. In addition, large numbers of soldiers, regardless of skills, were detailed for temporary duty (usually for six months) with aircraft manufacturers. They were generally employed as common laborers if they lacked previous training, but their presence in the factories created considerable unrest and dissension among civilian workers because they were better clothed and drew far better rations than were available for the most highly-skilled regular workers. Many companies attempted to work double shifts but supervision was then spread so thin that night work was never planned or controlled properly. There was considerable testimony to the effect that efficiency on the second shift fell so low that it was hardly worthwhile.[38]

In spite of the fact that the experience of the average aircraft worker was very low, little was done to provide specialized jigs and tools to compensate in part for lack of skill, as was common in the United States and in Germany. A U.S. OSRD report correctly surmised that

> . . . Apparently the part was made without the use of extensive blending and forming dies such as would be used in this country to mass produce the item. The poor fit-up and low quality of the soldered joints indicate that jigs and fixtures used in assembly were inadequate for the design. As a result the joints formed were all low quality.[39]

There was a large amount of bench work, with individual workers chipping and filing on bits of metal and assembling small subassemblies by main strength and awkwardness. This was partially due to the fact, as was indicated previously, that the machine-tool industry was geared to output of general- rather than special-purpose tools. Japan had de-

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Omiya (Navy) engine plant. A company protest brought a new group of unskilled soldier-laborers to the plant. See *Nakajima Aircraft Co. Ltd.*, (Nakajima Hikoki KK.), Corporation Report No. II. USSBS. Washington, 1947, p. 148.

[38] See USSBS Interrogations of Goko, head of Aviation Industry Association; of Kimihei Nakajima, vice-president of Nakajima Aircraft, and of Otani, head of aircraft division of Mitsubishi Heavy Industries.

[39] *Metallurgical Examination of Japanese Aircraft Oil Radiator*, OSRD Report No. 3920, July 18, 1944. (Available in the Library of Congress.)

pended on foreign producers for special-purpose precision tools. One manufacturer estimated that the industry-wide average (airframe and engine plants combined) showed about 50 percent foreign-built tools at the beginning of the war, with a drop to 20 percent at the end. Variations in tools and subassemblying practice led to lack of standardization and interchangeability, which handicapped subsequent maintenance operations.[40] A contributing factor was that a considerable percentage of airframe and engine subassembly manufacture was let out to subcontractors, and a high percentage of parts came from a larger network of subcontractors. Shops scattered throughout the industrial areas supplied thousands of bits and pieces which made up the finished aircraft. Good master tooling, with tight control of subcontractors' tools, was absolutely essential, if the pieces were to fit together properly at final assembly. The Japanese had much more difficulty with this due to their lack of specialized tools and, as a result, the major producers came to extend much closer control and supervision over their subcontractors than was true either in the U.S. or in Germany.

Before examining the system of subcontracting as well as component supplies, it would be logical to consider the major producers of both completed aircraft, engines and propellers. The relative standing of the producers of completed aircraft is shown in Table 29. Five manufacturers, Nakajima, Mitsubishi, Kawasaki, Tachikawa and Aichi, accounted for nearly three-fourths of all aircraft output during the period 1941-45. The remaining production was distributed among 10 corporations and 5 arsenals, none of which made as much as 5 percent of the total output. The two biggest companies produced 60 percent of all combat types, while the five largest turned out 88 percent of all combat aircraft. At no time during the war did the Army air arsenal or the four Navy air depots produce any significant number of aircraft nor was their output devoted primarily to research and output of experimental craft particularly. Less than 5 percent of the Japanese aircraft were made by the Army and the Navy in their own facilities.[41] Mitsubishi and Nakajima also led in output of

[40] A number of non-operational planes were found on Luzon. Replacements for missing parts were available on the island but the Japanese explained that they were either parts for the wrong planes or they did not fit and therefore could not be used. For a discussion of Japanese difficulties because of lack of standardization, see ATIG Report No. F-IR-66-RE, Tokyo, June 26, 1946. (Library of Congress, PB 33117.)

[41] Even in engine manufacture where production was concentrated in a few hands, ATIG noted: "The Japanese specified an oil/fuel ratio of 1/14 based on overload fuel. However, each engine manufacturer was permitted to determine and demonstrate the oil consumption for a particular engine and the ratio for an aircraft using that engine would be adjusted accordingly. This led to considerable confusion, the oil and fuel ratio varying with airplanes and with various engines in the same airplane." ATIG Report No. 16, Tokyo, October 29, (Library of Congress, PB 16821).

TABLE 29

RELATIVE IMPORTANCE OF PRODUCERS OF JAPANESE AIRCRAFT, PRODUCTION OF ALL TYPES, 1941-45

Name of Corporation	*1941*		*1942*		*1943*		*1944*		*1945*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Nakajima Aircraft Co.	785	15.4	2215	25.0	4646	27.8	7896	28.0	4019	36.3	19561	28.0
Mitsubishi Heavy Industries	1397	27.5	2241	25.3	3546	21.2	4176	14.8	1153	10.4	12513	17.9
Kawasaki Aircraft Industries	733	14.4	1034	11.7	1984	11.9	3665	13.0	827	7.5	8243	11.8
Tachikawa Aircraft Co.	1048	20.6	1224	13.8	1289	7.7	2189	7.8	895	8.1	6645	9.5
Aichi Aircraft Co.	255	5.0	377	4.3	997	6.0	1496	5.3	502	4.5	3627	5.2
Japan Aircraft Co.	209	4.1	329	3.7	725	4.3	1222	4.3	397	3.6	2882	4.1
Kyushu Aircraft Co.	166	3.3	278	3.1	697	4.2	1124	4.0	355	3.2	2620	3.7
Manchuria Aircraft Co.	60	1.2	300	3.4	523	3.1	1021	3.6	292	2.6	2196	3.1
Japan International Air Co.	95	1.9	163	1.8	340	2.0	1429	5.1	107	1.0	2134	3.1
Kawanishi Aircraft Co.	71	1.4	97	1.1	235	1.4	1060	3.8	531	4.8	1994	2.9
Hitachi Aircraft Co.	139	2.7	205	2.3	405	2.4	833	3.0	201	1.8	1783	2.6
Tachiarai Aircraft Co.	....	...	....	...	....	...	300	1.1	920	8.3	1220	1.7
Fuji Aircraft Co.	....	...	23	.3	230	1.4	506	1.8	112	1.0	871	1.2
Showa Aircraft Co.	22	.4	87	1.0	62	.4	286	1.0	159	1.4	616	.9
Tokyo Aircraft Co.	....	...	....	...	....	...	33	.1	225	2.0	258	.4
Mitsui Mining Co.	....	...	....	...	....	...	2	*	15	.1	17	*
Matsushita Air Industries	....	...	....	...	....	...	....	...	4	*	4	*
Total	4980	...	8573	...	15679	...	27238	...	10714	...	67184	...
Navy Air Depots	43	0.8	111	1.3	648	3.9	639	2.3	259	2.3	1700	2.4
Army Air Arsenal	65	1.3	177	2.0	366	2.2	303	1.1	93	.8	1004	1.4
Total	108	2.1	288	3.3	1014	6.1	942	3.4	352	3.1	2704	3.8
Grand Total	5088	100.0	8861	100.0	16693	100.0	28180	100.0	11066	100.0	69888	100.0

* Less than one-tenth of one percent.

Source: Air Ordnance Bureau—Munitions Ministry.

engines. Together they accounted for two-thirds of all engines produced. In propeller output two companies, Sumitomo and Japan Musical Instrument (Nippon Gakki), together accounted for 92 percent of propeller production.

The Japanese distinguished between subcontractors and component manufacturers. Airframe, engine and propeller manufacturers received their orders directly from the government and the same was true of the component manufacturers. Both received their material allocations from the Munitions Ministry. Subcontractors, on the other hand, received their orders and materials directly from the principal manufacturers. Both component manufacturers and subcontractors were concentrated in Tokyo, Nagoya, or Osaka. The relative size of the two groups in relation to the industry as a whole may be judged from an estimate of employment presented by the Welfare Ministry.[42]

	Feb. 1, 1944	*Feb. 1, 1945*
Airframe	405,660	574,000
Airframe subcontractors	112,000	122,000
Engine	200,000	267,000
Engine subcontractors	34,000	53,000
Propellers	23,000	35,000
Propeller subcontractors	3,000	5,000
Component manufacturers	170,000	308,000
Component manufacturers' subcontractors	58,000	
Total	1,005,000	1,364,000

It is apparent that all segments of the aircraft industry relied upon subcontractors. The airframe manufacturers let about 35 percent of their work out to subcontractors. Mitsubishi subcontracted to the extent of 32 percent; Nakajima 42 percent. Component manufacturers subcontracted 36 percent of output, engine manufacturers 24 percent, and propeller manufacturers only 16 percent.[43] The relationship between sub- and prime contractors grew increasingly close, partly because necessity dictated. The ATIG noted:

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[42] *Estimates of Total Employment in the Output of Airplanes*, Welfare Ministry, Tokyo. This estimate for February 1945 is materially below one presented by the Air Ordnance Bureau of the Munitions Ministry for the same month. See Chapter 5, p. 302. This estimate was based on the national registration of November 1944. Since only unmarried women between 12 and 39 were required to register, it understates female employment in the industry to a considerable degree. It also excludes older men who were not required to register. It is used here, however, because it is the only one available which attempts a breakdown between main producers, subcontractors, and component manufacturers. All the omissions mentioned above would be common to all branches of the industry and, therefore, to the extent that the figures are used only for gauging relative importance, they are not misleading and present a picture nowhere else obtainable.

[43] *Subcontracting in the Aircraft Industry*, Air Ordnance Bureau, Munitions Ministry, Tokyo, October 20, 1945. For a list of component suppliers see *Koku Nenkan* for 1943, p. 278 *et seq.*

Judging by the assembly jigs remaining, which were very meager, both their type of construction and number were much below that employed in U.S. factories. Much use of hand location of parts and rivet holes was made for assembly in lieu of jigs. . . . Troubles encountered can be explained by failure to use accurate or proper tooling for locating coordinating holes, and by inexperience in riveting sequence to avoid distortion. The resultant lack of uniformity and non-interchangeability of parts led the main plant to supply master tools and jigs to branch plants and subcontractors in an effort to maintain interchangeability of major assemblies; however, from general information obtained, much difficulty was encountered in holding interchangeability due to poor tooling and the large amount of subcontracting.[44]

In addition to tools and equipment, prime contractors supplied subcontractors with materials, financial and technical aid. Subcontractors were usually spoken of in terms of the prime contractor, as a "Nakajima subcontractor." Subcontractors were concentrated in the Tokyo, Nagoya and Osaka industrial areas fairly close to the prime contractors they served, and when the air raids began and dispersal got underway, the enforced separation of prime and subcontractor due to lack of transportation proved to be a very disruptive factor.

Component manufacturers, comprising roughly 17 percent of the aircraft industry, produced the landing gears, wheels, tires, communication, engine and propeller equipment, instruments, etc., necessary in plane production. In contrast to subcontractors, final component production was highly concentrated. Two firms produced 59 percent of all generators, two firms produced 83 percent of all bearings, one firm produced 86 percent of all gyro-compasses, two firms produced 68 percent of all landing gears, two firms produced 90 percent of all starters, two firms produced 75 percent of all tires, two firms produced 75 percent of all wheels, etc.

Output of parts is best measured in terms of spares. Orders were planned by the Air Ordnance Bureau on the basis of a certain number for current plane production plus a fixed percentage over and above that for spares. Where requirements for spares were not filled operations suffered, though new plane production was not necessarily hindered. While production orders called for 30 percent spares for altimeters, compasses and bank and turn indicators, no spares were produced in 1944 and 1945. From mid-1944 on, only half as many carburetors were delivered as were ordered. No spare electric motors or radios were produced in 1945. Generator spares averaged only 5 percent in 1944 and 1945. Tire output, which had risen from a ratio of 105 percent spare output to production for new planes, to 300 percent in 1943, fell to 110 percent in 1945. There

[44] *Aircraft Production Facilities & Methods*, Air Technical Intelligence Group, Report No. 29, Tokyo. November 1, 1945. (Library of Congress, PB 19202.)

were never enough radiators and oil coolers, fuel and oil pumps, fuel injection pumps, and magnetos, to meet replacement needs.[45]

As spare production declined, pressure on the component factories for the delivery of spares became heavier because of breakage from faulty materials and poor workmanship and also because of heavier damage in more active military operations. There was abundant testimony pointing to the fact that shortages of critical parts restricted plane output. Capt. (Navy) Miyakawa of the Air Ordnance Bureau stressed fuel pumps, carburetors, gears and electrical equipment.[46] Kurt Schmidt, a Heinkel production engineer sent to Japan by Germany in June 1943 and subsequently assigned to the Hitachi Aircraft Company, declared that every component which required light metals or alloys in its production was either in short supply or, if available, in such poor quality as to be almost unusable for any period of time.[47] The decline in the availability of parts at the Tachikawa plant of the company to which he was assigned may be seen from the following table:

Component	*1943*		*1944*		*1945*	
	Ordered (Unit)	*Percent Received*	*Ordered (Unit)*	*Percent Received*	*Ordered (Unit)*	*Percent Received*
Carburetors	3049	93	3440	60	920	15
Magnetos	5020	100	5870	66	1160	23
Oil pumps	2530	98	2930	69	450	31
Fuel pumps	2489	100	3350	60	900	15
Injection pumps ..	2470	100	3320	62	435	29
Starters	2630	94	2580	79	180	70

Schmidt's summary of the difficulties and deficiencies in Japanese aircraft is interesting. He stated that practically no automatic tools existed and that such production devices as rolled threads were not used; that there was a lack of adequate special-purpose machine tools and production equipment. Secondly, he pointed to the increase in required man-hours which he estimated at three times those required for German production. Thirdly, he stressed the critical shortage of materials. One indication, he declared, of the shortage of light metals was the generally unsuccessful attempt starting in March 1944 to build substitute wooden structures. Fourthly, he mentioned lack of adequate shop supervision and gave as an example the German use of one "meister" or foreman for each 100 men, whereas the Japanese had only one for each 2,000 men. Only 10 percent of the workers were "skilled" and the average age of the

[45] *Critical Aircraft Parts,* Special Memorandum by Air Ordnance Bureau, Munitions Ministry, Tokyo, October 27, 1945.

[46] *Current Aircraft Production for the Japanese Navy,* ATIG Report No. 30, Tokyo, November 2, 1945. (Available in the Library of Congress.)

[47] "Aircraft Production Facilities and Methods at the Hitachi Aircraft Co.," *Air Technical Intelligence Review,* Report No. F-1R-51-RE, June 27, 1946, Tokyo. (Available in the Library of Congress.)

machinists was 19 years, he estimated. Next, he cited the extremely poor interchangeability of parts and noted that spoilage of machined parts in engine production was 30 percent. Then he mentioned the inability to meet schedules for parts delivery with the resultant shortage of parts retarding plane output. He declared that detail design did not lend itself to production methods in use and finally pointed to a serious lack of cooperation between Army, Navy, Japanese scientific and research institutions and foreign technical specialists.[48]

Plans and performance in aircraft production were fairly realistic up till the end of 1943 and on the average 90 percent of the plans were met but, with the formation of the Munitions Ministry, the two parted company. Planning lines went up and production lines went down and a yawning gap between the two developed. This may be seen in Charts 6 and 7.

From January 1944 to August 1945 procurement plans (on an adjusted basis) called for a total of 66,000 aircraft (original plans had scheduled 97,000). Actual deliveries came to approximately 40,000, or 41 percent of original plans and 60 percent of adjusted plans. Of a planned engine output of 105,000 (adjusted) only 56,000, or 53 percent, were delivered.[49] As was indicated in Chapter 2, the planning by the Munitions Ministry was over-optimistic and unrealistic. The aircraft division of USSBS speculated as to whether there might not have been political implications behind the planning with the military, sensing defeat, deliberately setting production goals too high so that blame for failure might be shifted to manufacturers. In many cases production goals were set for specific plants in excess of the capacity of the plant. For example, the Ishikawajima plant's production of HA-35 engines, compared to capacity and orders, was as follows:[50]

Period	*Actual*	*Ordered (Planned)*	*Capacity*
1944—Jan.-Dec.	1155	2705	1970
1945—Jan.-Aug.	732	2010	1680

Total plane production of Aichi Kokuki KK., compared with orders and capacity, was as follows.[51]

Period	*Actual*	*Ordered (Planned)*	*Capacity*
1944—Jan.-Dec.	1496	2849	1815
1945—Jan.-Aug.	482	3212	889

[48] *Ibid.*, pp. 3-4.

[49] *Planning Programs in Aircraft*, Special Memorandum by Air Ordnance Bureau, Munitions Ministry, Tokyo, November 15, 1945.

[50] *Ishikawajima Koku Kogyo KK.*, Corporation Report No. 13, Aircraft Division, USSBS, Washington, 1947, Appendix I-1.

[51] *Aichi Kokuki KK.*, Corporation Report No. 5, Aircraft Division, USSBS, Washington, 1947, Appendix C.

From April 1944 through August 1945, Nippon Kokusai Koku Kogyo had capacity to produce 2,113 airframes, orders for 2,964, and actually produced 1,292.[52] Numerous additional examples could be cited. The fact that this was also true of production at Army and Navy Air Arsenals weakens the supposition that there was a political basis for poor planning. While capacity of the Eleventh Naval Air Depot (Dai Juichi Kaigun Kokusho) in 1944 was only 30 aircraft per month, plans called for 60, and actual output was only 24. At the Koza Naval Depot, orders from April 1944 through August 1945 totaled 525 planes, capacity was 341, while actual production was 128.[53]

The gravest defect in planning was the failure to properly relate material requirements to planned aircraft and engine output. No real attempt was made before 1942 to determine the exact raw-material requirements for the aircraft program. In that year both the Army and Navy attempted to forecast aluminum needs by computing requirements based on aluminum content of sheets, rods, pipes, etc., needed for individual plane production. They came up with an estimate of 4½ tons per plane but in 1943 this was found to be entirely too low. New formulas were worked out and the aluminum estimate raised to approximately 5½ metric tons per plane for the 1944 requirements forecasts. This was found to be approximately correct in view of the greater concentration on fighters. The trend by quarters from 1942 to 1945 of plane production in relation to aluminum allocated to aircraft production may be seen in the following table:

Fiscal Year & Quarter	*Planes (Units)*	*Primary Aluminum Allocation (metric tons)*	*Tons per Plane*
1942—I	1991	17,184	8.6
—II	2187	14,591	6.7
—III	2852	16,100	5.6
—IV	3206	18,339	5.7
Total	10236	66,214	6.4
1943—I	3565	25,961	7.3
—II	4250	25,854	6.0
—III	5672	27,185	4.8
—IV	6756	28,290	4.1
Total	20243	107,290	5.3
1944—I	7332	33,017	4.5
—II	7391	34,419	4.7
—III	6701	16,352	2.4
—IV	4940	16,223	3.2
Total	26364	100,091	3.8
1945—I	4499	10,200	2.2

Source: Air Ordnance Bureau, Munitions Ministry.

[52] *Nippon Kokusai Koku Kogyo KK.*, Corporation Report No. 8, Aircraft Division, USSBS, Washington, 1945, p. 6.

[53] *Army Air Arsenals and Navy Air Depots*, Report No. 19, Aircraft Division, USSBS, Washington, 1947, pp. 17 and 44.

It is apparent that by mid-1944, allocation of primary aluminum to aircraft had fallen below the minimum requirements. This, in spite of the fact that a larger and larger percentage of total aluminum supply was allocated to aircraft, reaching 89 percent in 1944 and 100 percent in 1945. Had it not been for the fact that there was a six months' lag in the pipe-line from aluminum ingot to finished plane and that there was an increasing use of secondary (scrap) aluminum, even the reduced plane output of 1945 would not have been possible. Bauxite imports ceased in April 1945 and by the end of August stocks of primary ingot were down to 4,129 metric tons. With supplies of aluminous shale from North China and Korea cut off and the supply of primary aluminum exhausted, plane production would have been reduced to negligible proportions by the fall of 1945, even if not one bomb had been dropped anywhere in Japan proper and even if the Japanese dispersal program had been 100 percent effective.[54] In anticipation of this lack of aluminum, the Japanese had been experimenting with steel- and wood-frame substitutes, but since steel output was also plummeting downward, as was indicated in the previous chapter, they would have been reduced to the fabrication of all wood-frame aircraft.

Another serious defect in materials planning was the failure to adequately stockpile and obtain sufficient quantities of alloy materials used in making high-tensile strength special-alloy steels. As we have seen, the output of special steel rose even though ordinary steel output was declining, but its quality deteriorated because of the necessity of substituting for scarce alloy materials. Shortages of chromium, nickel, cobalt, tungsten, vanadium, titanium, and molybdenum, led to a decline in the quality of the alloy steels used in engine production, landing gears, motor mounts, and terminal fittings. The Japanese did erect a nickel concentrator in the Celebes in 1943 but they failed to develop available tungsten and chromium resources in China and the Philippines respectively. The attack on shipping in 1942 and 1943 cannot be blamed for this. It was just bad foresight and poor planning. Two or three shiploads a year of tungsten concentrates would have provided a large stockpile. Chromium ore was left on Manila docks while Army and Navy ships returned with only partial cargoes. Peak ferro-chrome output could have been doubled by the movement of about 100,000 tons of ore. Even had all shipping been used to capacity, this would have required a shift of less than one percent in shipping allocation. Nickel from the Celebes was cut off as was cobalt from Burma. Molybdenum and vanadium were available in Japan and Korea only in small quantities after Burma was cut off. Chrome-nickel steel was early replaced by manganese-chrome-molybdenum steel, and that in turn by silicon-manganese chrome steel. Nickel steel

[54] This is wholly apart from the fact that there would have been almost no aviation gasoline left to fly any planes which could have been produced.

was replaced by silicon-manganese-chrome steel, and in 1945 by straight high-carbon steel. The extent of the substitution of high-carbon steel for alloy steel is indicated in the increasing proportions of high-carbon steel to total special steel produced; 37 percent in 1942, 39 percent in 1943, and 50 percent in 1944.[55] The procuring of alloy metals became so difficult that the standard on flaws for magna-fluxed materials had to be reduced. The decline in deliveries of special steel and light alloy parts at the Hitachi Company may be seen from the following table: [56]

Materials	*1943*		*1944*		*1945**	
	Orders (tons)	*Percent Received*	*Orders (tons)*	*Percent Received*	*Orders (tons)*	*Percent Received*
Special steel:						
Forgings ...	1,392	94	1,974	54	457	15
Bar	807	100	1,280	54	108	38
Sheets	97	96	84	94	23	21
Tube	30	92	57	42	2	52
Light alloy:						
Castings ...	574	100	117	43	84	36
Bar	20	95	25	65	3	32
Sheet	1	86	2	51	1	30
Tube	2	100	6	21	.2	52

* Five months.

The impact of the critical shortages of alloy steels was well described in the following statement:

> The evidence for the desperate shortages in special steels and the effects on Mitsubishi engine production are shown by data available from the No. 14 works. These indicate that from December 1943 until September 1944, shortages of cobalt steels reduced exhaust valve supplies for new engines to as much as 40 percent below immediate requirements.... Since Mitsubishi provided more than 90 percent of all exhaust valves for the industry, the shortages struck at all engine-production lines. The data are clear for engine exhaust valves, and there are indications that all other special steel parts were equally affected at about the same time by mounting shortages of special steels. Between March 1943 and March 1944, for example, there were 32 revisions of steel specifications for engines approved by the Munitions Ministry, 10 of them affecting nickel, 3. chromium, 16, molybdenum and one each, tungsten and cobalt. These shortages were at the base of the decline of Mitsubishi production.[57]

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[55] At the beginning of 1944 the "Special Steel Supply and Demand Regulations" (January 28, 1944) broadened the "special" steel category to include high-carbon steels formerly termed ordinary, and this classification shift accounted for more than half the apparent increase in special steel output for 1944.

[56] *Hitachi Kokuki KK.*, Corporation Report No. 8, Aircraft Division, USSBS, Washington, 1947, p. 61.

[57] *Mitsubishi Heavy Industries, Ltd.*, (Mitsubishi Jukogyo KK.), Corporation Report No. 1, USSBS, Washington, 1947, p. 38. This report also declares: "The use of substitutes alone (alloy steel substitutes, that is) was sufficient to play havoc with the Japanese aircraft industry because it struck at the heart of engine manufacture." p. 290.

The decline in overall engine output after March 1944, all testimony indicates, was largely due to the alloy materials situation.

In the propeller field the shortage of alloy steels for hub parts resulted in a number of changes in specifications[58] and each change resulted in a decline in quality and increased production and operational difficulties.[59] Not only was absolute production lost but quality of those produced declined. At the Kawasaki Aircraft Company, Akashi plant, in overhauling 857 engines received from the Army over the period April 1944-April 1945, 457 were found to have failed because of defective material, largely bearings and crankshaft. An index of the failure of landing gears is the increase from 40 percent ordered for spares in 1942-43 to 70 percent ordered in late 1944-45. A Japanese pilot's diary indicated that of 80 Ki-84 (Franks) which set out from Japan for Lingayen Bay in November 1944, only 14 arrived. The others developed trouble with engines, fuel system, landing gears, etc. The ATIG reported:

As an indication of the deteriorating quality of workmanship and materials, particularly in engine and power plant accessories, it was stated that at the beginning of the war the Japanese Navy was able to maintain operational availability of 80 percent. The percentage progressively became 50 and in some cases 20. These losses were due to a combination of poor factory workmanship, inferior materials and poor maintenance. In many cases only one out of three airplanes ever reached the front lines due to engine failure.[60]

When duraluminum sheet began to deteriorate in quality and strength because of the high percentage of scrap and secondary aluminum, certain design and construction compromises were made which deviated widely from good practice. In many instances sheet steel parts and steel fittings were substituted for dural parts and steel and even brass rivets were used to make up the joints. Such combinations were an open invitation to rapid deterioration, due to corrosion. No effort was made to inhibit corrosion at such joints by the use of insulating materials or special coatings.[61] One military member of the Air Ordnance Bureau indicated that

[58] *Sumitomo Kinzoku Kogyo KK., Puropera Seizosho,* Corporation Report No. VI, Aircraft Division, USSBS, Washington, 1946, p. 8.

[59] For example, see OSRD Report No. 3587, April 24, 1944, which noted lack of titanium and is consequences. (Library of Congress, PB 22509.) Also OSRD Report No. 3922, July 20, 1944 (Library of Congress, PB 22514).

[60] Report No. 30, Tokyo, November 2, 1945 (available in the Library of Congress).

[61] The OSRD noted "where steel was threaded onto magnesium it was necessary to strip the threads in order to remove the nut, because no protection against corrosion of the magnesium had been provided. Such methods of assembly tend to make field repairs extremely difficult, hence such assemblies are evidently replaced and are not repaired in the field." *Metallurgical Examination of Landing Gear from Japanese Aircraft "Betty"*, OSRD Report No. 4073, August 24, 1944 (Library of Congress, PB 22524).

it did not matter since it was anticipated that the aircraft would have only a short operational life anyway. This philosophy seems to have been widely accepted in plane construction. Plainglass, much of it not even shatterproof, was used extensively in cockpit canopies, windows and gun turrets, in place of the transparent plastics used in the U.S. Even wood, however, could not be used to the fullest extent because of a shortage of waterproof glues and limited plywood techniques. The shortage of magnesium led to its restriction in landing gear-housing use and as a result gear damage rose sharply.

At the same time that shortages were causing quality declines, the low stocks of aviation gasoline, discussed previously, caused a sharp decline in testing both for engines and for planes. At the beginning of the war the test flight time for aircraft was two to three hours with five landings. By the end of the war the test flight was that from producing plant to point of delivery. As a result, ferrying losses increased sharply. At the beginning of the war engine tests covered seven hours running time for the Army and nine hours for the Navy. By the end of the war only one out of ten engines was being tested and time had been reduced to two hours. Alcohol, low-grade gasoline with methanol and water injection systems were used for test runs. The combination of poor engines and poor fuel caused difficulty and losses.

The monthly output of planes, engines and propellers during 1944-45 may be seen in the following table:

Year & Month	*Planes*	*Engines*	*Propellers*
1944—Jan.	2122	3633	3638
Feb.	2199	3789	3980
Mar.	2435	4530	4078
April	2473	4215	4513
May	2318	4127 [a]	4711
June	2541	4127 [a]	4980
July	2473	4038	5409
Aug.	2346	4203	4578
Sept.	2572	3266	4990
Oct.	2371	3789	4537
Nov.	2220	3819	4588
Dec.	2110	2991	4450
1945—Jan.	1836	1987	4278
Feb.	1391	1695	3593
Mar.	1713	1787	3491
April	1567	1734	2992
May	1592	1677	3746
June	1340	1669	1389
July	1131	1257	383
Aug.[b]	496	554	50

[a] The output figure for engines for May 1944 was abnormally low and for June unduly high because accepting inspectors were called to Tokyo for a ten-day meeting at the end of May. Therefore the figures for May and June have been averaged.

[b] Less than ½ month.

While the decline in aircraft output was compounded of many factors, air attack, dispersal, absenteeism, material shortages, etc., it is interesting

to note the extent of the decline in output of planes and engines which occurred prior to the impact of the main weight of the air attack. As is shown in Charts 8 and 9, the main weight of the air attack fell on the aircraft industry after the middle of March. From the peak in September 1944 to February 1945, plane production fell 46 percent. Engine output declined 63 percent from its peak in March 1944 to February 1945. Even propeller output fell 34 percent from its July 1944 peak. In March 1944, at its peak, engine output was roughly twice plane production. By early 1945, prior to the main air attack, it was almost down to a 1-to-1 basis.

The decline in engine production after March 1944 was explained by Chikuhei Nakajima, president of the Nakajima Aircraft Company:

> The Munitions Ministry in September 1943 ordered Nakajima to expand engine production until, in March 1944, it was 2½ times that of September 1943. In order to achieve that goal we mobilized all our materials and resources, but after March, parts and materials had become largely exhausted and our machines worn out. In addition skilled mechanics were being taken by the Army and replaced by school children.[62]

General Saburo Endo, chief of the Air Ordnance Bureau of the Munitions Ministry, explained the reason for the Munitions Ministry order to achieve, at all costs, a maximum level of production by March 1944.

> Both the Army and Navy had decisive battles to win. The Navy considered the decisive battle to be coming in June 1944, north of New Guinea, and the Army thought their decisive battle would be in August 1944 in the Philippines.[63]

Was Japanese output adequate to meet their war needs? This can be considered in two ways. First, did production exceed losses by an adequate margin? Secondly, did the industry provide the Japanese with an airforce (in numbers at least) capable of coping with enemy air strength deployed against it? Unfortunately, a full answer to the first question cannot be given since the details of Japanese Army Air Force gains and losses are still restricted.[64] Until 1945, when the air war really closed in upon the Japanese, production exceeded planes expended. In 1944 the gap between production and losses narrowed, as losses rose significantly. Finally in 1945, as output fell and losses increased even more sharply than in 1944, planes expended exceeded planes produced and the Japanese could not hope to reverse the pattern. The second question may

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[62] Interrogation of Nakajima, Chikuhei, Tokyo, November 12, 1945, p. 5. Nakajima was, by the time of the interrogation, accustomed to thinking in terms of orders from the Munitions Ministry. Since, however, the Ministry was only formed in *November* 1943, it was probably the military which ordered him to step up output in *September* 1943.

[63] Interrogation, Tokyo, November 17, 1945, p. 6.

[64] The wartime history of the Japanese Naval Air Force may be found in *Interrogations of Japanese Officials*, Naval Analysis Division, USSBS, Vol. II, p. 374.

be answered more precisely. The following table indicates the total first-line combat strength of all U.S. airpower, Army, Navy and Marine, pitted against comparable first-line combat strength of the Japanese in the Far East, on four successive dates.[65] Had the Japanese been keeping an ac-

Date	*U.S.*	*Japanese*
Jan. 1943	3,537	3,200
Jan. 1944	11,442	4,050
Jan. 1945	17,976	4,600
July 1945	21,908	4,100

curate air order of battle, their motivation for surrender would have been even stronger.

Ordnance

Japanese production of Army and Naval ordnance and motor vehicles was conditioned by the inherent limitations of the economy described in Chapters 2 and 3. In order to supply the steel necessary to produce combat and tracked vehicles, it was necessary to sharply reduce motor vehicle production. In order to raise the level of air ordnance output in 1944, when the aircraft drive reached its peak, it was necessary to sharply reduce steel allocations for Army ground force items such as artillery, ammunition, tanks, etc. In order to award the major priority on basically-limited steel supplies to merchant shipbuilding, the whole ordnance program, though it expanded substantially, had to be held to levels which did not meet scheduled plans of production or military requirements.

Of course, on December 7, 1941, the Japanese were not aware of these forthcoming restrictions. Their crystal ball was very shadowy and they had only the experience of the past decade to look back upon in satisfaction and confidence. Army ordnance output had expanded from 20.6 million yen in 1931 to 956.4 million yen in 1941. The growth of Army and Navy arsenals was as follows (in millions of yen):

Year	*Operating Funds*	*Revenue*	*Total*
1930	23.8	48.5	72.3
1937	105.6	386.6	492.2
1941	823.7	1876.0	2699.7

Source: *Oriental Economist.*

On an index basis naval ordnance output had risen from 19 in 1931 to 100 in 1941.[66] While figures for numerous individual components could

[65] Compiled from data presented in *The Effects of Strategic Bombing on the Japanese War Economy,* USSBS. Washington, 1946, p. 35.

[66] Since a considerable amount of the material on Japanese Army ordnance output during the war is still restricted, the discussion that follows is largely in terms of naval ordnance. The index of naval ordnance output was computed by the Military Supplies Division of USSBS from basic data gathered in Japan. A description of the construction of the index will be found in *Japanese Naval Ordnance,* USSBS. Washington, August 1946, pp. 18-21.

be cited, trends were all so sharply upward as to inspire such real confidence that total steel allotted to Army ground, Naval surface and air forces in 1942 was lower than the 1941 figure. This may be seen in the following table:

STEEL DISTRIBUTION TO ARMY, NAVY AND AIR ORDNANCE
(in 1000 metric tons)

Year	*Army Ground Forces Total*	*Army Ordnance (Ground)*	*Naval Surface Forces Total*	*Naval Ordnance (Surface)*	*Air Forces Total*	*Air Ordnance (Army and Navy)*
1940 ..	745	541	804	254	368	115
1941 ..	1046	760	1129	392	483	147
1942 ..	840	575	1120	423	485	143
1943 ..	1148	913	1238	491	559	145
1944 ..	598	379	1059	445	961	296
1945* ..	106	73	150	89	138	49

* First quarter.

Source: Haikyu Ka, Tekko Kyoku, Gunjusho (Allocation Branch, Steel Bureau, Munitions Ministry).

The error was quickly rectified in the following year but the subsequent dilemma the Japanese faced in 1944 and the way in which they solved it is reflected by the figures. Steel allotted to Army ground ordnance was cut sharply in order to grant a larger share to expanding aircraft output.

The drastic reduction in iron ore and coking coal imports during 1944, under the impact of the tightening blockade and the resultant sharp drop in ingot and finished steel supply, was shown in the previous chapter. Allocation of steel to army and navy ordnance reacted promptly. Ordinary steel allotments fell sharply from the first quarter of 1944 on. By March 1945, allocations of ordinary steel had dropped in terms of their peak level to 28 percent in the case of the Army, 55 percent in the case of the Navy, and 63 percent in the case of the air forces. Cuts in the consumption of special steel were less severe but substantial.[67] There just was not enough steel to go round to allow expansion in one ordnance area without contraction in another. An indication of the way in which the decline in ordnance output paralleled the decline in steel allocation may be seen from the following:

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[67] The quality of the steel also declined. OSRD Report No. 4089 indicated that whereas alloy steel is customarily used for armor-piercing projectiles, the Japanese were using plain carbon steel. See *Metallurgical Examination of Japanese 75 mm Armor-Piercing High Explosive Howitzer Rounds*, OSRD No. 4089, August 29, 1944 (Library of Congress, PB 22525). OSRD 5357 noted that the phosphorus and sulphur contents, particularly sulphur, were unduly high and exercised an unfavorable influence on the properties of the steels used in Japanese guns. See *Metallurgical Examination of a Japanese 37 mm Tank Gun*, OSRD No. 5357, July 24, 1945 (Library of Congress, PB 22004).

Period	Index of Naval Ordnance Output		Index of Steel Deliveries
	Total Naval Ordnance	*Naval Ordnance Excluding Air*	*For Naval Ordnance Excluding Air*
1944:			
April-June	100	100	100
July-Sept.	112	106	115
Oct.-Dec.	113	102	94
Jan.-Mar.	94	85	87
1945:			
April-June	71	58	55
July-Aug.	24	19	26

One of the very significant developments in the Japanese war production picture was the relative decline in the importance of Army (including Army Air) ordnance to total ordnance output. As is seen in Table 30, the Army's share of total ordnance output fell from 64 percent in 1941 to 30 percent in 1945. There were three basic reasons for this trend. In the first place, the primary responsibility for the defense of the area in which the weight of the American offensive fell was assigned to the Japanese Navy. It was the Japanese fleet and the Japanese naval airforce which bore the brunt of the U.S. attack. It was not until the attack on the Philippines in late 1944, which resulted in the need for the Japanese airforce in Manchuria to be brought down in toto to reinforce the almost depleted naval air force, that any significant attrition hit the army air force. Secondly, the American advance of the first two and a half years of the war, which for the most part isolated and captured strategic islands, did not result in any great expenditure of ordnance on the part of the Army. To be sure, it lost whatever was on the island but, since reinforcements were almost always shut off, it was precluded from expending any additional ordnance over and above what was already on the island. There were no major campaigns of attrition involving enormous battle wastage such as marked the European theater. Thirdly, since the Pacific War was largely a naval and air war, it was soon found that conventional army ground force weapons, such as heavy artillery, tanks, etc., were not the essential needs. Table 30 illustrates the results of the realization of this fact, quite clearly. The relative decline in artillery, ground force ammunition, and armored and tracked vehicles is apparent. On the other hand, air force armament and ammunition rose significantly as did radio, optical and marine transportation equipment. The army insisted on producing its own submarines for supply, as well as landing craft, which in 1944-45, in anticipation of probable invasion, were being fitted out as special-attack suicide craft. The increase in the miscellaneous category in 1944 (fiscal) was due to the ballon bomb campaign against the U.S. Output of balloon bombs rose from one million yen in October 1944 to a peak of 49 million in February 1945. In all some 9,000 balloon bombs were launched against the U.S. over the period from October 1944 to

March 1945, at a total cost of 141 million yen. Since there was no outcry in the U.S. the Japanese General Staff concluded that the campaign was a failure and it was abandoned at the end of March 1945.

Had AA ammunition not been included with GF ammunition in Table 30, the relative decline would have been sharper. Army ordnance output, in value terms, reached a peak in August 1944 (excluding balloon bomb expenditures) but production of tank and other combat vehicles reached its highest level in 1942 (See Table 31) as did ammunition production for Army ground forces. Small arms production for army use reached its peak in 1943, as did army artillery, though anti-aircraft gun output continued to rise until 1944. The effect of the 1944 drop in steel supply on ground force armament was concentrated on artillery, ammunition, and combat and transport vehicles. The impact on motor vehicle output will be traced in a subsequent section. The pattern of artillery production was altered in 1944 to reduce the output of field and heavy pieces. Army chiefs outside the home islands were told in the spring of 1944 that heavy artillery manufacture was being discontinued. Ammunition production was cut and an order was issued early in 1944 practically forbidding the use of ammunition for training purposes. Output of the principal categories of combat vehicles was also reduced in 1944, as a direct result of the steel situation. Light tanks were virtually cut out and medium tanks and armored cars reduced severely. (See Table 31.) An American observer, who after the war studied Japanese tank and vehicle production, declared:

TABLE 30

RELATIVE OUTPUT OF ARMY ORDNANCE COMPONENTS, FISCAL 1941-45

(Percentage of yen-value production in 1945 prices)

Category	*1941*	*1942*	*1943*	*1944*	*1945*
Small Arms	8.4	8.5	9.5	8.6	9.6
Armament for AF	1.6	3.9	9.3	9.4	15.0
Artillery	7.5	7.8	8.1	5.5	5.8
Ammo. for GF & AA	33.3	35.8	28.9	19.0	18.1
Ammo. for AF	5.7	7.9	10.4	13.3	14.3
Armored Vehicles	16.5	12.1	9.5	6.7	5.6
Tracked Vehicles	18.6	17.6	10.1	7.1	7.6
Optical Equipment	2.4	1.3	2.9	3.7	3.2
Radio Communication Equipment	.6	1.5	5.6	8.6	8.8
Marine Transportation Equipment	2.6	2.3	3.9	10.7	11.0
Miscellaneous	2.6	1.3	1.8	6.4	1.0
Total Army Ordnance	100.0	100.0	100.0	100.0	100.0
Army Ordnance Percentage of All Ordnance	61.0	56.0	47.0	35.0	30.0

Source: Computed from data supplied by War Ministry.

> It is obvious that the Japanese military staff had no conception of the magnitude of the task they had set for themselves, and little understanding of the pace that would be set in the development and production of tank and automotive material and equipment. Their reliance on their ability to copy,

TABLE 31

JAPANESE PRODUCTION OF TANKS AND COMBAT VEHICLES, 1940-45

(value in 1000 yen)

	1940		1941		1942		1943		1944		1945	
	Unit	*Value*	*Unit*	*Value*	*Unit*	*Value*	*Unit*	*Value*	*Unit*	*Value*	*Unit*	*Value*
Medium Tanks	315	46,116	495	73.296	531	78,322	544	79,971	294	46,680	89	14,800
Light Tanks	708	46,184	529	38.673	634	46,481	232	17,241	48	3.932	5	477
Military Tractors	468	18,269	919	58,563	1489	93,288	870	55,236	741	48,682	196	12,974
Self-propelled Guns ..	...	.....	...	.....	26	3,120	14	1,680	59	6,720	48	4,680
Armored cars	...	.....	...	.....	88	4,671	505	31,437	385	24,599	126	8,049
Miscellaneous Vehicles	272	16,404	503	28,196	442	22,228	615	42,112	725	47.846	105	6,954
Spare Parts	...	.....	...	26,800	....	36,600	...	40,800	...	38,400	...	4,055
Total	1763	132,973	2446	225,528	3202	284,710	2780	268,477	2252	216,859	569	51,989

Source: War Ministry and Japanese Automobile Control Association.

and frequently to improve on foreign designs apparently added to their confidence. It was too late when they realized the necessity for heavier firepower, armor, performance, and mobility, and by the time they were able to develop more effective and heavier equipment, the drain on resources of men and material made it impossible to undertake their manufacture.[68]

In 1945, when the prospects of invasion grew, another reversal took place and while aircraft armament and ammunition retained its overriding priority, artillery was raised from a "C" to a "B" priority, combat vehicles from a "D" to a "B" rating and various items of radio and communication equipment were dropped from a C-A range to a D-B priority while marine transportation equipment was reduced in the same way. By this time it was too late, but the constant tailoring and trimming of some programs in order to allow a little more of a constantly diminishing steel supply to be devoted to more essential uses, was the main feature of the ordnance picture.[69]

Naval ordnance output (including naval air) during the Pacific War period was about ten times greater than the average of the prewar decade. Ammunition, which accounted for nearly two-thirds of the value of ordnance output during the earlier period, declined in relative importance, as may be seen in the following table:

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[68] *Japanese Automotive Research, Development and Production of Combat and General Purpose Vehicles,* U.S. Army. Ordnance Technical Intelligence Report No. 21, Tokyo, March 23, 1946. p. 16. (Library of Congress, PB. 25588.)

[69] For a discussion of the quality of Japanese Army Ordnance, see Ordnance Technical Intelligence Report No. 8, GHQ, AFPAC, Tokyo. January 28, 1946 (Library of Congress, PB 20387). The report states in part:

"Although the Japanese had ample testing facilities, they were not utilized to the fullest advantage during the war because of transportation difficulties, decreased production and a gradual lowering of testing requirements. Toward the close of the war only powder, fuzes and some materiel were given production acceptance tests. Precision instruments at the proving grounds were usually copies of now obsolete German, French or American designs. The Japanese proving grounds were mere firing stations. No research work was carried on as in American proving grounds." And, "As the war progressed, the Using Arms personnel of the Ordnance board were needed in other fields and were relieved from the Board; no replacement personnel were appointed. Manufacturing difficulties became so great and requirements for immediate relief from these difficulties became so critical that special laboratories were set up at various arsenals. These laboratories assumed many of the functions formerly assigned to the Board. The whole system led to chaos; design, development, and testing suffered as a result of the lack of direction." See also, Wakefield, F. A., *Tests of Japanese Rifles,* Springfield Armory Engineering Dept., Technical Report No. WO 593. (Library of Congress, PB 39515.)

Category	Percent of Total Value of Ordnance Output	
	1931-40	1941-45
Ammunition	62	34
Guns and mounts	12	16
Bombs, mines & torpedoes	12	17
Radio & electrical equipment	10	24
Optical & navigation equipment	4	3
Small arms & miscellaneous	--	6
Total Naval Ordnance	100	100

Although guns accounted for 27 percent of the total in 1931, this category declined relatively over the decade and averaged 12 percent for the entire period. During the Pacific War years, however, the relative share of ammunition to total naval ordnance output continued to decline while guns rose, due to the need in aircraft and merchant ship armament. This may be seen in the following table:

Category	Percent of Total Naval Ordnance Output				
	1941	1942	1943	1944	1945
Guns	8	9	15	22	18
Bombs, mines & torpedoes	21	23	17	13	19
Ammunition	43	41	37	31	26
Optical & navigational	3	3	3	3	2
Radio & electrical	19	19	23	26	26
Small arms & others	6	5	5	5	9
Total Naval Ordnance	100	100	100	100	100

Output of flat-trajectory guns declined after 1942 in accordance with the shift to smaller vessels in the naval construction program. No guns over 20-cm were built after 1943, and the number of 20-cm guns dropped from 20 to 15 in 1944. A large number of short 12- and 20-cm guns were constructed in 1943 and 1944, however, which were used in arming merchant ships. This reduction in naval guns contrasts sharply with the increases in anti-aircraft and machine guns. Aircraft machine gun output rose from 23,405 in 1943 to 55,770 in 1944 but met only 75 percent of the 1944 plan which, however, was based on scheduled aircraft production. When this failed to meet the plan, the real need for ordnance was likewise reduced.[70] Production of machine guns for surface vessels tripled in 1944. The 31,000 produced was slightly better than the plan called for (29,000) but neither met the real need.[71]

The trend in ammunition was roughly similar to that in guns. Increases in machine gun and anti-aircraft ammunition were partially offset by the decrease in naval gun projectiles. Naval gun ammunition larger than 20 cm reached a peak of 35,000 rounds in 1943 but was stopped in

[70] See *Air Ordnance and Aircraft Output*, Koku Soiki Sokyoku (Air Ordnance Bureau), Gunjusho (Munitions Ministry), Special Memorandum No. 6 for Japanese Liaison Office, Tokyo, November 4, 1945.

[71] *Wartime Problems in Vessel Equipment*, General Affairs Section, Navy Technical Bureau, Navy Ministry, Tokyo, December 5, 1945, p. 6.

1944. Production of ammunition less than 15.5 cm amounted to 250,000 rounds in 1943, but production was also stopped in 1944. Aircraft machine gun ammunition showed the largest increase of all ammunition categories. While output of all calibers totaled 84,248,000 rounds in 1944 as against 71,976,000 rounds in 1943, the 1944 output was only 68 percent of planned production.

Output of bombs, mines and torpedoes increased at a less rapid rate than total naval ordnance output, due partially to the shortage of skilled labor. It was reported that 40 percent of all torpedoes produced were rejected because of defects and failure to meet specifications.[72] As in the case of other ordnance components, output of air items expanded most sharply.

Optical and navigational equipment constituted a relatively small part of total ordnance output, accounting for approximately 3 percent of total value. No real shortages developed in this category, with the exception of gyrocompasses, late in the war.

Output of radio and electrical equipment expanded six and one-half times between 1941 and 1944, and in the latter year accounted for one-fourth of the value of all naval ordnance. As was to be expected, the largest increase was shown by the aeronautical group. The Japanese

Radio & Electrical Equipment	*Indices of Output (1941 monthly av. = 100)*		*Percent 1944 actual to plan*
	1943	*1944*	
Air	378	1158	82
Other	275	615	70
Total	311	641	74

Navy had no radar until after the Battle of Midway. The industry had to be built from the ground up. Output of radar units totaled 1,850 in 1943, of which 400 were for aircraft, and 11,942 in 1944, of which 2,959 were for aircraft. Since the Japanese were able to acquire no detailed plans prior to the war, their product was very poor in quality. This was the conclusion of U.S. radar experts who made a detailed investigation of the Japanese industry after the war. They declared:

The Japanese attempted to duplicate our 3 centimeter airborne magnetrons without success. Nor were they able to make permanent magnets of sufficient strength to eliminate heavy and clumsy electro-magnets. One Japanese engineer specializing in airborne radar claimed to have gotten a renovated APQ-13 into bench operation. He considered it a beautiful job and said they could have readily duplicated everything in it except the magnetron. All of the Japanese designed radar equipment appeared to be crude both electrically and mechanically in comparison to U.S. sets. There is some doubt whether they could have duplicated successfully our modern fire control and GC1 radars even if they had captured them. As a matter

[72] See Interrogation of Capt. Toyama, Chief of Torpedo Section, Naval Technical Bureau, Tokyo, November 26, 1945.

of fact they had obtained fairly good specimens of our IFF sets and the APQ-13 from B-24's and B-29's but generally they had never been able to put them in complete operation. Admiral Nawa, head of Japanese Navy electronics research, stated that their greatest defect in comparison with American radar design was their inability to turn out a high-powered centimeter transmitting tube.[73]

The three chief producers of Japanese radar for both Army and Navy were Nihon Musen, Tokyo Shibaura Denki and Sumitomo Tsushin Kogyo. Nihon Musen was originally an affiliate of Telefunken, the German electrical equipment manufacturing concern (from 1923 on). At first there was a free exchange of information but this later declined since the Japanese had nothing to supply in return. The contract expired in 1943. Sumitomo, the principal Japanese manufacturer of telephones, automatic switchboards, telegraph apparatus, etc., was affiliated with American Western Electric Co. and later with I. T. & T. which purchased Western Electric's interest. Shibaura Denki was affiliated with General Electric and RCA. The characteristic lack of cooperation of the Japanese Army and Navy was well illustrated in the case of the Nihon Musen plant which was divided into two parts, one for manufacturing army equipment and the other for navy. Engineers working in one were not allowed in the other. The ATIG declared:

Very severe criticism must be leveled at those Japanese military leaders who so long insisted that army and navy research, development, production and operation must be kept entirely separated. The number of scientists in Japan sufficiently skilled to undertake radar research is much more limited than in the U.S.—it was inadequate to begin with. It was then the height of folly to insist on reducing their effectiveness by nearly one-half by requiring all projects, oftimes parallel, to be studied secretly within each of the two services.[74]

A different group of investigators came to essentially the same conclusion:

At the outset of the war, the Japanese Army officers controlled all research and development in fire control material. Failure to organize very capable scientists of the universities and of the army, navy and civilian establishments, seriously handicapped any progress in development of new equipment requiring real scientific skill. University professors were assigned projects without proper orientation, were not allowed to discuss topics among themselves and were viewed with suspicion and even distrust.[75]

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[73] *Short Survey of Japanese Radar*, in three volumes. Air Technical Intelligence Group Report No. 115, Tokyo, November 20, 1945, Vol. 1, p. 18. (Library of Congress, PB 8709.)

[74] *Ibid.*, p. 22.

[75] Ordnance Technical Intelligence Report No. 18, Office of the Chief Ordnance Officer, GHQ, Tokyo, January 9, 1946, p. 22. (Available in the Library of Congress, PB 259024.)

SCAP noted: "Developments in signal communications during the war by non-

The degree to which the Navy diverted its expenditures and ordnance outlays into the air effort to meet the American attack may be seen from the two following tables. The first shows the percentage breakdown of total Navy armament expenditures for aircraft, ships and ordnance (both surface and air). This is as follows:

Fiscal Years	*Percentage of Armament Expenditures*		
	Aircraft	*Ships*	*Ordnance*
1941	43	20	37
1942	58	17	25
1943	49	19	32
1944	53	13	34
1945	65	17	18
Total 1941-45	55	16	29

Source: Finance and Navy Ministries.

A breakdown of ordnance output, based on physical production indices weighted by yen value at 1945 prices, follows:

Category	*Percent of Total Naval Ordnance Output*				
	1941	*1942*	*1943*	*1944*	*1945*
Aircraft ordnance	15	17	21	28	31
Antiaircraft	30	31	31	34	27
Ship and base ordnance	55	52	48	38	42

Ship and base ordnance in this tabulation includes non-airborne radio and electrical equipment and small arms. There was an increase in the ratio of small arms to total ordnance output from 5 percent in 1944 to 9 percent in 1945. This was due almost entirely to rocket production which was begun in 1944 but which doubled in 1945. If non-airborne radio and electrical equipment and small arms are excluded, the category "ship and base" ordnance declined from 33 percent of total naval ordnance in 1941 to 16 percent in 1944 and then rose to 20 percent in 1945.

The disparity between overall plans and performance may be noted in Chart 10. Output was 59 percent of plan in 1943 and 61 percent in 1944. The plan was realistic in view of requirements but unrealistic in view of the material supplies which could be allotted. The main reason for the decline in output of guns, ammunition, bombs, mines and torpedoes, which together accounted for two-thirds of naval ordnance output, was the decline in steel allocations after mid-1944. Arsenals and plants pro-

military laboratories (such as the electronics laboratory of Tokyo Shibaura Denki, the best equipped electronics laboratory in Japan, and the research laboratory of Sumitomo Tsushin Kogyo KK.) were seriously hampered by a lack of confidence and trust in these organizations by the military. To preserve secrecy, only meager information was supplied to researchers when assigned projects for development. This policy resulted in engineers attempting to develop communication equipment and devices without the knowledge of where or how such devices were to be used." *Summation of Non-Military Activities in Japan and Korea*, SCAP, GHQ, Tokyo, Vol. I, September-October 1945. p. 104.

ducing these items were not bombed until June-August 1945, by which time output had declined by more than 50 percent and idle plant capacity far exceeded that which was destroyed by bombing. Less important, but equally real, reasons for decline in output, were shortage of copper (for shell casings), inadequate local transportation and dispersal. It may be concluded that the decline in output until mid-May can be primarily attributed to material shortages, while thereafter the air attack with its resultant chaos was the primary factor. The decline in overall naval (including naval air) ordnance ouput, by months, from the September 1944 peak, was as follows:

Month	*Index*	*Month*	*Index*
Sept. (1944)	581	March (1945)	439
Oct.	578	April	389
Nov.	566	May	370
Dec.	522	June	308
Jan. (1945)	509	July	250
Feb.	464	Aug.	112

In radio and electrical equipment, which accounted, at the end, for 25 percent of naval ordnance output, and where steel was not as crucial an item as in other ordnance, and where initial stockpiles of copper had been high, the urban air attack was principally responsible for the decline which set in about March 1945. Though the industry was beset by shortages of such things as thin wire, lack of silicon steel, diamonds, quartz crystals, cobalt, tantalum and columbium, and though lack of gas used for melting glass was an important bottleneck in the production of tubes, the governing fact seems to have been that the principal producers were dependent on subcontractors in Tokyo, Osaka, Nagoya and Kobe for 60 percent of their parts and the urban air attack ruined this supply.

To what extent did Japanese ordnance production meet military requirements? This is a difficult question to answer for a variety of reasons. For one thing, Japanese military consumption figures are not available. Even if they were, the statistical picture in terms of production and consumption would hardly tell the whole story because of the very large transportation losses and because of the isolation of battle-areas. Stocks may have been available in Japan proper but inability to send them to Saipan, Guam, the Philippines, Iwo, Okinawa, etc., made the question of home production of little consequence in the actual campaigns. Losses of military supplies enroute were increasingly heavy. They rose from 160,000 tons (3 percent of material shipped) in 1942 to 1,390,000 tons (17 percent) in 1943, to 1,405,000 tons (33 percent) in 1944. In the latter year half of the supplies sent to the Philippines were lost. In 1945 the 340,000 tons sent to the bottom amounted to nearly 50 percent of

the supplies shipped.[76] Secondly, no large-scale, prolonged campaigns of attrition with large battle wastage had confronted the Japanese. For example, while the supply of small arms was adequate for the overseas garrisons, when, in the face of the threat of invasion, the military set out to arm the home forces, a marked shortage developed.[77] Thirdly, needs and shortages varied at different times and changed as the course of the war varied. After Midway, emphasis was placed on air strength. Requirements for aircraft machine guns increased by four times, ammunition by three times. Twenty-millimeter machine guns for mounting on Zero fighters received special attention and the large Toyokawa arsenal cutback its production of 25-mm (surface vessel) guns in favor of this class. But with the greater attack on shipping and the development of the escort vessel construction program, requirements for surface vessel machine guns increased sharply. Plans called for a tenfold increase in machine-gun output in 1943 and a further increase of 50 percent in 1944. But production fell short of plan and on important classes of ships such as tankers it was possible to fit only from 4 to 8 guns instead of the 20 units desired. The battleships *Nagato* and *Musashi* obtained 60 guns each, instead of the 130 planned. Captain Oi testified:

> At the end of January 1945, 25 mm. machine guns were drawn from every possible place on shore and even off merchant ships to increase the armament of tankers running from Singapore to the homeland. The plan to increase the armament of merchant ships had been in existence since the beginning of the war, but production was not sufficient to make it possible.[78]

In 1945, when attention was given to special-attack weapons to counter the anticipated invasion, the development of midget subs created shortages of certain types of electrical and navigational equipment such as batteries

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[76] *Estimate of Military Supplies Transported and Received or Lost*, Central Liaison Office (from War, Navy and Transportation Ministries), Tokyo, October 14, 1945, p. 7.

[77] See *Nippon Times*, Tokyo, October 9, 1945, p. 3. The paper summarizes an unidentified U.S. ordnance report which stated that the shortage was due to two reasons. First, in 1942 Japan attempted to switch the calibers of two basic infantry weapons, the rifle and the light machine gun, from 25 to 30. Japanese productive capacity was incapable, the paper declares the report states, of doing it successfully. The second reason was a shortage of materials which forced the Japanese to adopt a steel shell case for the new 30-caliber ammunition; the technical difficulties of drawing the steel for these small cases were never fully overcome. On the other hand, the report continues, the Japanese had more ammunition for their heavy grenade discharger (the so-called "Knee mortar") than they could have used over a long period. The paper reports the Allied report as concluding that many of the radiators removed from larger buildings for scrap during the war were found rusting in dumps when the war ended, indicating a lack of coordination between army, navy and the government.

[78] Interrogation No. 61, Tokyo, October 18, 1945.

and gyrocompasses. In other fields such as radio and communications equipment, though the testimony indicated that the services were underequipped, the main complaint was on quality. Captain Yoshida of the Military Affairs Bureau of the Navy Ministry declared that the Japanese radio and radar industry was 20 to 30 years behind American industry, and stated that Japan had no radio or radar at all by American standards.[79] Captain Inoguchi was asked, "Did you plan to use pathfinder planes equipped with radar during the Ketsu operation [Defense of Japan]?" and replied, "There were too few radar equipped planes to plan any considerable use of them in the Ketsu operation."[80] When Rear Admiral Koyanagi was interrogated concerning the battle of Leyte Gulf (October 24-26, 1944) he was asked, "Did you have a special radar set for fire control, a special radar used only for that purpose?" and answered, "There was no special set for radar fire control because the radar fire control was not yet well developed; there was no particular confidence in it. They got up to the stage where they could barely use radar for firing, no further than that."[81] Commander Yatsui declared, "An effort was made to use radar against submarines as widely as possible, but due to poor technical ability and poor equipment, it proved to be very ineffective."[82] Commander Mori, testifying on the battle of Surigao Strait, declared: "When we came to that place the smoke screen was very dense and the Japanese radar on our ships was not working effectively; we could detect no American ships on the radar. We knew, however, that American forces were there because of the smoke screen."[83]

Japanese ordnance output was, of course, small in terms of American production. Japanese mortar production, in 1944, was 4 percent of U.S. output. Japan's output of small arms ammunition was 6.5 percent of U.S.; output of aerial bombs was 0.6 percent of U.S., of artillery and naval guns over 105 mm. 22.5 percent, between 75 and 105 mm. 8.5 percent, between 20 and 57 mm. 2.2 percent. Tank production was 4.7 percent of U.S., anti-aircraft ammunition output 8 percent of U.S., etc. While the Japanese were able to meet the ordnance requirements of their expanded aircraft, it was accomplished only by cutting army ground forces, naval surface forces and merchant shipping protection. While statistical evidence cannot be advanced here, the weight of all available testimony indicates that in ordnance as in everything else, the Japanese could not meet overall requirements. Though they made a strenuous effort they were limited by material supply and technological skill.

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[79] Interrogation No. 721, Tokyo, January 24, 1946.

[80] Interrogation No. 62, Tokyo, October 15, 1945.

[81] Interrogation No. 149, Tokyo, October 24, 1945.

[82] Interrogation No. 159, Tokyo, October 26, 1945.

[83] Interrogation No. 233, Tokyo, November 3, 1945.

Motor Vehicles

The motor vehicle industry was another which was built from the ground up in the thirties. Imports of foreign cars and trucks were prohibited after 1938 and thereafter Japan was on her own, as the following table indicates:

Japanese Production and Imports of Motor Vehicles, 1936-41

	1936	*1937*	*1938*	*1939*	*1940*	*1941*
Domestic	8,841	25,642	30,880	41,308	42,547	47,901
Imports	32,175	32,939	18,593	0	0	0
Grand Total ..	41,016	58,581	49,473	41,308	42,547	47,901

Source: Jidosha Tosei Kai (Automobile Control Association), Tokyo, 1945.

Ironically, production, which had increased steadily throughout the thirties, particularly after the passage of the industry-stimulating Motor Car Manufacturing Enterprise Act of 1936, reached a peak in 1941 and declined thereafter.

The decline was due to two basic interlocking reasons. The drop in vehicle output was, as we shall see, paralleled by a decrease in steel allocations to the industry. This in turn was due to the fact that, confronted with many conflicting demands for an inadequate and limited output of steel, the authorities had to choose the most important and slight the others. The motor vehicle industry's priority for raw materials was not high. Motor vehicles, principally trucks, since output of busses was stopped in 1941 and of passenger cars at the beginning of 1944, were given the following ratings in the Army priority system:

1941	1942	1943	1944	1945
B1	B2	C	C	B5

The Army Ordnance Bureau explained this as follows:

> At the beginning of this war, vehicles were considered as the highest priority for the urgent completion of motorization in continental war. But they were not so important after the island operations in the Pacific began, hence the materials were awarded instead to airplane and ship production. The degree of priority was again raised as the decisive battle in the homeland was expected soon.[84]

The Army, of course, was preoccupied with motor vehicles for service in military operations and failed to appreciate the need for them in industrial activity. This was a large limitation in 1945 and efforts then to increase output by stepping up the priority were unavailing. At no time during the war did the planned truck production reflect the growing need for local transportation and at no time did the industry's output meet the plans. This may be seen from the following comparison of planned and

[84] *Changes in Army Priorities During the Greater East Asia War*, Army Ordnance Bureau, War Ministry, Tokyo, October 18, 1945, p. 7.

actual production of 2- and 4-ton trucks. All of the trucks were produced by the three principal vehicle manufacturers in Japan, the Nissan Automobile Company, the Toyota Automobile Company, and the Diesel Automobile Company.[85] All were closely identified with the Army.

Fiscal Year	*2-Ton Trucks*			*4-Ton Trucks*		
	Planned	*Actual*	*Percent of Plan Obtained*	*Planned*	*Actual*	*Percent of Plan Obtained*
1940	36,800	30,687	83	3,960	2,531	64
1941	44,800	39,297	88	3,960	2,828	71
1942	43,000	33,129	77	3,240	2,257	70
1943	34,850	21,987	63	3,000	2,013	67
1944	32,750	19,546	60	2,100	900	43
1945 .... (Apr.-July)	15,300	1,695	11	800	63	8

Source: Automobile Control Association (Jidosha Tosei Kai).

Nissan's main plant was located along the Yokohama waterfront. Total floor area of its buildings occupied 1.4 million square feet (32 acres), or about two-fifths the size of the Ford Willow Run Plant. Its four branch plants had an additional floor area of 552,062 square feet. In addition, on Army instructions, it established small assembly and repair plants in Singapore, Central China and Korea. Its Tsurumi plant produced alloy steels, which it required. Output of vehicles was as follows:

Calendar Year	*Trucks*	*Passenger Cars*	*Busses*
1937	7,181	4,546	27
1938	12,036	4,150	307
1939	14,951	1,369	1480
1940	13,702	1,163	1092
1941	17,953	1,586	138
1942	16,457	904	0
1943	10,096	456	0
1944	7,074	0	0
1945 (Jan.-Aug.)	1,795	0	0

Source: Automobile Control Association.

The Toyota Company had its main plant three miles south of Koromo, a small city seventeen miles from Nagoya. The floor area of the plant was 1.8 million square feet (41 acres). It also had a separate plant for the manufacture of bodies and the Toyota Steel Works produced the special steels required. The company's output was as follows:

Fiscal Year	*Trucks*	*Passenger Cars*	*Busses*
1937	3,740	647	451
1938	3,973	458	241
1939	12,693	84	1,241
1940	13,068	384	659
1941	15,502	121	53
1942	15,558	43	0
1943	9,796	66	0
1944	10,689	0	0
1945 (April-Aug.)	1,035	0	0

Source: Automobile Control Association.

[85] See "Automobile Industry of Japan," *Oriental Economist*, June 1942, pp. 278-79, and *Jidosha Nenkan* for 1943, Tokyo, p. 121.

The Diesel Company had two main plants, one at Kawasaki and one at Tsurumi, and five minor plants in Kawasaki and northern Yokohama. A third plant, at Hino, erected by Diesel for the manufacture of military tracked vehicles, was separated from the company in 1942 and taken over by an Army arsenal. In 1943 repair plants were set up, at the Army's instruction, in Singapore and Batavia. The company's output was as follows:

Fiscal Year	*Trucks*	*Caterpillar Cars*
1938	1,655	243
1939	4,196	495
1940	7,148	640
1941	7,769	479
1942	5,638	415
1943	5,282	0
1944	3,845	0
1945 (Apr.-Aug.)	344	0

Source: Automobile Control Association.

Even though the military made a sharp distinction between production of combat vehicles and production of motor vehicles, and exercised direct control of the former, most of the wartime output of the latter went to the military. This may be seen from the following table which shows the percentage distribution of Japanese truck production.[86] "Civilian" use included industrial, hauling from railroad terminal to factory, etc.

Fiscal Year	*Army*	*Navy*	*Munitions Ministry*	*"Civilian"*
1942	47	18	..	35
1943	51	23	..	26
1944	49	28	6	17
1945	44	19	7	30

Source: Automobile Control Association.

A U.S. Army report, released by the Office of Technical Services of the U.S. Dept. of Commerce, surveyed Japanese automobile production methods and found, in the words of the author:

Of truck and car development there is nothing to be said. No genuine effort appeared to have been made to improve the vehicles in any important respect . . . production volumes with respect to tank and automotive material were measured by hundreds where production of similar material in the U.S. was measured by the thousands and tens of thousands. This no doubt accounts for the lack of new developments in Japanese production methods, but there were many other reasons. The Japanese used many American machine tools, copied U.S. production methods, were unable to afford the time and manpower for either development or production of new tools, and could not afford the delays incident to changeover of production methods.[87]

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[86] See *Our Activities During the Late War*, Automobile Control Association, Tokyo, December 3, 1945, p. 8.

[87] *Japanese Automotive Research, Development, and Production of Combat and General Purpose Vehicles*, U.S. Army, Ordnance Technical Intelligence Report No. 21, Tokyo, March 23, 1946, p. 28.

Since the industry was never a primary bombing target and the only occasion on which bombs were actually aimed at a motor vehicle producer was the August 14, 1945, attack on the Koromo plant of the Toyota Company with one experimental bomb, the decline, until the time the industry began to disperse, can be attributed to the steel supply. The decline in steel supply resulted in a parallel decline in vehicle output until April 1945. For example, by the second quarter of 1944, steel supply had fallen to 41 percent of the 1941 peak while vehicle output had dropped to 39 percent. In the January-March quarter of 1945 steel deliveries were off 32 percent from the previous quarter while vehicle output was down 39 percent. By the end of March vehicle output was only 18 percent of the 1941 level. In the following quarter output fell faster than steel supply due to the attempt to disperse. Production came to a standstill at Nissan in May as the plant was torn apart for dispersal. No trucks were produced after May. Machine tools were shipped to a small town 180 miles north of Tokyo. No buildings were ever erected at the dispersal location, due to a delay in arrival of building materials. The machines, unprotected against weather, were stored in the open and many of them were ruined. Toyota shut down in May except for assembly of parts on hand. It was planned to set up plants in the new area with just roofs over the machines. About 50 percent of the machine shops were moved but production at the new site never started. Some of the machine tools were ruined when the temporary roofs leaked. At the end of March Diesel began an underground plant at Nagano designed upon completion to house the manufacture and assembly of 250 truck chassis a month. Four hundred machine tools were moved but production never started since there was no power connection.[88]

The crisis in requirements for and use of motor vehicles in Japan came in 1945. Dispersal of all industry raised requirements sharply at a time when output was down to virtually nothing and existing vehicles were in a sad state from overuse and undermaintenance. Those plants that somehow succeeded in dispersing successfully were usually located away from rail lines and required trucks to haul materials in and finished products out. The trucks were just not available. The Japanese road system was an undeveloped, rudimentary one. Of the reported 932,000 kilometers of roads of all kinds, only 9,000 km. were major or national highways, the remainder were for the most part unpaved and unimproved village or town roads. During the war the national roads were not maintained, due to lack of manpower and materials.[89] The wear and tear of such a road

[88] For further details of the air attack, bomb damage and dispersal, see USSBS, *The Japanese Motor Vehicle Industry*, Washington, 1946, pp. 8-10.

[89] *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Vol. 1, Tokyo, September-October 1945, p. 74.

system on vehicles lacking repair and parts, running on worn-down tires which could not be replaced, and operating on all kinds of substitute fuels which shortened the life of motors, can be imagined.[90]

The Japanese Army had 62,500 trucks at the beginning of the Pacific War. During the war they lost 71,000 trucks overseas. At the end of the war they had 51,000 trucks in Japan proper (20,600 were requisitioned "civilian" trucks) of which 26,000 were operable. On January 1, 1941, there were 64,000 trucks and 27,000 busses in the Japanese "civilian" economy. As a result of requisitions, losses, lack of maintenance, etc., by the end of 1944, operable trucks in "civilian" hands totaled 22,800 and operable busses totaled 8,100. By war's end only 17,000 "civilian" trucks and 4,700 busses were operable. Thus at the end of hostilities there were only 43,000 trucks, "civilian" and military, in operating condition in Japan proper.[91]

In 1945 the bottleneck of local transportation became critical. Trucks had seldom been used for long hauls in Japan but there was a tremendous demand for them to haul materials and components from rail terminals and docks to factories, and vice versa. As we have seen, dispersal added enormously to this demand. Aside from the use in dispersal itself, where factories moved away from their component suppliers and where parts of factories were scattered, the truck transportation load increased sharply, particularly when the dispersal point was far from a railroad. Frequently dispersal had to be undertaken with ox or horse cart. Terminal operations came to depend on horse and hand carts rather than upon trucks. In Nagoya, in November 1944, one-third of the equipment of the Japan Express Company was taken by the Army. In 1945, of the 4,722 vehicles used in all terminal operations, 421 were trucks, 1,718 were horse and ox carts, and 2,583 were hand carts. In Osaka, of the 5,007 vehicles used in 1945 in terminal operations, 2,175 were trucks but only 410 were in operating condition.[92] The Japanese Army Ordnance Bureau listed lack of local transportation, after lack of steel, as one of the primary causes for the decline in army ordnance output. While the importance can be overstressed, there is no doubt that immobilization and lack of local transportation contributed both to the decline and to the chaos in the last year of the war.

Ships

Japan's dependence upon shipping during the years 1941-45 was probably greater than Britain's, for in addition to dependence upon shipping

[90] See *Summation*, Vol. 5, Tokyo, February 1946, pp. 161-62.

[91] Many which the author saw, in the months immediately after the surrender, limping along, might just as well have been taken out of the "operable" class.

[92] *Difficulties of Wartime Operation and Present Deplorable Status*, Report of Nihon Tsuun KK. (Japan Express Co.) to SCAP, Tokyo, October 26, 1945, p. 8.

for vital imports of all kinds, Japan used water transportation for inter-island movements of essential commodities such as coal. By a series of subsidy measures and a "scrap and build" program in the thirties she had endeavored to lessen that dependence by replacing antiquated and slow merchant ships with new and fast ones prior to Pearl Harbor.[93] In 1940 Japan had over 700 ocean-going freighters, 132 combination passenger-cargo vessels and 49 large ocean-going tankers. Nearly 300 Japanese cargo ships were rated at 12 knots and over, which compares with a speed of 10 knots for the average American prewar freighter of the Hog Island type. Some 236 dry cargo ships of about 1½ million gross tons were built subsequent to 1930 and thus were comparatively new and modern. Out of the total of 132 combination passenger-cargo vessels, 49, or 37 percent, were capable of speeds of approximately 15 knots and better. Thirty-seven of these, or 28 percent, were built between 1932 and 1940, which placed them in the "new" class. They were mostly motor vessels of the most modern type and included some of the fastest ships afloat. Over 65 percent of the tanker fleet of Japan was built after 1930, and 20 out of the total of 49 ships were capable of speeds of 16 knots and upwards. Japan also had moved to carry a greater percentage of her imports in her own vessels as their tonnage rose from 4 to 6 million gross tons over the 1930-40 decade. Whereas 54 percent of her import tonnage had been carried in her own vessels in 1937, this rose to 65 percent in 1941.[94]

Confident that she had a well-rounded and adequate merchant fleet, Japan turned, in the China War period, to the modernizing and strengthening of her naval forces. Since even in this period the overall steel supply was limited, expansion of naval ship output had to come at the expense of a contraction of merchant ship output. The trend may be seen from the following table:

Year	*New Merchant Tonnage**	*New Naval Tonnage*	*Total*
1937	442,382	55,360	497,742
1938	410,644	63,589	474,233
1939	343,526	58,248	401,774
1940	279,816	94,705	374,521
1941	237,617	225,159	462,776

* Tonnage of steel ships over 100 gross tons.

In addition to requirements for new naval tonnage, naval modernizing and repair began in 1936 and continued through 1939, slowing up in 1940 until by the end of 1941 there was only one primary fleet unit in need of repair. This may be seen in the table below:

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[93] For details, see *The Shipping Industry of Japan*, Nippon Keizai Remmei Kai, Intelligence Series No. 6, Tokyo, October 1940, p. 16 *et seq.* Also *Kokusei Gurafu*, Tokyo, December 1940.

[94] Interrogation of Ariyoshi, T., of the Shipping Control Association, Tokyo, November 14, 1945, p. 3.

FLEET READINESS

(Includes annual additions)

Category	1936				1937				1938			
	Serviceable	*Need Repair*	*Modernizing*	*Total*	*Serviceable*	*Need Repair*	*Modernizing*	*Total*	*Serviceable*	*Need Repair*	*Modernizing*	*Total*
Battleships	5	3	2	10	6	3	1	10	5	4	1	10
Carriers	5	1	0	6	4	0	2	6	5	0	2	7
Cruisers	18	6	7	31	17	4	10	31	20	5	8	33
Destroyers	62	10	0	72	68	8	0	76	76	7	5	88
Submarines	22	22	0	44	38	9	0	47	42	6	0	48
Minelayers	4	0	0	4	5	0	0	5	5	0	0	5
Minesweepers	11	0	0	11	12	0	0	12	12	0	0	12
Subchasers	2	0	0	2	3	0	0	3	3	0	0	3
Coast defense	0	0	0	0	0	0	0	0	0	0	0	0
Gunboats	0	0	0	0	9	0	0	9	9	0	0	9
Torpedo boats	4	0	0	4	8	0	0	8	12	0	0	12

Category	1939				1940				1941			
	Serviceable	*Need Repair*	*Modernizing*	*Total*	*Serviceable*	*Need Repair*	*Modernizing*	*Total*	*Serviceable*	*Need Repair*	*Modernizing*	*Total*
Battleships	7	2	1	10	8	0	2	10	10	0	0	10
Carriers	4	2	2	8	8	0	1	9	10	0	0	10
Cruisers	15	4	15	34	25	0	10	35	37	0	0	37
Destroyers	75	15	0	90	84	12	0	96	109	1	0	110
Submarines	42	9	0	51	40	12	0	52	63	0	0	63
Minelayers	5	0	0	5	6	0	0	6	8	0	0	8
Minesweepers	16	0	0	16	12	0	0	12	18	0	0	18
Subchasers	8	0	0	8	12	0	0	12	15	0	0	15
Coast defense	0	0	0	0	0	0	0	0	0	0	0	0
Gunboats	9	0	0	9	10	0	0	10	11	0	0	11
Torpedo boats	12	0	0	12	12	0	0	12	15	0	0	15

Source: Navy Technical Bureau (Konsei Hombu) Navy Ministry.

Thus in the early part of the period, modernizing and repair of naval vessels, and in the latter part, sharply increased naval tonnage combined to limit merchant ship production. The large increase in 1941 deliveries over those in 1940 was the result of production started two or more years before, when the keels were laid for the ships turned out in 1941. The Japanese commissioned two 60,000-ton battleships, the *Yamato* and the *Musashi*, in 1941 and 1942 respectively. The keels for these two were laid in 1937 and 1938, marking the commencement of the large-scale Japanese naval shipbuilding program. One other battleship keel was laid after 1939, but the vessel was converted to an aircraft carrier before its completion.

One other factor was responsible for increased naval ship production crowding merchant shipbuilding. Not all the naval shipbuilding was done in the four principal navy yards, Yokosuka, Kure, Sasebo and Maizuru.

(A fifth navy shipyard, Ominato, was used for repairs only.) In fact, only 41 percent of the total naval tonnage delivered during the war was produced in naval shipyards. The remaining 59 percent came from commercial shipyards, and only one commercial yard, the minor Kawasaki Senshu, engaged wholly in naval work. Most other major commercial yards built both naval and merchant ships. Thus, without expansion of shipbuilding facilities, expansion of naval output could come only at the expense of merchant shipping output, or vice versa. The percentage of naval ship deliveries to total deliveries by commercial yards, on the basis of value, was as follows:

Year	*Percentage Naval Ship Deliveries*
1939	20
1940	27
1941	41
1942	44
1943	30
1944	34

The value of naval ship deliveries by commercial yards increased each year from 1939 on. The percentage decline after 1942 was due to the fact that merchant ship deliveries increased at a faster rate than naval ship deliveries. While some twenty-seven yards were involved in naval construction, one Navy Yard, Kure, and one commercial yard, Mitsubishi Nagasaki, delivered together over 30 percent of the entire naval tonnage during the war. More than half of the increase in floor space of commercial shipyards between 1935-41 was concentrated (60 percent) in the eleven commercial yards which did over 90 percent of the commercial yard naval ship construction. On the whole, expansion of the shipbuilding facilities during the last half of the pre-Pearl Harbor decade was moderate. The average annual increase for commercial yards was 8.2 percent and 8.1 percent for floor space and length of ways respectively.[95]

This placid rate of expansion of facilities and the actual decline in the volume of merchant ship construction through 1941 reflected the utter lack of realization on the part of the Japanese of the precariousness of their shipping position. The first plan of the Communications Ministry (later the Transportation Ministry), which remained in charge of merchant shipbuilding until the Navy took over in July 1942, provided for a slight increase in merchant ship output in 1942 but then a lower and lower output for each succeeding year. The plan dated December 15, 1941,[96] scheduled the following output of merchant tonnage:

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[95] *Waga Kuni No Zosen Setsubi* (Japan's Shipbuilding Facilities). Zosen Tosei Kai (Shipbuilding Control Association), Tokyo, January 1944, p. 4.

[96] *Plan for Construction of New Merchant Shipping Tonnage,* Communications Ministry, Tokyo, December 15, 1941.

Year	*Scheduled Tonnage*
1942	398,295
1943	317,520
1944	247,110
1945	72,370

Apparently the officials of the Communications Ministry really believed the U.S. had an aversion to the use of submarines.[97] The Cabinet Planning Board's more realistic estimate of anticipated damage and replacements, drawn up in December 1941,[98] was as follows (in tons):

	1st Year of War	*2nd Year of War*	*3rd Year of War*
Anticipated Damage	800,000-1,100,000	700,000-800,000	700,000-800,000
Replacement	300,000	500,000	600,000

The Japanese could little guess, of course, that they would lose over four times the tonnage anticipated in the third year of the war and be able to build over twice what they thought possible.[99]

Three additional plans were drawn up by the Communications Ministry during its period of control over merchant shipbuilding. These schedules, including the one of December 15, 1941 (for purposes of comparison), were as follows (in tons):

Date of Plan	*1942*	*1943*	*1944*	*1945*
Dec. 15, 1941	398,295	317,520	247,110	72,370
Feb. 5, 1942	388,060	638,970	766,840	592,130
Mar. 3, 1942	500,316	695,170	770,580	.....
Mar. 25, 1942	389,460	689,310	675,580	651,200

While three of the four estimates for 1942 were close to actual tonnage constructed during that year (361,239), those for subsequent years fell far short of what the Japanese were actually able to realize. They were unable to anticipate the magnitude of the coming need, and so sharp was the criticism by shipbuilders of the March 3 plan, largely because they could not see how they could meet the goal for 1942, that the Ministry was forced to backwater and its plan issued toward the end of March represented a retreat from optimism. This was the last plan to be drawn up by the Communications Ministry.

The Ministry had neither the staff, the imagination, experience nor prestige to promote a large-scale expansion in merchant shipbuilding. No civilian authority existed in the Japanese government which could stand up to the military in the scramble for raw materials and production capacity. Since the military was intent upon expanding its own resources, allo-

[97] See Chapter 2, p. 50.

[98] *Estimate of Japanese National Strength at the Outbreak of the Greater East Asia War*, Cabinet Planning Board, Tokyo, p. 7.

[99] Though the *Economist* in March 1942 carried an article entitled "Increase of Bottoms Considered Urgent," p. 147.

cations to merchant shipbuilding had to be made from what remained after the armed forces were satiated. As a result, the Communications Ministry had been unable to schedule any real expansion of shipbuilding capacity and as its December 15, 1941, plan indicated, its outlook, conditioned by repeated demands for naval expansion, was hardly conducive to the increased production which the war need required. Accordingly, the Cabinet decided to give the control over merchant shipbuilding to the Navy. The Navy Technical Bureau had the staff and the prestige to initiate expansion, changes in schedules and ship designs. It was a good strategic move because vesting responsibility in the Navy made that Ministry consider and balance the relationship between merchant and naval shipping requirements and capacity. Thereafter greater attention was paid to merchant shipbuilding. All told, eight plans were drawn up by the Navy at varying dates, as follows (in tons):

Date of Plan	*1943*	*1944*	*1945*
Nov. 20, 1942	591,410	827,760	708,200
March 1943	818,880	1,558,780	464,700 [a]
December 1943	958,770	1,898.110	839,020 [b]
April 1944		2,631.250	1,607,760 [b]
August 1944		1,966.480	1,105,040 [b]
Nov. 1944			2,065.250
Feb. 1945			1,356,630
April 1945—Primary			566,600
" " —Secondary			665,930

[a] First quarter 1945, only.

[b] First half 1945, only.

Source: Navy Technical Bureau.

The first Navy plan [100] raised the sights somewhat higher than the last Communication Ministry Plan but still reflected a limited concept of need. Guadalcanal had not yet been wholly written off. The March 1943 plan represented a real lifting of goals and from that time through 1944 the plans were overoptimistic in relation to what was actually accomplished. April 1944, which was close to the actual peak production month, represented the high-water mark of aims. The tide of hope receded somewhat in August, still further in November, and then fell sharply by February, by which time the figure was wholly unrealistic. The April 1945 plan represented an attempt to adjust to reality. The plan covered only the first nine months of fiscal 1945. All previous plans had covered at least a year in advance, some had covered four. Also unlike the others, this plan set up two different goals. A "primary" goal of 566,600 tons was scheduled for approximate completion in six months. The attainment of this near-range goal was considered as a "must." A "secondary" goal of

[100] These plans, as did those of the Ministry of Communications, covered steel ships, including tankers of 100 gross tons and over. They did not cover wooden ships. Production plans for wooden ships will be considered later.

665,930 tons represented the continuation of the schedule through the first nine months. Obviously, production at a rapidly decelerating rate was anticipated and it was added that the secondary goal was to be attained "if materials are available."[101]

Obviously capacity had to be increased if the expanded goals of the 1943 and later plans were to be realized. Real expansion did not come until 1943, when the industry increased by one-third based upon measurement of floor space. On an index basis (1941 = 100), the trend of floor-space expansion, total length of ways and total employment during the Pacific War years, was as follows:[102]

Fiscal Year	*Floor Space*	*Length of Ways*	*Employment*
1941	100	100	100
1942	111	104	129
1943	148	120	188
1944	170	126	226
1945	178	126	185

Another indication of growth, though less precise, is the increase in number of yards, ways and docks. Changes in number over the war years were as follows:[103]

Number of	*1941*	*1942*	*1943*	*1944*	*1945*
Yards	47	48	56	56	50
Ways	126	130	133	133	126
Docks	70	71	73	78	75

The extent to which the wartime expansion was accomplished by the construction of new yards as against the expansion of old (those in existence before 1940) is best indicated by the distribution between them of the increase in floor space and average employment. Of the new floor space built between March 31, 1942, and August 15, 1945, 39 percent was built in new yards and 61 percent in the older yards. The difference between the average monthly employment in the fiscal year 1941 and that of the wartime portion of fiscal 1945 was divided 28 percent in the new yards and 72 percent in the old ones. This was unfortunate for Japanese shipbuilding, for although the older yards had the benefit of experience, it was experience in antiquated methods and clumsy, hand-tailored ways of building ships.

These older yards were almost invariably congested and not well-organized for a smooth flow of production. Their growth had been piece-

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[101] *Plan for Merchant Ship Construction in the Ensuing Months*, Navy Technical Bureau, Tokyo, April 15, 1945, p. 5.

[102] Based on data from the Shipbuilding Control Association.

[103] *Jiji Nenkan*, 1947, p. 453; a discussion will also be found in *Summation of Non-Military Activities in Japan*, Vol. 1, Tokyo, September-October 1945, p. 59.

meal and as a result did not conform to any systematic layout plan. The old yards were almost invariably seriously overcrowded. Good sites for shipyards, expanses of low flat land alongside deep water, are comparatively limited in Japan because of the rugged terrain and coasts. The few places in Japan where considerable flat area is adjacent to protected deep water are usually the sites of cities. Most of the older shipyards were located on city waterfronts and therefore expansion was both difficult and expensive. As a result, with the wartime expansion, congestion in yards invariably resulted. This, together with lack of specialization, made a systematic, smooth, controlled flow of work practically impossible. Hence, there was an inevitable preoccupation with this or that particular ship from time to time, resulting in erratic variations, in many of the yards, in the building time required for different ships of the same or similar type. The older yards built ships up from the keel on conventional end-launching building ways. Material was designed and fabricated in the usual plate, boiler, machine, forge, carpenter, pattern, etc., shops. Most of the larger yards also built their own ships' engines and were equipped with shops for the purpose.[104]

The newer yards could, of course, avoid congestion and they specialized for the most part. They had planned layouts and they used more modern shipbuilding procedures. Instead of the conventional piecemeal construction on single-position building ways, four of the new yards built their ships in multiposition stages on either rails or in drydocks and employed block preassembly at least to some degree. A rebuilt yard, Koyagijima, was the only one building ships over 1,000 tons which made any fundamental departure from the traditional shipbuilding procedures. The principal feature of its rebuilding beginning in 1940 was the construction of a large graving dock capable of handling two A-type ships abreast in three different stages of construction, each stage being in separate compartments. In the use of block preassembly, welding and other modern techniques, the Koyagijima Yard did not differ materially from other new yards. Welding was not highly developed in Japanese shipbuilding. Only the simplest types were attempted and large sections were always riveted. Thus, since new yards were few in number and most of the wartime expansion occurred in the old yards, it is apparent that the efficiency of Japanese shipbuilding was considerably less than might have been expected.

In an effort to speed and facilitate wartime shipbuilding, standard models were adopted. Even before the outbreak of the war various commercial yards had developed their own designs and produced several sister ships according to a standard set of specifications. In the spring of 1942, the Communications Ministry promulgated the first official schedule.

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104 Interrogation of Nakayama, Ichiro, of Shipbuilding Control Association, Tokyo, November 28, 1945.

It provided for 6 dry cargo types, designated A to F and varying from 6,400 to 530 tons, respectively. There was also one 5,300-ton ore carrier called type K, 3 tanker types designated TL, TM and TS, ranging from 10,000 to 1,020 tons, a 9,600-ton transport called type M, and a railroad car ferry of 2,800 tons designated type W. When control over steel merchant shipbuilding was transferred to the Navy, it discontinued types B, C, F and K and substituted type TE (833 tons) for type TS (1,020 tons). In addition, extensive changes in specifications of the six remaining types called for more angular styling of the hull to facilitate production as well as weaker construction; for example, wider spacing for members and elimination of double bottoms, and lighter engines to conserve materials and facilitate production. Significant sacrifices of speed and durability were made in the interest of increased production. For example, the speed of the large tanker TL (10,000 tons) was lowered from 18.5 to 15 knots per hour. The 6,400-ton cargo vessel, type A, was reduced from 15 to 13 knots per hour. The horsepower of the engine of type TL was reduced from 9,500 (metric) hp. to 4,500 hp., while that of the type A was cut from 3,500 to 2,000 hp. Such changes were made all along the line and constituted a major error of planning, for although they undoubtedly facilitated increased production they also increased the vulnerability of Japanese shipping to our attack. By the end of 1944 the Navy recognized its mistake and established a new set of specifications which not only returned to, but even went beyond, the original Communications Ministry specifications in increasing horsepower, increasing speed and improving the lines of the hull. For example, type TL had its horsepower raised from 4,500 to 9,000 and its speed from 15 knots to 19 knots per hour. Type A was increased from 2,000 hp. to 4,500 hp., which it will be recalled was 1,000 hp. above the original 3,500 hp. specification. Its speed was increased from 13 to 15.5 knots. Similar changes were made in other models to improve ships' chances of eluding submarines, even though such changes might cause the rate of construction to fall.

An analysis of the various plans discussed previously for the details of ship types reveals some interesting facts about the Japanese shipping position. The 1943 plans called for the sharpest increase in output of type A, the 6,400-ton cargo carrier; for a large expansion in type E, the smallest cargo carrier (originally 830 gross tons, changed to 871 grt. when the Navy took over, and then to 880 tons in the 1944 revision); some increase in type D (originally a 1,900-ton cargo carrier, raised to 2,300 tons by the Navy and to 3,000 tons in its 1944 revision). In tankers, the initiation of a new type TE (the smallest tanker, 833 grt.; type TS—1,020 tons—was discontinued) and a large increase in output of TL's (10,000 tons) were scheduled. The changes in the plans from March 1943 through

April 1944 indicate that during the period in which production was expanding, the hoped-for continued increases were pinned mainly on types A, TL and E. Four of the new yards specialized in E's only, while two other new yards, Mitsubishi-Hiroshima and Hitachi-Kanagawa, specialized in A's only.

The great need in 1944 was for tankers. Japan never had a sufficient tonnage of large tankers in the first place and since U.S. submarines were concentrating on tankers the rate of tanker sinkings mounted sharply. In December 1944 the Japanese Navy had less than one-third the tanker tonnage they had in December 1943. Tankers were less than 10 percent of total Japanese shipping tonnage as of December 7, 1941. During 1942 they constituted only 7 percent of total tonnage constructed; in 1943 the percentage rose to 33 and in 1944 to 36 percent.[105] Tanker output in 1944, however, was obtained only by sharp cutbacks in planned cargo ship construction and by converting hulls begun as cargo vessels to tankers. For example, the August 1944 plan, which was, in effect, an admission of the failure of the previous plans for greatly increased goals, cut back A-type tonnage by 52 percent, but in spite of this it provided that 26 percent of the A-type ships still scheduled were to be finished as tankers. Similarly, in spite of an 18 percent reduction in all type-E ships, 21 percent were to be finished as tanker-type TE. To indicate this in another way, changes in the scheduled output of the type-TL tanker and type-A cargo ship in three different plans, December 1943, April 1944 and August 1944, are compared in the following table:

Type	*April 1944 as % of December 1943*	*August 1944 as % of April 1944*	*August 1944 as % of December 1943*
A (cargo)	128	48	62
TL (tanker)	198	90	178

It is apparent that the April 1944 plan provided for a 28 percent increased cargo output but a 98 percent increase in tanker production. The August plan cut back cargo ship output by 52 percent but tanker schedules by only 10 percent. This scheduled cargo output in August was 62 percent of the December 1943 figure while tanker schedules were 178 percent of the December 1943 plan. The percentage by which three-fourths of the annual production scheduled in the August plan was met at the end of the third quarter of fiscal 1944 (December 31, 1944—this marked the real end of tanker output since the decision was made in January 1945 to cancel the entire tanker construction program), for cargo types A and E and tanker types TA, TL and TE, was as follows:

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[105] "Japan's Ship Tonnage Is Revealed in Detail," *Nippon Times*, Tokyo, September 9, 1945, p. 5.

Cargo Types	*Percent*	*Tanker Types*	*Percent*
A	93	TA	58
E	92	TL	67
		TE	99

The reasons for the failure to meet TA and TL schedules were quite different. The TA was a new problem for Japanese ship engineers—the adaptation of the 6,400-ton cargo hull to a finished tanker—and they were slow in finding the answers and bungled the job.[106] The reason for failure to meet the TL schedule was twofold; the plan set an unattainable goal in view of material limitations and the yards to which the TL output was assigned had to meet conflicting demands. The large tankers were assigned to the four most heavily-equipped commercial yards in Japan—Nagasaki and Yokohama yards of Mitsubishi, Kobe-Kawasaki and Aioi-Harima. These yards were overloaded and were engaged in construction of naval ships and other merchant types at the same time. In contrast, production of A's, E's and TE's was carried out in much more specialized yards. The three major yards, which built 72 percent of the A-type ships during the war, Koyagijima-Kawaminami, Tamano-Mitsui and Kobe-Mitsubishi, specialized in them. Four new yards produced all the E ships; one of them, Matsunoura-Harima, built all of the TE ships. It turned out 116 ships in 1944 while the other yards produced 111, 82 and 71 ships, respectively. Apparently the TE's had been assigned to the best E-yard. So effective was the interdiction of shipping from the southern areas that by January 1945 the decision was taken to halt the tanker construction program and only those tankers which were substantially finished were completed. By May 1945 tanker tonnage afloat was one-quarter of that attained at the peak in November 1943, and less than half the tonnage still afloat was in serviceable condition.

The composition of naval ship input during the war changed materially.[107] In 1941 over 50 percent of the input was going to battleships and carriers. By 1945 less than 1 percent was going into such channels while over 50 percent was used for submarines and coast defense vessels (Kaibokan). In 1941, an additional 20 percent was going into cruisers, destroyers and sub-chasers, while in 1945, 25 percent was going to special-attack and landing craft. Work on battleships ceased after delivery of the *Musashi* in 1942. In 1942 cruisers took up 8 percent of construction activity in naval shipbuilding (in tonnage terms), in 1943, 3 percent, and in 1944 less than 1 percent. While deliveries of completed aircraft carriers were maintained through the middle of 1944, construction activity

[106] Interrogation of Sukima, Yoshio, of Shipbuilding Control Association, Tokyo, November 12, 1945, p. 4.

[107] An index of naval ship input was computed by the bombing survey. See *Japanese Naval Shipbuilding*, Washington, November 15, 1946, pp. 7-8.

or input of work was highest in 1943 and dropped sharply in 1944. No carriers were delivered in 1945 and practically no construction work was done on them in that year. Delivery of destroyers was heaviest in 1944 when 31 were completed. Six destroyers were completed in 1945. Input of work on submarines was highest in 1943 but was maintained even through early 1945 at a fair rate. Deliveries were highest in 1943 when 40 were completed; 37 were delivered in 1944 and 22 in the first four months of fiscal 1945. Thereafter all submarine work ceased. The Japanese went to great lengths to maintain submarine output, though they used them poorly during the war and toward the end did not have enough fuel to operate all they had. To obtain lead which was used in large quantities in submarine construction the Japanese removed and scrapped the lead linings of the staple fiber baths in the textile industry.[108]

An interesting commentary on Japanese submarines was made by Vice-Admiral Paul Weneker, former German Naval Attaché at Tokyo, who left Japan in 1937 to command the pocket battleship, *Deutschland,* and who then returned to Japan in 1940 and remained until the surrender. He declared:

It was the expressed desire of the German Naval Ministry that every possible effort be made to induce the Japanese to exert their maximum effort in attack against U.S. merchant shipping in the Pacific. Notes were repeatedly exchanged between my office and Berlin on this subject and directives from home instructed me to press the matter further. The Japanese had one invariable answer, namely that they must conserve their submarines for attack against the U.S. Fleet. They argued that merchant shipping could be easily replaced with the great American production capacity, but that naval vessels represented the real power against which they fought and that these vessels and their trained crews were most difficult to replace and hence were the one logical target. If, therefore, they were to hazard their subs it must be against the U.S. Navy.

The Japanese Navy always thought of the U.S. carriers. They talked about how many were building and how many were in the Pacific and that these must be sunk; but it was always carriers they talked about. Next after that they would attack battleships and lesser ships but never the merchantmen except under most favorable conditions. On instructions from Berlin I suggested specifically that they concentrate on certain supply lines, with a chance of attacking tankers and transports, but they refused. I suggested the desirability of attacking the route between Honolulu and the West Coast because that would force the use of convoys and would force the withdrawal of many escorts from the Western Pacific. Again the answer was negative; the mission was the American carriers and they could not be changed on this principle.

The Japanese had poor types of submarines in this war. First of all they were too big for easy handling under water when under attack and consequently were too easily destroyed. Then the asdic and sonic and radar

[108] Interrogation of Tamura, Kyuze, Capt IJN, of Navy Technical Bureau, Tokyo, October 22, 1945.

equipment was very far behind in development. We therefore arranged to bring over a type D-9 boat which would be best for them. We brought it to Kure, to the Navy Yard, where the Japanese studied it very carefully, removing the engines and much of the equipment and looked into every part of the construction. But they then came to the conclusion that this type boat was too complicated for construction in Japan.[109]

The delivery of primary fleet units during the war may be seen from the following table (fiscal year):

Category	*1941*	*1942*	*1943*	*1944*	*1945**	*1931-45*
Battleships	1	1	..	..	..	3
Aircraft Carriers	5	6	3	4	..	25
Cruisers	1	2	2	1	..	18
Destroyers	9	9	15	31	6	117
Submarines	11	22	40	37	22	156

* April-July.

Source: Navy Ministry.

The development of the secondary fleet during 1944 and 1945 may be seen in Chart 11. This fleet was developed largely in anticipation of invasion and with the purpose of inflicting as much damage on U.S. invasion forces as possible. It consisted of landing craft, coast-defense vessels and special-attack vessels. The latter consisted of suicide boats (Shinyo), midget subs (Kairyu and Koryu), and "human" torpedoes (Kaiten), all of which the Japanese Navy regarded as so expendable that they classed them as "naval ammunition" and not as ships.[110] This weird collection in the aggregate, as Chart 11 indicates, accounted for more than half of naval output in 1944 and 1945. It required much less steel, how-

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[109] *Interrogation of Japanese Officials, op. cit.*, Vol. 1, Interrogation No. 359, Karuizawa, November 11, 1945, p. 284. Wenecker had the following to say about the overall causes for Japan's defeat:

"Of course, the Japanese over-estimated their own strength and under-estimated the enemy. Then, they had very long supply lines which they could not protect; they admitted this in a pre-war statement. These were basic reasons for their failure to do better in the war. After that, I would say the reasons for their disaster could be classed about as follows in order of importance: First, and by far the worst, were the attacks of the highly efficient American submarines on the merchant shipping. Most serious of all here was the sinking of tankers and hence the loss of oil from the South. The second factor in importance was the destruction of the Japanese Navy, so they knew they then could not stop the enemy from coming to these vital areas. The third, which no doubt had some effect to close the war, was the air bombing attack on this [Japan] country." *Ibid.*, p. 285.

[110] The Shinyo, suicide boats, were made of wood with an explosives charge in the bow. They ran from 1½ to 2 tons and were powered by a standard gasoline-truck engine. The Kairyu were 2-man, 18-20-ton submarines, completed in an average of 30 days. The Koryu were 5-man, 40-50-ton subs usually completed in 60 days. The Kaiten or human torpedo was a one-man affair of about 4-8 tons. It was built as a regular torpedo with room for an individual to steer.

ever, than the primary fleet units since many of the items, such as suicide boats, landing craft, etc., were made mostly of wood.

The relationship between naval ship construction tonnage and steel deliveries may be seen in the following table:

Fiscal Year	*Tonnage*		*Steel (metric tons)*	
	New Displacement	*Delivered Gross*	*Planned Allocation*	*Delivered*
1941 ..	180,932	225,159	374,000	382,500
1942 ..	177,183	253,992	326,400	345,700
1943 ..	240,107	230,066	271,100	352,600
1944 ..	365,536	468,402	147,300	222,200
1945 * .	41,128	66,692	10,400	16,200

* April-July.

Source: Navy Technical Bureau.

It is interesting to note that the Navy was able to obtain more steel for naval shipbuilding purposes than the allocation plan provided. This bears out the point made in Chapter 2 that the basic weakness of the allocation system was that both the Army and Navy operated outside it for the most part and disrupted schedules by their insistence upon obtaining what they considered their requirements. Even so, the Navy was forced to use less steel in 1944 in order to make more available for merchant shipbuilding. The fact that both delivered and displacement tonnage reached a peak in 1944, when steel consumption was falling, was due to two factors. First, delivered tonnage in the case of steel ships represented in considerable part carriers, destroyers and submarines, started in previous years and utilizing the steel of 1941, 1942 and 1943. A 19,000-ton carrier required 828 days from keel to launching (and an additional 338 days from launching to delivery). A 9,000-ton carrier required 364 days from keel to launching (and 311 days from launching to delivery). The 1,950- to 2,200-ton submarines required 490 days from keel to launching (and an additional 550 days from launching to delivery). The 2,040-ton destroyer required 248 days from keel to launching (and an additional 120 days from launching to delivery). Secondly, the total delivered tonnage of 1944 included a large amount of wooden components of the secondary fleet. It was not possible to obtain separate figures on wooden vs. steel naval ship tonnage delivered.

According to all available evidence, the expansion of output in 1943-44 exhausted steel inventories and when deliveries in the first quarter of 1945 fell to 30 percent of the 1944 rate of deliveries and to 5 percent of the rate of deliveries in 1941, the construction of steel naval ships came to a virtual standstill. Over four months 16,200 tons of steel would not produce very much shipping. Lack of steel was the primary factor responsible for the decline of naval shipbuilding after the peak in August 1944, and that peak was attained only through the higher steel input of previous years.

In merchant shipbuilding it is possible to separate the wooden from the steel tonnage. Construction of wooden ships remained under control of the Communications Ministry, after control of the building of steel merchant ships was transferred to the Navy.[111] This divided responsibility did not work very well, however, because the wooden ship construction yards were small, scattered,[112] and did not, in contrast to most of the large steel shipbuilders, make their own engines. Nor did the Communications Ministry have sufficient authority in the war structure to secure the engines. As a result, in late 1943 the Navy was directed to procure the engines and supply them to the builders of wooden ships.

Japan had 18.789 wooden ships totaling 1.1 million tons, as of the end of 1941. During the ensuing war years 385,794 tons were constructed. At the end of the war there were only 244,210 tons of wooden shipping left, of which only 43 percent was operable, the remainder being laid-up or under repair.[113] Construction during the war ran a futile race against sinkings.

The first plan for wooden shipbuilding was announced in September 1942 and covered the remaining seven months of fiscal 1942. It called for a substantial rate of production, but the amount actually produced was nominal. Despite this, the plan for 1943 was stepped up sharply, with results that were only slightly better. Only 18 percent of the plan was achieved. By 1944 the need for shipping had become so urgent that the rate of planned production was again advanced. The number of types

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111 See *Oriental Economist*, March 1943, p. 112.

112 The largest wooden shipyards in all Japan had 32, 29, and 25 building ways, respectively. Together these amounted to less than 4 percent of all wooden shipbuilding ways in Japan. The absence of concentration is indicated by the following tabulation:

	No. of Yards	*Percent of Total*	*No. of Building Ways*	*Percent of Total*
Yards with 10 or more ways ...	43	8	600	26
Yards with 4 to 9 ways	236	43	1350	57
Yards with 1 to 3 ways	269	49	400	17
Total	548	100	2350	100

Source: Federation of Wooden Shipbuilders (1944).

Formerly there were several thousand but as the Communications Minister at the time, Admiral Terajima, declared before the 81st Diet: "Shipwrights in Japan may be counted by thousands. But shipbuilding units employing more than one hundred operatives are very few. Most of the shipyards employ only ten or so workers, and naturally their production capacities are limited. In view of this situation, the Communications Ministry has undertaken to bring about enforced mergers reducing their number to several hundreds." *Oriental Economist*, July 1943, p. 325.

113 See *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Vol. 1, Tokyo, September-October 1945, p. 76. Also *Oriental Economist*, February 22, 1947, p. 141.

was reduced and construction simplified. For example, the use of curved wood for keeling, and metal plates below the waterline for protection, was eliminated. Nevertheless, production lagged and an altered schedule was substituted which reduced the goal by about one-fourth. Actual production for the year amounted to about 60 percent of the altered schedule. Peak output came in 1944 when 245,000 tons were produced. As may be seen in the following tabulation, which shows the average monthly tonnage of planned and actual wooden ship output, there were also two plans for 1945.

	1942 (7 mos.)	*1943*	*1944*		*1945**	
			Original	*Altered*	*Original*	*Altered*
Planned	15,369	41,666	48,825	36,083	38,844	19,345
Actual	218	7,630	22,005		10,696	
Percent	1	18	45	61	28	55

* First quarter.

Source: Transportation Ministry.

The first 1945 plan set the goal slightly higher than the altered 1944 plan. After one month the Ministry hurriedly cut to half the original figure but even this lowered goal was not met.[114] Since the yards building wooden ships were widely scattered throughout Japan and largely outside the cities, the bombing attack was not responsible for the decline in output; it was due largely to the shortage of engines and of lumber and the failure of local transportation. The shortage of lumber was due not to the lack of wood, for Japan was well forested, but to the lack of able-bodied males to cut it. Particularly in the last year and a half of the war when the demand for lumber was greatest, the supply of men to cut it was shortest. So acute did the problem become that the Army purchased or seized stands of timber in the hills and used its forces to cut, log and deliver the lumber. Sawmills had difficulty getting maintenance parts and retaining labor, and the Japan Lumber Company declared that by the end of the war half of the mills were out of operation.[115] It is apparent therefore that the production of wooden ships during the war never reached levels of sufficient magnitude to significantly supplement production of steel ships. Wooden ships served as fishing and cargo vessels, for lighterage in principal ports, for interisland transportation, particularly of coal, and were even used as small oil tankers, but they hardly filled the gap caused by the sharply mounting total ship losses and the inadequate production of steel ship replacements.

During the course of the war the allied forces sank 10,583,755 tons of Japanese shipping, of which 8.6 million tons were merchant vessels of 500

[114] *Summary of Planned vs. Actual Production of Wooden Ships During the War,* Transportation Ministry, Tokyo, October 22, 1945.

[115] *Report on the Lumber Industry During Recent Years,* Japan Lumber Co. (Nihon Mokuzai KK.), Tokyo, December 1945, p. 8.

or more gross tons and 1.9 million were naval vessels. In all, 3,032 ships were sent to the bottom, exclusive of merchant tonnage of less than 500 tons for which no tabulation was ever made.[116] This was the outstanding and controlling fact in the Japanese shipping picture. For every ton of shipping the Japanese were able to build, three were sunk, and with the inadequate merchant tonnage with which Japan began the war, this meant that her merchant fleet was being whittled down to nothing. Coupled with her great dependence on imported raw materials, this development brought Japan to the verge of collapse. A vicious cycle of increasing velocity developed. Inability to bring in raw materials due to shipping attrition caused a sharp decline in steel output. This, in turn, limited ship production and Japan was unable to bring her shipbuilding activities to anything near a replacement level. As a result she faced certain economic strangulation, a process which had advanced to the extreme crisis point by early 1945, at which time the coup de grace was administered by the air attack.

The decline in Japan's overall merchant shipping position may be seen in Table 32, which covers the changes in Japanese steel merchant shipping of over 500 gross tons. Only in the first four months of the war was Japan able to effect a net increase in her shipping tonnage and this was due not to production but to shipping captured and salvaged. Although new construction increased steadily from about one-fourth of the rate of sinkings in the first four months of the war to almost one-half in 1944 when the maximum building effort materialized, the Japanese never even came near closing the gap. Even if production could have continued, after 1944, to increase faster than sinkings by the same rate of gain shown up to 1944, the balance of the merchant marine afloat would have been wiped out long before production caught up with sinkings. It was just not within the production potential of Japan to offset the rate of sinkings. That the operable tonnage of steel merchant ships of 500 tons and over should have been reduced by the end of the war to a mere 557,000 tons is both a reflection on the ability of the Japanese Navy and a tribute to the effectiveness of our war-long campaign to interdict Japanese shipping lanes. Reduction to such a tonnage level meant that Japan had been isolated, that imports, for all practical purposes, were cut off, and that when material in the pipelines was exhausted, the economy would grind to a virtual standstill since Japan with her very limited domestic resources was incapable of supporting a war economy. Based on the destruction of shipping alone, the war had been won, and in one sense it is

[116] *Japanese Naval and Merchant Shipping Losses During World War II by All Causes*, Joint Army and Navy Assessment Committee, Washington, 1947, p. vi. This was the final authoritative evaluation drawn from all previous sources, U.S. and Japanese. It lists each Japanese ship sunk during the war, by name, date of sinking and attacking agent responsible for sinking.

TABLE 32

JAPAN'S OVERALL MERCHANT SHIPPING POSITION, 1941-45

(in thousands of gross tons)

Time & Period	Tonnage Status			Tonnage Changes				
	Afloat	*Laid up*	*Operable*	*Captured, Salvaged*	*Built New*	*Sunk*	*Net Change*	*Built-sunk Percent*
Dec. 7, 1941	5996	700	5296					
Dec. 7, 1941 to Mar. 31, 1942				331	68	272	+ 127	25
March 31, 1942	6123	775	5348					
Fiscal 1942				377	362	1250	— 511	29
March 31, 1943	5612	900	4712					
Fiscal 1943				90	1094	2560	— 1376	42
March 31, 1944	4236	825	3411					
Fiscal 1944				24	1590	3484	— 1870	45
March 31, 1945	2366	806 *	1560					
Mar. 31, 1945 to Aug. 15, 1945				...	179	1051	— 872	17
August 15, 1945	1494	937 *	557					
Entire War				822	3293	8617	— 4502	38

* Includes operable tonnage cut off in the southern areas.

Source: Compiled from *Japanese Naval and Merchant Shipping Losses during World War II by All Causes*, Joint Army-Navy Assessment Committee, and USSBS, *Japanese Merchant Shipbuilding* and *The War Against Japanese Transportation*.

unfortunate that it did not last another six months for then it would have been completely clear, as it was partially evident in early 1945, that with the cessation of imports, industry after industry would have come to a halt.

The best indicator of the intensity and timing of the Japanese shipbuilding effort was the index of monthly economic input computed by the bombing survey.[117] It revealed that the scale of effort on new ship construction during the first 11 months of the war did not materially exceed that of the preceding year. Not until November 1942 did the expansion in the shipbuilding effort begin in earnest. In the 15 months from October 1942 through January 1944, the overall scale of effort increased to six times the original. The peak construction effort as measured by input came in January 1944, when the index (1941 = 100) reached 680. The greatest gains had been in tankers and as the fiscal year ended (March 31, 1944) the effort on tankers continued to increase at a pace sufficient in April to offset the usual recession after the year-end rush. The cargo ship effort continued to decline from January through July because of the diversion of more and more effort into tanker construction; keels for 11 of the 13 completed TA tankers were laid in the three months, May, June, July 1944. The net decline from April to July 1944 in the total steel ship construction effort was partly due to the shift in the production program from cargo to tanker types. After the effort on tankers reached its peak in July, it tapered off gradually during the ensuing three months through October. The shipbuilding industry as a whole may be said to have been operating at the maximum rate achieved during the entire war from January through May of 1944. The decline from October on was particularly severe and in the ten months after October 1944 it fell to less than one-tenth of the October level of output.

The Japanese shipbuilding effort possessed certain inherent limitations, the most important of which was the small total steel output of Japan. Even when the seriousness of the shipping position was realized and the effort stepped up to a maximum in 1944, the steel allocation given the merchant shipbuilding industry in that year was only achieved, as we have seen, by severely restricting other uses of steel, and even the allocation for naval shipbuilding was cut sharply. The industry's low steel stocks,

[117] The computation of monthly economic input was derived from the gross ton production of new ships. The gross tonnage completed of each ship produced or under construction at the end of the war was spread equally among the months during which the ship was under construction, including the months of keel laying and delivery. The tonnages assigned in this manner to each month, April 1941 through August 1945, were totaled by standard ship type or comparable class of nonstandard ships and the total unit cost per ton at 1945 prices, for each such class applied. The total of the resulting input values for the ship types constituting each general ship classification and for all ships as a whole represents the monthly economic input of merchant ship construction. See USSBS, *Japanese Merchant Shipbuilding*, Washington, January 1947, pp. 27 and 45.

which fell from a 7 6 months' supply in 1942 to a 3 6 months' supply in 1944, made it difficult to accelerate the building process by prefabrication or pre-keel work There were cases where the frames of ships were all up and the deck plates had not yet been obtained from the steel mills [118] Specifications for steel were lowered Tensile strength was reduced to allow 10 percent additional steel to pass through the material test in 1944 and toward the end of the year when quality declined further this was again reduced In the last year, many steel plates were delivered which cracked with cold bending and did not fuse together with welding

The relationship between allocations of steel and construction of steel merchant ships (of over 100 gross tons) may be seen in the following table:

Fiscal Year	*Steel (1000 metric tons)* [a]	*Ships (1000 gross tons)*
1941	348	238
1942	501	361
1943	858	1,111
1944	1 233	1 600
1945 [b]	212	181 [c]

[a] Includes steel for ships' engines and repairs but not for naval construction or expansion

[b] *April-August*

[c] This is the figure for tonnage delivered during the period In addition another 227 000 tons were under construction

The desperation of the Japanese shipbuilding effort in 1944 is reflected by the fact that the steel allocation increased by almost 400,000 tons despite the 1,300,000-ton decline in finished steel production that year It should be noted that by 1945 a little over 9 percent of the steel allotted to shipbuilding was being used for repair work The mining of Japanese ports and coastal waters, and particularly of Shimonoseki Straits in early 1945, increased the repair requirements [119] This may be seen in the following table which shows the percent of total work on construction compared to that on repairs in all commercial yards in Japan proper:

Type of Work	*1944*	*1945*
Merchant ship construction	54	44
Merchant ship repair	8	12
Naval ship construction	35	39
Naval ship repair	3	5
Total work on ships	100	100

Source Navy Technical Bureau

Since the 1945 distribution shown above is the average for the year to the end of the war, it undoubtedly understates the degree of shift that occurred during the last few months of the war By 1945, average monthly

[118] See Interrogation of Sukima, *op cit*, p 6

[119] See Interrogation of Minami, Rokuemon, Capt IJN, Tokyo, November 1, 1945

deliveries of steel to merchant shipbuilding had fallen to 40 percent of the 1944 figure and inventories were virtually exhausted. Again, since the average monthly figure is based on a five-month total for the fiscal year to the end of the war and an actual monthly breakdown is not available, the average overstates actual deliveries in the last few months. By the end of July, it is probable that the industry was receiving steel at the rate of about 15,000 tons per month. Even had the flow continued at this rate, which is improbable, it would have permitted construction of only 200,000 tons of shipping on an annual basis if no steel was diverted to repair work.

Until the end of February the shipyards were virtually untouched by the air war. Less than one percent of their floor space had been damaged by stray bombing. At that time the rate of ship construction had fallen to one-third of the 1944 peak. The decline was primarily due to the drop in steel availability. From March on, the air attack on urban areas caused damage in the shipyards. The output of shipping in damaged yards fell more sharply than in undamaged yards. The air attack undoubtedly accelerated but was not the basic cause of the decline in shipbuilding in Japan. Had there been no bombing damage to shipyards, by the end of the war, due to lack of steel, output would have been down to less than one-fifth of the 1944 level. Sakomizu, Chief Secretary of the Suzuki Cabinet, in his survey of national resources in June 1945, flatly concluded: "Shipping of iron ore has become almost impossible. The total production is about one-fourth that of the same period of the previous year. Construction of steel ships cannot be expected after the mid-year."[120]

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[120] *Survey of National Resources*, by Sakomizu, H., Chief Cabinet Secretary, Tokyo. June 10, 1945, p. 17.

CHAPTER FIVE

MOBILIZING MANPOWER

Labor management is satisfactory. The morning scene between 5:30-6:00 o'clock at the march-off places of mines impresses one with the change the war has wrought. The workers line up into sections and march to their respective places of work, like infantrymen to their posts or airmen to their planes. The hours of work are ten hours from 6:00 A.M. to 4:00 P.M.—but since workers cannot come out of the pits until their day's task is done the actual hours put in are 12."—ORIENTAL ECONOMIST [1]

In 1930 Professor Orchard noted: "Labor is the chief industrial asset of Japan. With few resources in power or raw materials, a limited supply of capital, and no especial distinction in mechanical skill, Japan has built an industrial system upon cheap labor. . . ."[2]

In view of the fact that Japan traditionally enjoyed a plethora of labor, it would be most unlikely that of all the bottlenecks and obstacles which might beset an isolated war economy, a deficiency of manpower would limit war production. The balance of judgment appears to indicate that quantitatively labor was not a limiting factor though due to mismanagement it came close to being so. Had it not been for the greater material limitation and had the Japanese been able to operate all their plant capacity on a full two-shift basis, they would either have had to devise more efficient practices of manpower utilization or face a continuing stringency. Qualitatively, the labor available was a retarding factor even under existing conditions of material shortage. That there was a shortage of "skilled" labor in the Western sense of the term appears to be incontrovertible in the light of all available testimony. Statistically it is hardly possible to prove this, but source after source made the point. While in a war period almost everyone would be expected to claim that labor was short, the Japanese in many cases admitted that there was enough labor, but "not of the right kind."

The military would not allow any exception for skilled or heavy workers until late in the war and, as able-bodied males with experience in handling machines were drained out of the war plants by the increasingly

[1] April 1944, p. 166, "A War of Coal."

[2] Orchard, John E., *Japan's Economic Position*, McGraw-Hill, New York, 1930. p. 339.

heavy draft calls, the Welfare Ministry poured in shop girls, students, Koreans, textile workers and farm workers who were unable to meet the military's physical requirements. One manufacturer declared, "We were successful in getting only 5 percent of our workers deferred from military service. We lost 1,000 skilled workers and it took 4,000 unskilled to replace them."[3] Another manufacturer, the Hitachi Industrial Co., stated, "Our technicians were spread too thin to be effective in maintaining standards. There was a gradual decline in the skill of our workers during the war until in 1944 three workers were doing the same work that one had done in 1940."[4] Lt. Col. Nohara, who represented the Army at manpower conferences with the Welfare Ministry, remarked, self-searchingly, after the war: ". . .if military efficiency had been higher, it would not have been necessary to take so many men away, and industry should have been more stubborn earlier in insisting on workers for themselves."[5]

The use of the term "conscription" in relation to labor in Japan during the war had three distinct meanings. It meant draft for military service, assignment to industrial plants, and freezing of all workers in a "conscripted plant." Industrial conscription never involved many workers. It was largely used as a lever to induce voluntary readjustment from non-essential industries to war plants. When some conscripted workers were assigned to a plant, all other workers in the plant were frozen to their jobs for the duration.

Overall labor planning was embodied in the yearly labor mobilization plans drawn up in the Cabinet Planning Board and given to the Welfare Ministry to implement. Total new demands for labor and replacements required were balanced against various sources of supply and these plans formed the basis for the allocation system. Growth of the labor force in war industries was paralleled by a sharp decline in non-essential fields such as commerce, textiles, etc. Commerce accounted for 16.7 percent of the 1930 civilian labor force, manufacturing and construction for 20 percent. By 1944 commerce had declined to 7.5 percent and manufacturing and construction had risen to 30 percent. The labor force assigned to the category "machinery and tools" (including aircraft, shipbuilding, ordnance, etc.) rose 105 percent between 1940 and 1944 while the labor force in textiles declined 52 percent.

The mobilization of women for war work in Japan was greater than in the case of Germany, but far less than the strenuous effort in Britain. The percentage of women in the civilian labor force increased from 36 percent in 1930 to 39 percent in 1940 to 42 percent in 1944. Compulsory conscrip-

[3] Interrogation of Tsugami, T., Tokyo, October 17, 1945, p. 3.

[4] *Replies to USSBS Questions*, submitted by Hitachi Co., Tokyo, November 23, 1945, p. 5.

[5] Interrogation, Tokyo, December 20, 1945, p. 6.

tion of women was not resorted to because of the traditional aversion of upper-class women in Japan to industrial work. However, in October 1944 those women who were at work were frozen in their jobs.

The mobilization of students began in a small way in 1943, under the jurisdiction of the Ministry of Education. In 1944 control was transferred to the Welfare Ministry and by 1945 over 3,000,000 students were assigned to war work.

Pre-war labor organizations were destroyed during the China War period and replaced by several government-sponsored, employer and police-dominated patriotic harmony groups, which received government subsidies and tried to lure workers with handouts of sake, tabi, tobacco, etc. The Advisory Committee on Labor in Japan noted:

> By the end of the war, repressive measures of the Japanese Government had effectively destroyed every vestige of freedom of organization and self-expression on the part of labor. . . . In the past, police activity was perhaps the most important element in Japanese labor relations. In the name of law and order or 'peace preservation', the police maintained such close surveillance and regulation of workers that specific anti-labor legislation was largely superfluous.[6]

Most of the protective legislation, such as that limiting employment of women and children at night and in dangerous occupations, was swept aside during the war. For example, in Hokkaido women were even utilized as coal miners. Hours of labor for all workers increased though the increase was not marked, for hours were already quite long prior to the beginning of the Pacific War. In most industries only one 10- to 12-hour shift was worked because of the limitations of skilled workers for supervision and, more important, because of the shortage of materials.

Wages in Japan, as students of the economy are aware, are complicated to a point where averages for take-home pay are almost impossible to compute with any degree of accuracy. Wages are compounded of payments based on age, sex, years of experience, attendance, efficiency, family obligations, profitability of the enterprise for the period, etc. The worker was paid more on the basis of status than for services rendered. Wages were frozen during the China War period and subsequently a complicated series of maximum and minimum wages were set for various occupations but, nevertheless, in general, money wages rose sharply. When deflated by an index of retail prices which included elements of black-market costs, it was apparent that real wages had fallen.

A substantial black market developed for labor in the last year and a half of the war. Army, Navy, munitions plants, and governmental bodies bid higher and higher rates, particularly for day laborers, until a national scandal developed when the metropolitan government of Tokyo offered 70

[6] *Final Report of the U.S. Advisory Committee on Labor in Japan*, SCAP-GHQ, Tokyo, July 29, 1946, pp. 4-6.

yen per day for common labor to clear firebreaks. The Army and Navy, when they needed labor for airfield construction, and later for defense entrenchments and munition plant dispersal, simply paid whatever was necessary to lure labor, and added as bait, food and clothing from their superior stocks. As a result, even before the air-raids began, absenteeism rose as laborers frozen to war-plant jobs reported that they were sick and then went to work as day laborers at higher wages than their regular jobs afforded.

Unified, centralized control over manpower was supposed in theory to have been lodged in the Welfare Ministry (Koseisho), but in practice labor control was spread over all the Ministries—agricultural and forestry labor in the Ministry of Agriculture and Forestry, merchant marine, communications and railroad labor in the Transportation Ministry, munitions company labor in the Munitions Ministry, ordnance and arsenal, air depot and defense construction project labor in the Army and Navy, labor for industries run by the Monopoly Bureau in the Finance Ministry, workers for assignment to Formosa and Korea in the Home Ministry, labor for colonization purposes in Manchuria and China in the Greater East Asia Ministry—coordinated only by a loose Ministerial conference system at the national government level. Army and Navy labor demands could not be questioned. Neither they nor the Munitions Ministry would supply the Welfare Ministry with production figures so that labor requirements might be judged more exactly, the Vice-Minister of Welfare, Kameyama, testified.[7] He also indicated that when the Ministry wanted to send inspectors into large war plants to investigate the labor supply situation because it suspected that labor was being hoarded, the Munitions Ministry under Army pressure refused to grant permission on the ground that such plants were "secret." Saito, chief of the Allocations Section of the Welfare Ministry, testified[8] that the Ministry's policy resolved itself into one of giving the essential industries as many workers as possible, despite the fact that it knew the demands were excessive, and of cutting down as much as possible on the unessential industries.

Before the war Japanese students largely chose liberal arts courses rather than technical programs. During the China War period the government attempted to shift more students into the technical fields by adding to the number of schools and technical departments which were far too few in number to handle any heavy influx of students. Hours in technical schools were increased and the hours devoted to liberal subjects were reduced. Generally, by the end of 1943 and the beginning of 1944, the commercial middle schools had been converted to technical schools and liberal arts courses had been eliminated. A factory training program, undertaken

[7] Interrogation No. 3, Tokyo, October 2, 1945.

[8] Interrogation No. 384, Tokyo, November 22, 1945.

in 1939-40, broke down under the drainage of skilled workers to the armed forces, Army and Navy insistence upon greater output, and owners' reluctance to sacrifice production by transferring skilled workers from supervision to training. There were just not enough skilled workers to go around and by 1944 the training program had virtually disappeared.

The efficiency of Japanese workers, measured in terms of output per worker, declined steadily throughout the war. This was due in part to the introduction of fewer and fewer skilled workers, to the declining supply of materials, and to lack of special-purpose machines. Where it was possible to measure efficiency in terms of levels in other countries, the output of the Japanese worker suffered by comparison.

The tightest pinch in industrial labor supply seems to have been felt in the period of peak end-products output, about August-October 1944. By 1945, in terms of the decline in output, labor was in surplus supply in many plants though, of course, the plants did not release the labor. At this time, however, as Tsurushima, the labor expert of the Munitions Ministry expressed it, it was not a question of the number of workers, it was a question of the number of workers who would report for work. Absenteeism soared under the lure of higher wages, the necessity of foraging in the country for food, and the burden of the air raids. The administrative control over manpower, such as it was, fell apart. The Welfare Ministry discontinued all paper work, reports from local areas ceased. Fires destroyed not only homes, business places, police stations and government buildings, together with their files and records, but streets and even entire districts lost identity in the flames. The police were no longer able to control labor. People simply disappeared and there was no way of knowing whether they had been killed or injured, or whether they had moved to another part of the city or had fled from the city altogether. Tokyo's population fell by about four million; the police numbered 19,000 and many of them disappeared too. At the same time there were new demands for labor. Dispersal, some clean-up and repair, defense entrenchments, the pine-root oil project, courier communications, etc., all required allotments. At the same time the Army and Navy demanded an additional 1,500,000 workers. Under the circumstances the labor situation in the spring of 1945 fell into chaos.

Such were the essential highlights of the wartime labor situation, which will be examined in more detail in the ensuing pages. A note of warning and apology must be sounded. To the general inadequacy of Japanese statistics, discussed in the preface, must be added a special demurrer for labor statistics. They are grossly inadequate for the purposes at hand. The Cabinet Bureau of Statistics and the Welfare Ministry were permitted to obtain from war plants only those figures which the Army, Navy and Munitions Ministry allowed. It was to the plants' advantage to pad, conceal real facts, demand as much as possible, etc. The Japanese sta-

tisticians themselves made matters more difficult by not even attempting to maintain comparability. For example, the census of February 1944 differed in many essential respects from the census of October 1940, and numerous adjustments were necessary in order to make the data at all usable.[9] In some instances statistics on plans were available but no comparable data on what actually happened had been collected. Statistical series were discontinued at different times for varying reasons. Records were burned, deliberately or accidentally. The Industrial Bureau of the Ministry of Commerce and Industry well summarized the situation in its comment:

. . .as the compiling of the "Table of Statistics on Factories" was suspended since 1943 due to the severity of the war, it is regrettable to say that for 1943 and after the presumptions had to be made as there are no accurate data obtainable, and also during the war, many factories were under the direct supervision of the Army and Navy, in forms of the munition production plants. And those factories were placed outside the competency of this Bureau. For those above mentioned munitions production plants, the extreme secret policy was constrained by the military authority that the release of any sort of statistical data was prohibited and considerable amount of data were burned up at the time of the termination of the war. For those general civilian production plants which were under the supervision of this Bureau, the collection and compiling of the factory statistics during the war were extremely difficult due to the fire damage of the offices by the air raids, the difficulty of communications, shortage of papers, etc. Due to the foregoing reasons, during the war when the very accurate basic data were really in need, we, on the contrary, had to go by presumption on almost everything.[10]

Kameyama declared that practically all Welfare Ministry statistics after February 1944 were based on estimates rather than upon actual compilations. Mori, the chief labor statistician of the Cabinet Bureau of Statistics, indicated that this was generally true of their data also.

The Nature of the Controls

As a result of Japan's affiliation with the International Labor Organization, a Bureau of Social Affairs was established in the Home Ministry

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[9] The census of 1944 showed an extraordinary drop in the number of persons under 20 in the labor force, compared to 1940, when just the opposite would have been expected. It developed that since the 1944 census was taken in February and the 1940 census in October, many more children were in the fields helping with the harvest and not at school in the latter month.

To cite another instance of difficulty, the census classified as "employer" anyone who had an assistant of any kind, paid or unpaid. Thus those whose wives and children were their only "employees" were called "employers."

[10] *Report on the Labor Conditions of Manufacturing Plants*, Industrial Bureau, Ministry of Commerce & Industry, Tokyo, December 12, 1945, pp. 2-3.

in 1922 to handle labor matters.[11] Its functions expanded and in 1938 the Ministry of Welfare was established. The Bureau of Social Affairs was transferred to it and the Ministry was given the administration of the employment office system and the social insurance program. In March 1938 a law had been passed bringing all employment agencies under State control and forbidding private placement work.[12] These public employment offices were physically located in the main police stations and, during the war when they served as labor mobilization offices, were under police domination and used police services to carry out their powers. The line of authority of the Welfare Ministry to the public employment or labor mobilization office ran through the Home Ministry to the prefectural governor and then either to the police chief or to the head of the labor office depending on the locality. Such a structure resulted from the fact that all of the prefectural and local personnel were appointees of the Home Ministry and administratively responsible to the Home Minister through the prefectural governors. All prefectural officials, including the governor, were, however, national officials. Thus the Welfare Ministry functions were diluted to a general planning nature since all instructions to the field had to be issued or approved by the Home Ministry.[13] The way in which labor was integrated with the police function may be seen in Charts 12 and 13.

The National General Mobilization Law, described in Chapter 1, gave the government authority to (a) conscript workers provided there was no interference with military conscription, (b) "cause subjects to cooperate" with local, prefectural, or national agencies, (c) regulate the use, employment, or dismissal of workers, (d) control wages and working conditions, (e) prevent or settle labor disputes, (f) request reports concerning the occupational ability and experience of the general populace, and (g) order the compulsory training of technicians in factories, training institutions or schools. This was the basic enabling act for labor control. Subsequent ordinances, issued under the authority of this law, covered the whole range of labor mobilization throughout the war.

A brief review of these ordinances will serve to indicate the trend which mobilization followed. Among the first of the ordinances was one regu-

[11] For a thorough discussion of labor conditions in Japan in the twenties, see *Industrial Labor in Japan*, International Labor Office, Studies and Reports Series A (Industrial Relations). No. 37. Geneva, 1933, 379 pp. A useful discussion in Japanese which carries through the thirties is "Nippon Rodo Rippo No Hatten" (The Development of Labor Legislation in Japan). *Kyushu Teikoku Daigaku*, September 15, 1942. For a very early account, see "The Labor Problem in Japan" by Miki, Shozaburo, unpublished manuscript in Columbia University Library, 1900.

[12] The labor "boss," or labor contractor system, however, continued and as a matter of fact existed all through the war period.

[13] *Final Report of the U.S. Advisory Committee on Labor in Japan, op. cit.* p. 102.

lating the use of technical school graduates (Gakko Sotsugyosha Shiyo Seigen Rei). The ordinance provided that graduates of technical schools had to apply to the Welfare Ministry for jobs which were made available on the basis of each applicant's particular training. The applicant had his choice of factory, type, and place of work, provided his choice coincided with the war-production programs. Employers were forbidden to hire technical school graduates directly. This was followed late in the year by another ordinance which also reflected Japan's concern over the problem of skilled labor, by making it necessary for employers who wished to hire skilled labor in 93 designated categories, and certain other school graduates and apprentices in these fields, to obtain permission from the government.

A series of ordinances requiring registrations of persons with specified technical abilities, beginning with one applying to doctors (Chiryo Kankeisha Shokugyo Noryoku Shinkoku Rei) in August 1938, were promulgated. One requiring the registration of all nationals with any technical ability specified by the Welfare Ministry was promulgated in January 1939 (Kokumin Shokugyo Noryoku Shinkoku Rei).[14] These registration ordinances were then followed by the National Conscription Ordinance (Kokumin Choya Rei) of July 1939, which authorized the Welfare Ministry to require registrants to take designated employment.[15] Thus the law at first was confined to technicians only and to filling vacancies in government-operated factories. In 1940 the law was expanded to include private factories under government supervision. In November-December 1941 both the registration ordinance and the conscription law were further enlarged to include all male registrants from 16 to 40, as well as unmarried women between 16 and 25 and to authorize their conscription to any factory designated by the Welfare Ministry.[16] A further discussion of conscription will follow later. There were six registrations in all until the beginning of the Pacific War and one every six months thereafter.

Wage control was instituted in March of 1939,[17] under the authority of the Mobilization Law. Initial wages for unskilled workers were set. Later this was extended to skilled workers. Industrial and mining concerns with more than fifty employees were required to give wage information to prefectural authorities, and the prefectural governor was authorized to require changes if he saw fit. A subsequent measure pegged wages and

[14] For details, see Mitsubishi Keizai Kenkyu Kyoku, *Hompo Zaikai Josei*, April 1940, p. 10; August 1940, p. 9; and November 1940, p. 16.

[15] The text will be found in Iwado. Z. T., "Japan's Wartime Legislation," 1939, *Japan Times and Mail*, Tokyo, 1940, pp. 156-71.

[16] Labor Adjustment Ordinance, No. 1063, December 7, 1941.

[17] Wage Control Ordinances (Chingin Tosei Rei), Ordinance Nos. 128 and 129, March 31, 1939.

salaries at the September 18, 1939, level. This lasted from October 1939 to October 1940, but was largely ignored[18] and in October 1940 the government enacted a basic statute upon which Japan's wartime wage control was based. Details will be covered later. By successive decrees, revising and implementing this law, a complex control system was evolved which had a limited enforcement. Generally, basic standards were set by the Welfare Ministry but within the framework of these upper and lower limits prefectural authorities could fix wages.

Several ordinances designed to prevent labor turnover and labor hoarding were passed late in the China War period. A decree in November 1940 froze "designated" employees to their jobs, mostly skilled workers, though the category was later progressively broadened. They could not leave their jobs without government permission, meaning permission of the local employment or labor mobilization office. If they left, the company had to notify the local police and labor office. Employers were forbidden to hire "designated" employees unless government permission was obtained. To strengthen this system a "workbook" law, patterned after the German system, was established in March 1941. It applied to male technicians and laborers in 112 industrial, mining, transportation, etc., categories, but was later extended to cover virtually all labor. Workers were required to register age, occupation, education, salary, etc., in two notebooks, one of which was retained by the employer and the other by a government employment exchange. If a worker left his job without the consent of his employer, the latter could retain his workbook for one year. Theoretically, without the workbook the worker could not obtain another job because the ordinance prohibited employers from hiring workers who could not produce a workbook.[19] Another ordinance of December 8, 1941, restricted the dismissal and retirement of workers in essential industries and plants. It also provided that allocation of all new primary school graduates would be done by the Welfare Ministry via local labor mobilization offices. Primary school graduates were forbidden to take jobs except by referral via the local labor office and thus an attempt was made to channel them into essential industry. Another measure in 1941 prohibited unessential factories, workshops and stores from hiring males from 12 to 40 years of age or females from 12 to 25, unless the staff was below 70 percent of the December 1939 total. Day laborers and temporary workers, however, were exempt.

The first labor mobilization plan was drawn up for the 1939 fiscal year. Responsibility for preparing the plan rested with the Cabinet Planning

[18] See "New Structure of Labor System" by Tanishima, Kiyoshi, in *Jikyoku Joho*, Tokyo, December 1940.

[19] See "Decrees on Labor Administration in Essential Industries," by Kawashima, Takeyoshi, in *Keizai Toseiho Nempo* (Economic Control Law Yearbook), Tokyo, 1942, p. 186.

Board, for its execution with the Welfare Ministry via the Home Ministry and the prefectural authorities. The plan estimated Japan's new and replacement labor requirements and the sources from which these demands could be met. The initial draft was prepared by the labor section of the Planning Board and was then submitted to a Secretariat composed of labor representatives from all the interested ministries except the foreign office and justice. This was necessary since at the time various ministries were responsible for labor supply in industries under their control, as described previously. The Secretariat would prepare a second draft which was then passed on to a committee of vice-ministers of the interested ministries, who would make necessary changes and submit the plan to the Cabinet for approval. It would then be given to the Welfare Ministry for execution. Prior to mid-1943 the Welfare Ministry would notify each Ministry of its total allocation and the Ministry would then break down its allotment among its constituent control associations, which would then subdivide among various companies. Allocations would then be made by the local labor offices to each company in its area which had authorization to obtain labor. With the establishment of the regional councils in mid-1943, as described in Chapter 2, a proposal was made to change the system somewhat and this was done in early 1944.

It is to be noted, however, that all the essential features of wartime labor control were adopted in the China War period.[20] Developments in the Pacific War period were, in the main, extensions and modifications of controls that had been previously adopted. With the activation of the regional or district councils, for example, allocations were not made to ministries but to districts, and the district council composed of representatives of the various ministries and prefectural authorities would then break down the allocation among industries and companies roughly in accordance with the industrial breakdown suggested in the plan. While the local *tosei kumiai* were used, the larger *tosei kai* or national control associations were largely eliminated from the labor allocation procedure, although they retained a general function in estimating requirements. Technical school graduates, however, were assigned at the ministerial level. Age was pretty well disregarded in making allocations.[21]

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[20] One of our wartime "intelligence" reports, whose contents were so valuable that they were "confidential" at the time (declassified after the war), concluded, "In the first period of the war 1937-41, very little attention was paid to labor controls." An enumeration of the various labor control laws of the China War period will be found in the *Rodo Nenkan* (Labor Yearbook of Japan), Tokyo, 1942, pp. 19-20, 104-11 and 269-71.

[21] See USSBS Interrogation of Kameyama, Seiji, Vice-Minister of Welfare, Tokyo, October 18, 1945; also Interrogation of Ayusawa, I., labor adviser to *Oriental Economist*, Tokyo, October 11, 1945.

In February 1942 the ordinance on Labor Control in Essential Industries was issued. It provided for Welfare Ministry inspection of plants to check on labor requirements, eligibility of workers, etc. The Army and Navy, however, refused to allow Welfare Ministry inspectors into the plants they controlled and when the Munitions Ministry was established it too refused to permit inspections of its plants by Welfare Ministry officials, who did not press the issue. The ordinance also permitted suspension of provisions of the previous laws limiting hours of work, child labor, night work for women, etc., and the Welfare Ministry was given power to prescribe working conditions and was given control over labor-management relations. The measure prescribed military organization and discipline for plants, including assignment of ranks to officials and workers, organization in "squads" and the salute.[22]

The earlier ordinance which attempted to prevent labor turnover was reinforced by another measure which provided that all hiring and firing, or even transfers of workers from one plant to another by the same company, had to funnel through the local labor mobilization office, if an essential war industry was involved. This was modified in 1943 to permit notification by the company to the labor office, of hiring or transfer, after the fact was accomplished, because the local labor offices had such a volume of work in relation to their staffs that they became bottlenecks.

Curtailment of nonessential industries was speeded in 1943 by an ordinance which gave war plants authority to requisition labor from nonessential factories, via the local labor mobilization office. In September 1943, men aged 14 to 45 were prohibited from working in 17 specified white-collar trades and services, such as salesmen, barbers, cooks, streetcar or bus conductors, etc. Busses and streetcars were limited to one operator per vehicle and a permit was required to hire more than one domestic servant. An order issued in March 1944 closed the theatres and this was reported to have released 35,000 to 45,000 persons in the entertainment field in Tokyo alone.[23] In October an ordinance provided that a laborer entering a munitions plant under free contract could be placed in the status of a conscripted worker and that in any plants where there were conscripted workers, all workers were frozen to their jobs.

In February 1944 the national registration was broadened to include all males from 12 to 60 and unmarried women and widows from 12 to 40. A separate registration for all scientists was provided, regardless of age.[24] Both the student labor ordinance (No. 518) and the women's voluntary

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[22] See "Kessen-Ka no Kinro Kanri" (Labor Management in Wartime), by Hikabe, Asataro. *Tocho Shoin*, Tokyo, March 1944.

[23] USSBS Interrogation of Sugahara, Taro, and Ogawa, Ichiro, of the Cultural Division, Bureau of Information, Home Ministry, Tokyo, November 7, 1945.

[24] See *Oriental Economist*, March 1944, p. 102.

labor ordinance (519) were adopted in 1944 but these will be discussed later.

With the abolition of the Cabinet Planning Board and the formation of the Munitions Ministry, responsiblity for drawing up the Labor Mobilization Plan passed to the Welfare Ministry with initial review by the Total Mobilization Bureau of the Munitions Ministry. However, the Welfare Ministry had to draw up the plan without the guidance of production statistics, since the Munitions Ministry would not furnish them. In addition, the Munitions Ministry would not permit inspection of plants under its jurisdiction by Welfare Ministry officials and made large demands for labor which it refused to justify other than to say that they were for war production. It would appear that the Munitions Ministry took the same arrogant attitude toward the Welfare Ministry as the Army and Navy took toward the Munitions Ministry.

Finally in early 1945, when administrative control of labor was just about to fall apart, a comprehensive National Labor Mobilization Law was passed.[25] It codified all the existing, piecemeal, scattered wartime labor ordinances and granted greater authority and autonomy to prefectural governors and local officials in the handling of labor matters, in keeping with the trend toward decentralization of governmental functions at the time. It also provided, (1) if the prefectural governor judged the food situation in his area to be precarious, he might transfer factory workers to farms for specified periods of time; (2) the establishment of a mobile labor corps for defense construction and dispersal projects, to be drawn from whatever sources either the Welfare Ministry or the prefectural governors might designate; (3) workers might not leave their jobs without an order from the prefectural governor; (4) subsidies and allowances for workers who became sick or who were wounded as a result of war work, and death benefits for the families of those who were killed by air raids while at work. While the law was a long-needed codification, it served remarkably little purpose coming at the time it did.

The one underlying purpose of the legislation reviewed was to channel workers into the war industries and keep them there. To the extent that part of the legislation was repetitious, it was an indication of poor administration. If one measure did not work, a traditional Japanese solution was to put another statute on the books. However, to a considerable degree the basic purpose was achieved—to what extent quantitatively, subsequent pages may reveal.

The Labor "Front"

The union movement in Japan had never been very strong. This was partly due to the fact that labor encountered long periods of suppression

[25] Ordinance No. 94, Tokyo, March 6, 1945.

from time to time. For example, as a result of the depression of 1900 and the police law for the preservation of peace (No. 17) of that year, the labor movement disappeared for some ten years.[26] Another factor was, of course, the proportionately low degree of industrialization. In the early thirties, however, the labor movement grew and the peak came in the last pre-war year, 1936, as the following table indicates.[27]

LABOR UNIONS IN JAPAN (1930-45)

(End of each year)

Year	*No. of Unions*	*Members*	*Members as Percent of Total Workers*
1930	712	354,312	7.5
1931	818	368,975	7.9
1932	932	377,625	7.8
1933	942	384,613	7.5
1934	965	387,964	6.7
1935	993	408,662	6.9
1936	973	420,589	6.9
1937	837	359,290	6.2
1938	731	375,191	5.5
1939	517	365,804	5.3
1940	49	9,455	0.1
1941	11	895	0
1942	3	111	0
1943	3	155	0
1944	3	155	0
1945*	0	0	0

*End of June.

The disintegration of the Japanese labor movement in 1939-40 was the result of government sponsorship of the Dai Nippon Sangyo Hokoku Kai (Great Japan Patriotic Industrial Association). The following is an interesting Japanese account of the atmosphere at the time:

The thoughts of the Army in regard to unions generally tended in the following directions.

1. Since the government employees [civilian employees of army arsenals, ordnance plants, aircraft plants subsidized by the government, etc.] were employed under the tenets of the military command system it would be difficult to recognize any contrary movements. In other words it was contended that any organization of workers under a free contract system should, as a military unit, be governed by the military command system.

2. In general there should not be created in industry opposition between capital and labor. Capital and labor becoming sincerely united should contribute mutually to the betterment of industry, the greater loving the lesser, and the lesser respecting the greater. Therefore it was felt that any organization of workers into groups was improper.

[26] See *Waga Kuni No Rodo Undo* (The Labor Movement in Japan), by Mitsu Kohno, MP, member of the Central Executive Committee of the Social Mass Party, Tokyo, February 1938, p. 14. A post-war account is "History of the Labor Movement in Japan", by Kataura, I., *Rodo Mondai Kenkyu*, Tokyo, October 8, 1946.

[27] Source is Ministry of Welfare as given in *Oriental Economist*, February 15, 1947, p. 112. The *Japan Yearbook, 1943-44*, gives a different figure for 1940. It places the number of unions at 428 with a membership of 184,004 (see p. 630).

Such thoughts as the above formed the main current of opinion and consequently unions were simultaneously disbanded after 1937. Moreover orders were given that every person intending to take up work in war industries should disassociate himself from any union.[28]

The official lore of "the service-to-the-state-through-industry-movement" records that the idea originated in early 1938 with the Kyocho Kai (Society for Cooperation and Concordia).[29] A chronology of the movement would, over the short period of eleven months, run somewhat as follows:

1937—Oct.: Aichi Prefectural office presents plan for harmony between capital and labor, as war emergency measure.
1938—Jan.: Tokyo Metropolitan Police advise industry to hold conferences to develop program, similar to Aichi prefecture, to promote capital-labor harmony.
1938—Feb.: Committee for Emergency Study of Labor-Capital Harmony established by Kyocho Kai.
1938—April: "Outline of Measure to Harmonize Capital and Labor," presented by Kyocho Kai to the government.
1938—June: In accordance with proposal, the Sangyo Hokoku Remmei is established (Patriotic Industry Association or League-for-Service-to-the-State-Through-Industry).
1938—July: First subsidiary formed at Ishikawajima Shipbuilding Yard.
1938—Aug.: Letters asking that Hokoku Kai be organized at each plant, sent out in the names of both vice-ministers of Welfare and Home Affairs.

Thus did the patriotic wartime spirit of the Japanese workers spontaneously manifest itself.

Through a government subsidy of 22 million yen annually and very low dues, the overall national organization, the Dai Nippon Sangyo Hokoku Kai, was able to establish branches in every major plant, and regional associations in each prefecture and in each large town. The prefectural governor was head of the regional association in his area and the chief of police of the town association.[30]

In addition, the *Economist* noted:

The membership of a unit industrial national service association comprises all those engaged at the factory, workshop or mine, as the case may be, from the chief director down to the youngest worker, with the chief director in each case serving as chairman of the association.[31]

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[28] *The Labor Situation and the Army*, by Col. Sato. War Ministry Liaison Officer with USSBS, Tokyo, November 22, 1945. p. 8.

[29] One could not call this a "lunatic fringe" organization because there were too many of them in Japan.

[30] *Nippon Times*, September 8, 1945, p. 3.

[31] "Industrial National Service Movement," *Oriental Economist*, June 1943, pp. 261-62.

So great was worker enthusiasm for this kind of organization in preference to the un-Japanese trade union that it developed widely and rapidly. Agricultural workers found themselves joining the Nogyo (Farm) Hokoku Kai; commercial workers were supplied with membership cards in the Shogyo (Commerce) Hokoku Kai; seamen and maritime workers had their Nippon Kaiun (Shipping); the Kokuyu Tetsudo Hokoku Kai (State Railway Service Association) was formed in April 1941, the Teishin (Communications) Hokokudan in May 1941, and the Kaigun (Navy workers) Hokokudan in February 1942. In 1942 all these organizations became affiliated with the IRAA (Imperial Rule Assistance Association). The last of the associations to be formed was the Dai Nippon Romu Hokoku Kai, which attempted to control day laborers, a group which prior to the war had been looked down upon as the lowest rung of the industrial ladder, but which during the war came into great demand and obtained money wages which in many cases exceeded those paid to regular factory workers. Japan had the greatest difficulty in controlling the allocation of day labor during the war years and it was in this type of labor that the most substantial black market developed. The Romu Hokoku Kai was one attempt at increasing control in this field.

Membership in the Sangyo Hokoku Kai in April 1940 was placed at the following: [32]

Field	*No. of Associations*	*Membership*
Manufacturing	26,465	2,877,211
Mining	827	415,032
Transportation	784	124,936
Others	552	87,869
Total	28,628	3,505,048

By June 1943 membership is estimated to have reached 5,815,473. Membership did not increase significantly thereafter, the total at the beginning of 1945 being estimated at 6,400,000. Membership in the Romu Hokoku Kai was estimated at two million. The movement was very weak in agriculture and strongest in the large industrial plants. Workers were compelled to attend meetings from time to time to listen to inspirational talks by patriotic and control society or government officials. Reward for attendance was a ration of beer or sake. Publications, such as *Chikara* (Power), were used for propaganda purposes to stimulate greater productivity, etc. Paternalistically, some of the larger plants provided locals with recreation rooms or canteens. Extra rations of tabi, tobacco, work clothes, etc., were issued through the plant locals. Commendations, awards and medals were distributed. Artificial limbs were provided for industrial casualties, condolence calls paid to bereaved families, funeral delegations

[32] From "Service-to-the-State-Through-Industry-Movement Is Expanding," by Machida, Tatsujiro, *Tosei Keizai*. Tokyo, November 1940.

supplied. One of the functions was described as "maintenance of discipline in working places." The main function was "diffusion of patriotic spirit in industry." This, it was explained, could best be manifested by not complaining too much, by not staying away from work too often and by speeding up production and increasing output.[33]

The town and prefectural branches were largely instrumentalities for police control. The suppression of dangerous thought and of trade unions had long been a major function of the Japanese police. Gantaro Suehiro, professor of law at the Tokyo Imperial University and a member of the Board of Wage Control, declared: "On one pretext or another police would break up a union and in its place install a factory association which the police themselves would control. Individual union initiative was completely stifled."[34]

There was a "Thought Section" in the Criminal Affairs Bureau of the Justice Ministry and a Special Higher Police in the Home Ministry. The Cabinet had a subsidiary "Surveillance Commission." In large urban areas, such as Tokyo, the police had tremendous power in the administration of every labor ordinance. The Metropolitan Police Board of Tokyo carried out its many labor duties through a Special Higher Police Division (Tokubetsu-Koto-Keisatsu-Bu) and a Labor Division (Kinro-Bu). The details of the organization of the labor division of the Osaka police office were shown in Charts 12 and 13. The Advisory Committee to SCAP effectively summed up the situation in the statement that:

At the time of surrender there were no genuine democratic workers' organizations in existence in Japan. As the result of a system of oppressive legislation and police and military repression perfected under the "Dangerous Thought" and the "National Mobilization" acts, there were no means for the Japanese laborers to express their needs or wishes on matters that affected them intimately. They were effectively denied the rights of assembly, speech, unionization, protest, collective bargaining and strike. All pre-war labor leaders had been killed, imprisoned, exiled or silenced. Two "labor front" or "patriotic" organizations effectively included and controlled all industrial and casual labor.[35]

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[33] See *Senji Rodo Kanri* (Wartime Labor Management), written and published by Dai Nippon Sangyo Hokoku Kai, Tokyo. February 1943. (Now available in Japan Section, Orientalia Division, Library of Congress.) See also "Mission of the Industrial Patriotic Movement," by Fukagawa, Masao, of the Dai Nippon Sangyo Hokoku Kai, *Tairiku*, Tokyo, March 1941.

[34] USSBS Interrogation No. 13, Tokyo, October 8, 1945.

[35] From Appendix A, "First Interim Report on Treatment of Workers' Organizations in Japan Since the Surrender, Tokyo, June 30, 1946," in *Final Report of the Advisory Committee on Labor in Japan, op. cit.*, p. A-1.

POPULATION, CIVILIAN LABOR AND ARMED FORCES [36]

Table 33 presents the basic overall figures for population, the labor force and the military establishment Total population, (including armed forces) increased 13 percent over the decade 1930-40 and then rose an additional 5 percent between 1940 and 1944 [37] The armed forces grew from 0 7 percent of the male population in 1930 to 4 percent in 1940 and then to 10 percent in 1944 By way of contrast, German mobilization absorbed 3 6 percent of its male population in May 1939 and 28 percent in May 1943 It should be noted, however, that Japanese mobilization was stepped up sharply during the year and a half following the 1944 (February) census This may be seen from the following figures

[36] In view of the statistical limitations described earlier and others to be indicated in subsequent pages the statistical material presented in this and following sections should be regarded merely as rough approximations which may serve as a basis for generalizations and as indicators of trends rather than as precise measurements

As a further indication of the kind of impossible and changing classification of Japanese census data the following note to their long compilation of 'employment in offices and shops' is cited

"Notes about the figures of laborers in 'Offices shops etc in 1941 and 1942, and in 'Offices Shops etc of all industries' in 1944

"1 The scope of the canvass of offices shops in 1941 and 1942 was limited to those offices and shops in which at the date of the canvass ten or more such specific laborers as salesmen shopgirls guards watchers sweepers servants, office boys, typists, telephone operators etc—namely those laborers not occupied in primarily productive processes—were employed but once offices or shops were decided to be canvassed, all the laborers there were to be counted, therefore in the tables of 'offices shops, in both years not inconsiderable numbers of laborers were counted

"2 The 'offices shops etc of all industries in 1944 were all other establishments besides factories mines communications and traffics in which one or more persons were employed therefore among the employees of these establishments are to be counted naturally laborers of various kinds such as farmers fishermen motor car drivers telephone operators salesmen and women servants etc

The data are, of course completely unusable

Source Cabinet Bureau of Statistics—"C Employment by Categories—1 Industrial employment by type d Offices shops etc Tokyo June 1944 For a detailed description and enumeration in labor statistics in Japan see *Showa Ju Ku Nen Nenji Kinro Tokei Chosa Teiyo* (Labor Statistics Investigation Manual) Naikaku Tokei Kyoku (Cabinet Bureau of Statistics), Tokyo February 1944

[37] The vagaries of Japanese statistical definition led different analysts to different conclusions on even such a long-standing object of census enumeration as population SCAP statisticians in a study of Japanese population changes declined "The estimated increase of nearly two million persons in the civilian population of Japan proper from 1940-1944, in spite of the heavy emigration during the early part of the period and military mobilization, was due to rapid natural increase" See *Summation of Non-Military Activities in Japan*, Tokyo, Vol 8, May 1946 p 226 On the other hand Cole concluded "The absolute increase of population resident in Japan proper may have been curtailed to approximately 382,000 for the period 1940-45 as compared with growth by more than 4 000 000 between 1935 and 1940" "Population Changes in Japan," by Allan B Cole *Far Eastern Survey*, May 22 1946, p 149

ACTIVE STRENGTH OF JAPANESE ARMED FORCES

(in thousands)

End of Year	*Total*	*Army*	*Navy*
1937	634	500	134
1941	2411	2100	311
1942	2829	2400	429
1943	3808	3100	708
1944	5365	4100	1265
1945*	7193	5500	1693

*August 1945.

At the end of 1943 the draft age was lowered to 19. While all male Japanese from the age of 17 to 40 were subject to military conscription, it had been the practice to postpone active service until 20. At the end of 1943 the upper age limit for service was raised from 40 to 45. In addition, medical standards were relaxed. Japan drafted more men in 1944 than in the previous two years of war with the U.S. She drafted one and a fifth times as many in the first seven months of 1945 as in 1944. From the beginning of 1944 until the end of the war, Japan drafted more men (3,385,000) than she had from 1937 through the end of 1943 (3,174,000).

TABLE 33

POPULATION AND LABOR FORCE, JAPAN PROPER, 1930, 1940 AND 1944

(in thousands)

	Oct. 1, 1930	*Oct. 1, 1940*	*Feb. 22, 1944*[a]
Total Population[b]	64,450	73,114	77,044
Male	32,390	36,566	38,605
Female	32,060	36,548	38,439
Total Labor Force	29,620	34,177	37,407
Male	19,030	21,424	23,395
Female	10,590	12,753	14,012
Armed Forces	243	1,694	3,980
Civilian Population	64,207	71,420	73,064
Civilian Labor Force	29,377	32,483	33,427
Male	18,787	19,730	19,415
Female	10,590	12,753	14,012

[a] The third column is the result of an adjustment of civilian labor force totals. The civilian labor force data for February 22, 1944, have been adjusted because of a downward bias inherent in the original census compilations. This bias was age connected. The Japanese Census showed an extraordinary drop from 1940 to 1944 in the number of males and females under age 20 in the labor force and a corresponding increase in the unoccupied. This shift was contrary to what would have been expected on the basis of an examination of the other age groups. Furthermore, an actual increase of the numbers occupied in these ages would have been expected since mobilization of students for factory and farm work on a part-time basis, and of other youths on a full-time basis, had been underway prior to 1944. The disparity of the figures is apparently connected with the date of the census (the 1944 census having been taken in February, whereas the censuses of 1930 and 1940 were taken in October). Japanese officials offered as an explanation the fact that graduation from school and subsequent enrollment in the labor force takes place each year after February but before October. The adjustment in the size of the labor force appearing in the third column has been computed by taking the labor force participation of youths aged 10 to 14 and 15 to 19 in 1940 and applying this pattern to the population of the same age groups in 1944. This is considered to be a conservative, minimum adjustment.

[b] Includes armed forces.

Source: Cabinet Bureau of Statistics.

It was small wonder therefore that an outcry arose from industry during 1944 that production could not continue if able-bodied and skilled men continued to be taken in such numbers. At the end of the war, however, Japan, with roughly the same male population as Germany, had drafted only half as many men for the armed forces, but she had also suffered only one-eighth of Germany's manpower losses.[38]

Over the entire period from 1930 to 1944 the total labor force rose by about eight million, allowing four million for the armed forces and four million for an increase in the civilian labor force. Total labor force was 45 percent of total population in 1930, 46 percent in 1940 and 48 percent in 1944. Thus it is apparent that the Japanese war effort, until February 1944 at least, imposed no great strain upon the total manpower situation, for there was no material reduction of the unoccupied portion of the total population. Numerically, there was an actual increase in the unoccupied, from 34,830,000 in 1930 to 39,637,000 in early 1944. Even if the population figure is too large and the size of the armed forces was understated by the Army, there is such a large margin of safety, that it appears to be logical to conclude that the Japanese had not really drawn their manpower belt tightly at all. To be sure there had been shifts within the civilian labor force, as we shall see later, but the real pinch seems to have come during the last year and a half of the war. During this post-census period the population did not increase materially but over three million men were added to the armed forces and the Labor Bureau of the Welfare Ministry estimated that the civilian labor force rose 900,000 between March 1944 and March 1945.[39] Thus some 4,000,000 persons who were not working or in the armed forces when the Feburary 1944 census was taken had to be drawn into the labor force in the ensuing year and a half.[40] Unfortunately only estimates and guesses are available as to the sources from which they were drawn.

The civilian labor force rose by three million over the 1930-40 decade and then by another million during the period to February 1944. In contrast, the German civilian labor force fell from 39,114,000 in 1939 to 28,432,000 in 1944. However, since the Germans resorted to use of larger and larger numbers of foreign workers and prisoners of war—the figure rose from 301,000 in 1939 to 7,487,000 in 1944—the total civilian labor really declined 3.5 million. As we shall see later, the Japanese use of

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[38] Some 510,000 Japanese were killed in action or died from wounds or sickness during the Pacific War. *Nippon Times*, Tokyo, September 7, 1945, p. 1.

[39] The "intelligence" report on labor supply in Japan, cited in footnote 20, declared, "it is evident that 1942 and 1943 were the years when labor was most in demand."

[40] *Estimates of Changes in Number of Workers in Select Fields, March 1944-March 1945*, Labor Bureau, Welfare Ministry, Tokyo, September 1945.

"foreigners" (including Koreans) and prisoners of war was relatively small. The ratio of civilian labor force to civilian population remained constant at 45 percent in 1930, 1940 and 1944, another indication that there was no really intensive labor effort prior to 1944.

Women's share of the civilian labor force rose from 35 percent in 1930 to 39 percent in 1940 and then to 42 percent in 1944. As is shown in Table 34, the numerical increase amounted to a little more than two mil-

TABLE 34

PERCENTAGE DISTRIBUTION OF CIVILIAN LABOR FORCE BY SEX AND ACTIVITY, JAPAN PROPER, 1930, 1940 AND 1944

	Oct. 1, 1930			*Oct. 1, 1940*			*Feb. 22, 1944*		
	Total	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*
Civilian Labor Force .	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture & Forestry	48.1	41.2	60.4	42.6	33.5	56.6	42.2	30.3	59.0
Fishing	1.9	2.7	.5	1.7	2.4	.5	1.5	2.1	.6
Mining	1.1	1.5	.4	1.8	2.7	.6	2.5	3.7	1.0
Mfg. & Constr.	20.0	23.6	13.7	25.0	31.3	15.3	30.0	39.3	17.0
Commerce	16.7	18.1	14.1	15.0	15.2	14.7	7.5	6.1	9.3
Transp. & Communic'n	3.2	4.8	.4	4.2	6.2	1.2	5.2	7.5	2.0
Gov't & Professional .	6.0	7.3	3.7	6.8	7.7	5.3	9.2	10.3	7.6
Domestic Svce.	2.7	.5	6.7	2.2	.2	5.3	1.5	.3	3.1
Miscellaneous	.3	.3	.1	.7	.8	.5	.4	.4	.4

Source: Labor Bureau, Ministry of Welfare.

lion during the decade and to an additional million and a quarter in the ensuing four years. According to estimates of the Welfare Ministry, in the year from March 1944 to March 1945 another 1.4 million women were added to the civilian labor force.[41] This is in marked contrast to the German experience. The number of German women in the civilian labor force increased only slightly from 14.6 in 1939 to 14.9 million in 1944. There was also considerable difference between the trend of Japanese and German males in their respective civilian labor forces. The number of Japanese males remained almost the same between 1940 and 1944 while German males in the civilian labor force fell from 24.4 to 13.5 million between 1939 and 1944. According to Ministry of Welfare estimates, there was a net decline of males in the Japanese civilian labor force of only 500,000 between March 1944 and March 1945. They reported 3,244,300 males leaving the civilian labor force over the period and 2,715,700 entering it. The impact of this sudden turnover upon Japanese industry, which was struggling to reach peak production at the time, must have had some limiting influence. Able-bodied men with some acquaintance with machines were drawn off and very young

[41] However, the national registrations of February and November 1944 and May 1945, which covered unmarried women between 12 and 39, showed an increase between February and November of only 370,000, and then a decline of 290,000 by May, in the civilian labor force.

or older men with little skill were substituted. Some indication of this developing trend may be seen from the following figures. Unfortunately, an age breakdown of the civilian labor force after February is not available and the statistics for those under 20 in the February 1944 census were inadequate, as described previously.

MALES IN THE CIVILIAN LABOR FORCE
(in thousands)

Age Group	*1930*	*1940*	*1944*
20-39	8,938	8,669	7,452
40 and over	7,004	7,813	8,550

Occupational Breakdown

The next step in the study of Japan's wartime labor mobilization is an analysis of the occupational breakdown of the civilian labor force. This is presented in Table 34. The labor force in agriculture declined from 48 percent of the total in 1930 to 42.6 percent in 1940 and then decreased slightly to 42.2 percent at the time of the February 22, 1944 census. The relatively slight decline during 1940-44 was due to deliberate government policy. The Agricultural Control Law of December 21, 1941, indicated the government's alarm at the migration from farm to factory and declared that in view of the need for foodstuffs it would be a general policy to maintain 40 percent of the population on farms.[42] Of course, there was a considerable change in the composition of the agricultural labor force both in age and sex but overall numbers were maintained for the most part. As a matter of fact, some evidence available indicates that the labor force in agriculture and forestry actually increased for a time after February 1944. The national registration held on November 1, 1944, while presenting only an incomplete picture since it covered men from 12 to 59 and only unmarried women between 12 and 39, showed an increase from 5.9 million workers in agriculture and forestry on February 22 to 6.1 million on November 1. Males had decreased, women had increased. The Welfare Ministry estimate covering the period March 1944-March 1945 indicated a rise of 700,000 in the labor force in agriculture and fishing, of which increase women constituted 600,000 and males 100,000. This is possible since the urban evacuations started prior to March and it is known that the government attempted to increase farm employment at the beginning of 1945 in view of the grave food situation.[43]

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[42] See *Kinro Seisaku No Hatten* (The Development of Labor Policy), by Toyohara, Matao, and Ishihara, Yoshige, Tokyo, August 1944, p. 69.

[43] The Ministry of Agriculture and Forestry officials, however, claimed that there was a net decrease between February 1944 and February 1945 of 873,000. This estimate will be presented later. Since it made no provision for women who went to work full-time in the fields when their husbands were drafted, it is not wholly reliable. Ministry of Welfare officials who estimated a 600,000 increase in women in the agri-

The largest increase in the labor force occurred, as was to be expected, in the category "manufacturing and construction." Labor force in this category rose from 20 percent in 1930 to 30 percent in 1944. In contrast to agriculture where males declined from 55 percent of the total labor force in 1930 to 42 percent in 1944, males in manufacturing and construction constituted 75 percent of the labor force in 1930 and 76 percent in 1944, as is shown in Table 35.

TABLE 35

PERCENTAGE DISTRIBUTION OF MALES AND FEMALES IN CIVILIAN LABOR FORCE BY ACTIVITY, JAPAN PROPER

	Oct. 1, 1930			*Oct. 1, 1940*			*Feb. 22, 1944*		
	Total	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*
Civilian Labor Force	100.0	64.0	36.0	100.0	60.7	39.3	100.0	58.2	41.8
Agriculture & Forestry	100.0	54.7	45.3	100.0	47.8	52.2	100.0	41.6	58.4
Fishing	100.0	90.7	9.3	100.0	87.7	12.3	100.0	81.9	18.1
Mining	100.0	85.8	14.2	100.0	88.5	11.5	100.0	84.6	15.4
Mfg. & Construction	100.0	75.4	24.6	100.0	76.0	24.0	100.0	76.3	23.7
Commerce	100.0	69.4	30.6	100.0	61.6	38.4	100.0	47.7	52.3
Transp. & Communications .	100.0	96.0	4.0	100.0	89.0	11.0	100.0	83.9	16.1
Government & Professional .	100.0	77.7	22.3	100.0	69.0	31.0	100.0	65.3	34.7
Domestic Service	100.0	11.5	88.5	100.0	5.5	94.5	100.0	12.3	87.7
Miscellaneous	100.0	90.1	9.9	100.0	70.6	29.4	100.0	55.7	44.3

Source: Labor Bureau, Ministry of Welfare.

Sharp declines were registered in commerce and domestic service. Scarcity of commodities, the government enterprise consolidation and policy company distribution programs, as well as the drive against unessential activities, resulted in more than a 50 percent decline in employment in commerce between 1940 and 1944. In absolute numbers, employment declined by more than 2.5 million as these workers were channeled into manufacturing by government pressure and direction. The national registration in November 1944 indicated a further decline from February 1944 of 450,000 and another 350,000 by May 1945, while the Ministry of Welfare estimates placed the decline between March 1944 and March 1945 at 600,000. Of the workers remaining in this field in 1944 women constituted 52 percent as compared with only 30 percent in 1930.

There were 100,000 fewer domestic servants in 1940 than in 1930 and an additional 230,000 were eliminated by February 1944, but it was an indication of both the importance of privilege in Japan and the weakness of the labor mobilization at that time that there were still 600,000 domestic

cultural labor force declared that the Ministry of Agriculture had always distorted its labor statistics to gain a greater labor allocation for agriculture. On the other hand, the military draft in early 1945 did, according to widespread testimony, take much of the remaining available manpower of draft age from the farms and the quality of the remaining labor force fell.

servants at the latter date. The Welfare Ministry estimated that another 160,000 were eliminated by March 1945.

The rise in the government and professional category occurred despite periodic announcements that the size of the bureaucracy would be reduced. The increasing degree of government regulation of every phase of economic activity nullified the pronouncements, however, and the number of government and professional workers rose from 1.7 million in 1930 to 2.1 million in 1940 to 2.9 million in 1944. The Welfare Ministry, however, placed the decline over the ensuing year at 400,000. While the proportion of women in this category did increase somewhat as is shown in Table 35, the failure to increase much more was due to the traditional subordination of women in Japanese public life. Most of the work of the labor mobilization offices, for example, could have been handled by women, but none were employed except as typist-clerks.

Such were the essential overall shifts in the composition of the civilian labor force. It remains to examine in more detail the changes in composition and in assignment of the labor force in agriculture and in manufacturing.

Labor in Agriculture

While Welfare Ministry and Agriculture Ministry officials disagreed on the trend of the agricultural labor force after February 1944, there was agreement on the fact that in quality terms, at least, there was a definite decline. Even prior to that time, as the census data in Table 36 indicate,

TABLE 36

Japanese Agricultural Labor Force by Age Groups and Sex, Japan Proper, 1930, 1940 and 1944

Ages	1930		1940		1944	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*
0-14	185,017	185,439	124,021	142,766	115,030	132,500
15-19	983,112	800,085	779,113	834,163	576,304	825,708
20-24	767,115	761,490	388,824	783,687	251,461	963,856
25-29	756,801	727,683	527,345	761,209	312,992	797,236
30-34	716,170	693,328	581,494	735,160	404,972	821,216
35-39	674,420	633,859	631,845	738,917	532,223	783,416
40-44	672,431	615,039	636,161	702,818	639,614	780,516
45-49	677,873	593,540	608,847	635,803	632,900	724,248
50-54	698,213	534,286	606,619	596,200	596,905	623,456
55-59	573,374	380,660	580,373	519,841	583,403	564,062
60 & over	1,030,332	470,758	1,153,736	772,634	1,023,572	890,879
Total	7,734,858	6,396,167	6,618,378	7,223,198	5,669,316	7,707,153

Source: Labor Bureau—Ministry of Welfare.

there was a marked reduction in able-bodied males between the ages of 15 and 40 on the farms. The number fell from 3.8 million in 1930 to 2.9 million in 1940 to 2.0 million in 1944. Male workers between 15 and 60 on the farms totaled 4.5 million in 1944 while the number of farm house-

holds was reported at 5.6 million the same year.[44] Thus there were 1.1 million farm households in 1944 which lacked a male worker between 15 and 60, and this was intensified in the next year and a half by further army drainage of manpower. The percentage of women in the agricultural labor force rose from 45 in 1930 to 52 in 1940 and then to 58 in 1944.

The 8.5 percent decline in cultivated acreage between 1940 and 1944, which accompanied the 4 percent decline in the agricultural labor force, was partly due to the decline in able-bodied males in agriculture but also to the use of arable land for airfields, military camps, training and testing grounds, and new industrial plants and workers' barracks. The Agriculture Ministry claimed that the drainage of farm labor to industry continued in addition to military conscription in spite of the freezing provisions of the Agricultural Control Act,[45] and submitted the following figures on the estimated movement of farm labor to industry:

ESTIMATED MOVEMENT OF FARM LABOR TO INDUSTRY
JULY 1937 TO FEBRUARY 1944

Period	*Men*	*Women*	*Total*
July 1937 to Aug. 1939	310,000	130,000	440,000
Aug. 1939 to Feb. 1940	200,000	100,000	300,000
Feb. 1940 to Feb. 1941	250,000	90,000	340,000
Feb. 1941 to Feb. 1942	220,000	110,000	330,000
Feb. 1942 to Feb. 1943	240,000	140,000	380,000
Feb. 1943 to Feb. 1944	100,000	80,000	180,000

Source: Ministry of Agriculture and Forestry.

Unfortunately there is no other statistical material available on this subject nor are there adequate statistical data to show precisely the number of agricultural workers drafted into the armed forces. In a study conducted in January 1945, the Ministry of Agriculture and Commerce estimated that approximately 2,780,000 men were conscripted from rural villages during the war, of whom about 1,500,000 were engaged in farming.[46] War Ministry records on this subject were burned by the Japanese immediately after surrender but they estimated that of the 19- and 20-year-olds conscripted in 1944, about 18 percent were drawn from agriculture, 48 percent from industry, 13 percent from communications and transportation, etc. For the entire Pacific War period they estimated that 43 percent of military recruits were drawn from industry, 23 percent from

[44] *Farm Tenancy in Japan*, SCAP-GHQ, Natural Resources Section, Report No. 79, Tokyo, 1947, Appendix Table 1, p. 47.

[45] The ordinance passed in December 1941 provided that in view of the previous alarming drift away from the farms and because of wartime need for foodstuffs a general policy of maintaining 40 percent of the population on farms was to be followed.

[46] Summarized in *Agricultural Labor and Food Production in Japan*, Ministry of Agriculture and Forestry, Tokyo, November 1945, p. 7.

agriculture, 8 percent from communications and transportation, and 26 percent from commerce, government and the professions, etc. If these estimates are even reasonably correct it would indicate that agriculture suffered far less loss of able-bodied manpower than industry.

The national registration, which provided only partial coverage, showed the following registrants in agriculture:

	Total	*Male*	*Female*
Feb. 1944	5,992,575	4,403,521	1,589,054
Nov. 1944	6,130,197	4,362,367	1,767,830
May 1945	5,907,569	4,035,452	1,872,117

Some compensatory gain came to agriculture as a result of workers (and their families), who were attached to new war plants established in rural areas, attempting to grow their own food. The 8 percent increase in farm tenancy during the war has been attributed in large part to this tendency.[47] This increase in tenancy kept the reduction in cultivated acreage from being greater than it was. Tohata, of the Agriculture Ministry, who was responsible for the agricultural labor study cited previously, stated that in 1941 conscription was responsible for only 12 percent of the arable land abandoned while occupational changes were responsible for 36 percent.[48] The situation changed, however, he testified, by late 1944 and conscription was responsible for 55 percent of land abandoned in 1944 and occupational change for only 15 percent. He submitted the following table to indicate the decline in agricultural labor from February 1944 to February 1945.[49]

Loss	*Men*	*Women*	*Total*
Total number of deaths	108,010	250,981	358,991
Excess of those leaving farms over those returning to farms	91,780	76,680	168,460
Military Conscription	728,260	.....	728,260
Total	928,050	327,661	1,255,711
Gain			
Demobilization	61,851	.....	61,851
National school graduates becoming farm workers	160,000	160,000	320,000
Total	221,851	160,000	381,851
Net decrease of agricultural population	706,199	167,661	873,860

Welfare Ministry officials indicated that this tabulation made no provision for wives, fathers, and grandfathers, etc., who went into full-time farm work when husbands and sons were drafted, nor did they agree with the estimate of net migration from the farm. Tohata stated that conscription of men caused the farm labor situation to become extremely acute in the spring of 1945. After February 1944 the government exempted farm labor

[47] *Farm Tenancy in Japan, op. cit.*, p. 13.

[48] *Interrogations*, Tokyo, November 17, 1945.

[49] *Agricultural Labor and Food Production in Japan, op.cit.*, p. 11.

from labor conscription.[50] In the autumn of 1944 students in agricultural technical schools, seniors in primary schools in farm villages, and students in agricultural colleges were permitted to be absent to work full-time on farms for the whole year. This was made compulsory in January 1945 and was enlarged to include middle-school students in agricultural villages. Draft animals (oxen) were shipped from Korea and surplus areas in Japan to deficit areas, to replace human labor. One of the functions of the People's Volunteer Corps, created primarily for defense against invasion in early 1945, was to be agricultural production. In addition, the vast migration from urban areas in the spring of 1945 added to rural and farming population. While the 1945 rice crop was the lowest since 1909, most of the blame seems to have been due to adverse weather, though in part shortage of competent agricultural labor and of fertilizer was responsible.

On the whole it may be concluded with respect to agricultural labor that it was more the shift in composition of the labor force, than decline in numbers, that accounted for the problems which arose. The size of the Japanese farm was, on the average, so small that it was always operated as a family affair and hired hands were rare.[51] When the male members of the family went to war the wives, children, mothers, etc., continued to operate the two or three acres but with less efficiency. The weight of the evidence seems to indicate that after February 1944 the agricultural labor force was fairly well maintained in numbers though its composition tended even more toward women and older males.

Industrial Labor Force

In contrast to the continuous decline in the agricultural labor force over the decade and a half to 1944, the labor force in manufacturing and construction rose steadily from 5.8 million in 1930 to 8.1 million in 1940 and to 9.5 million in 1944. Since the size of the loss in agriculture was small—289,000 from 1930 to 1940 and 566,000 from 1940 to 1944—while the gains in manufacturing and construction were large—2,256,000 from 1930 to 1940 and 1,362,000 from 1940 to February 1944—it can hardly be said that the increased numbers in manufacturing came at the expense of agriculture. In the thirties population increase was really the largest basic source, while in the early forties the 2.5 million decline in those engaged in commerce seems to have been the chief source. Perhaps as significant, if not more so, was the internal shift in emphasis within the broad category "manufacturing and construction." It was indicated in the first pages of this study that there was a basic shift from light industry to heavy in terms of value of output during the thirties. This was also true of labor

[50] *Oriental Economist*, February 1944, p. 54.

[51] According to the 1940 census, hired hands constituted but one percent of the farm labor force.

employment. The changing percentage of workers in heavy and light industry is shown below: [52]

	1930	*1937*	*1942*
Heavy Industry	27	47	68
Light Industry	73	53	32

The really basic change which the categories "heavy" and "light" tend to obscure was the decline of the textile industry and the rise of aircraft production. As is apparent in Table 37, employment in textiles, which had constituted 30 percent of total manufacturing and construction employ-

TABLE 37

LABOR FORCE, MINING AND MANUFACTURING AND CONSTRUCTION, BY SEX AND INDUSTRY, JAPAN PROPER, OCT. 1, 1930 AND FEB. 22, 1944 [a]

(in thousands)

	Oct. 1, 1930			*Feb. 22, 1944*		
	Total	*Male*	*Female*	*Total*	*Male*	*Female*
Mining	316	271	45	805	681	124
Metal	46	41	5	159 [b]	133	26
Coal	226	189	37	540 [b]	461	79
Oil	5	5	...	12 [b]	10	2
Other Mining	3	3	...	36 [b]	29	7
Stone & Earth Quarrying	36	33	3	58 [b]	48	10
Manufacturing & Construction	5,876	4,428	1,448	9,494	7,243	2,251
Metals	399	380	19	836	720	116
Machinery & Tools	217	207	10	936 [b]	757	179
Shipbuilding	100	99	1	693 [b]	638	55
Aircraft & Parts [c]	9	9	...	1,988 [b]	1,574	414
Vehicles & Conveyances	90	89	1	194 [b]	171	23
Ordnance [d]	34	33	1	496 [b]	395	101
Precision Instruments [e]	57	54	3	85 [b]	65	20
Chemicals [f]	201	164	37	613	428	185
Textiles [g]	1,960	844	1,116	824	251	573
Ceramics, Earth & Stone	210	180	30	232	170	62
Lumber, Woodworking	652	583	69	372	309	63
Printing, Publishing	266	230	36	110	77	33
Food Products	496	396	100	364	227	137
Gas, Electricity & Water	122	118	4	157	139	18
Construction & Civil Engineering	963	956	7	1,075	1,026	49
Miscellaneous	100	86	14	519	296	223

[a] Breakdown in terms of the industry to which a worker is attached (Sangyo-Betsu). Unemployed workers were considered attached to the industry in which they were last employed.

[b] Estimated from census data covering only those aged 14 to 60 to include all those in labor force.

[c] Assembling of aircraft, manufacturing of aircraft body, engine, propeller, special parts, and aircraft ordnance.

[d] Manufacture of ordnance for aircraft is classified under Aircraft and Parts.

[e] Measuring instruments for aircraft are classified under Aircraft and Parts.

[f] Includes synthetic rubber and oil.

[g] Includes apparel.

Sources: 1930 data are adapted from the 1930 census, *Final Report*, Table 47; 1944 data are adapted from census data of Cabinet Bureau of Statistics.

[52] *The Domestic Conversion to Heavy Industry in Recent Years*, Kokunai Keizai Shiryo #31, Research Bureau, Foreign Ministry, Tokyo, September 24, 1945, p. 5.

ment in 1930, was reduced by 58 percent to only 7 percent of 1944 total manufacturing and construction employment. Aircraft, on the other hand, expanded from a mere 9,000 employees in 1930 to 1,988,000 in February 1944. A survey by the Cabinet Bureau of Statistics in mid-1944 indicated that this trend had continued. As of June 30, 1944, employment in textiles was down to 777,000 while aircraft employment had risen to 2,042,000.[53]

On a lesser scale this was the pattern which prevailed throughout industry. The shipbuilding industry added some 600,000 workers over the decade and a half, while printing and publishing lost 150,000 and food products about 125,000. Ordnance gained 450,000, while lumber and woodworking lost 300,000. The extent of the changes between 1940 and 1944 may be seen in Table 38, which differs from Table 37 in that it reports only workers between 14 and 59 and presents an exact Japanese census classification which throws shipbuilders, ordnance, aircraft, machine tools, etc., all under the category "Machines and Tools." The percentage changes are indicative of the trends. It will be noted that even in highly essential war industries the percentage increase in women workers was greater than for males. This reflects the basic and uniform complaint of the managers of war industries. It was not, when really questioned closely, that they did not have enough labor—they did not have enough of the right kind of labor. The samurai tradition of militarist Japan that every man is first a warrior, and the resultant Army insistence on the sanctity of the draft, made impossible a reasonable exemption policy. With its dearth of skills, Japan should have been more lenient in its exemption of skilled workers than was the U.S. with its long mechanical tradition. The government tried to compensate for the Army policy and poured workers of every description into war plants so that actual numbers rose above 1940 totals, but this does not tell the story. Taking a coal miner with eight years experience and replacing him with a Korean farm hand and a 14-year-old student was not an efficient method of utilizing manpower. In the steel industry, for example, a prewar policy of employing military reservists resulted in a drain of one-third of its skilled workers and fore-

[53] See *Factory Employment in Manufacturing Industry by Category and Sex as of June 30, 1944*, Cabinet Bureau of Statistics Survey, Tokyo, November 15, 1944. Questioning of census enumerators and compilers indicated that where a textile firm had converted to war production, such as aircraft, but had retained its original name, the reporting form listed the original name and sometimes failed to indicate product, and computers therefore classified the plant under "textile." To the extent that this occurred, textiles would be overstated and aircraft understated in both the 1944 census in February and the survey in June. On the other hand a survey by the Air Ordnance Bureau of the Munitions Ministry, of a sample of 1,260 plants in February 1945, placed total employment in the aircraft industry (including light metal plants) at 2,104,500; excluding light-metal plants at 2,020,000.

TABLE 38

WORKERS IN THE LABOR FORCE, AGED 14-59, MANUFACTURING AND CONSTRUCTION, JAPAN PROPER OCT 1 1940 AND FEB. 22, 1944 [a]

(in thousands)

	Oct 1940	*Feb 1944*	*Difference 1940-1944*	*% Change 1940-1944*
Total Manufacturing & Construction	6,981	7,814	833	12
Male	5 271	5,936	665	13
Female	1,710	1,878	168	10
Metals	594	695	101	17
Male	550	610	60	11
Female	44	85	41	93
Machinery, Tools, etc [b]	1 800	3,681	1 881	105
Male	1,633	3,067	1,434	88
Female	167	614	447	268
Chemical	475	471	— 4	— 1
Male	347	321	— 26	— 7
Female	128	150	22	17
Utilities (Gas, Elec & Water)	82	94	12	15
Male	79	89	10	13
Female	3	5	2	67
Ceramics & Earth Stone	256	188	— 68	— 27
Male	205	134	— 71	— 35
Female	51	54	3	6
Textiles [c]	1 497	717	— 780	— 52
Male	533	178	— 355	— 67
Female	964	539	— 425	— 44
Lumber & Wood Products	431	294	— 134	— 32
Male	399	243	— 156	— 39
Female	32	51	19	59
Food Products	368	284	— 84	— 23
Male	249	166	— 83	— 33
Female	119	118	— 1	— 1
Printing & Publishing	116	85	— 31	— 27
Male	98	57	— 41	— 42
Female	18	28	10	56
Engineering & Construction	825	885	60	7
Male	809	850	41	5
Female	16	35	19	119
Miscellaneous	537	420	— 117	— 22
Male	369	221	— 148	— 48
Female	168	199	31	19

[a] Workers (Sagyosha) are those actually engaged in productive processes other than technicians

[b] Includes aircraft, shipbuilding, transportation equipment, and ordnance

[c] Includes apparel

Source Census data from Labor Bureau Ministry of Welfare

men in 1942 alone.[54] To compensate for this drain, the government sent conscriptees into the steel plants. The Steel Control Association declared:

[54] The Control Association declared: 'Inasmuch as the iron and steel industries required heavy labor it has been the policy in the past to rely largely on military reservists. Naturally the conscription of these workers was comparatively high. Furthermore this class of laborers furnished skilled workers and foremen. Therefore, the effect of conscription proved to be a severe blow to this industry. Although 33 percent of our workers were called to the colors this really represents a cut of 50 percent in the capacity of the working force."

After the outbreak of the Great East Asia War, government factories were allowed to commandeer laborers and the following important special steel industries relied heavily on commandeered labor: Daido Steel Works, Japan Special Steel Works, etc., and other factories producing special steel for the munitions industry. Because of the fact that most of the ordinary steel works not under government direction were unable to secure commandeered labor, great difficulties were experienced. Because of the fact that their poor production records were due to shortage of laborers due to conscription of skilled workers and increase of inexperienced workers, from December 1943, they receive special government help in making up their shortages.[55]

Conscription from non-essential occupations did not, however, result in an equal replacement of skills drafted. Nor did channeling of Koreans into the industry. They totaled 12,669 on August 15, 1945, and provided some relief in the "coolie" labor category—but a very unwilling relief. Nearly 4,000 were on the 1944 rolls of the Yawata Works, for instance, but the average daily working force was only 2,000. As one manager reported, "There was a bad tendency of Korean laborers running away from plant. . . ." When they could obtain 20 yen per day on military construction projects with no questions asked, as compared with 4 yen per day in the steel industry, there was a strong incentive to run away. The number of women replacing men in clerical jobs and in some types of labor increased six times in 1941-45, raising the proportion of women in the industry's total labor force to 13 percent. Finally, in the autumn of 1944, student laborers were placed in the plants, and by the end of the war amounted to 9 percent of the enrolled labor force. In some cases this proportion was much higher, however, as in the Tsukiji plant (Nagoya) of the Daido Electric Steel Co., where in 1945 students constituted 44 percent of employees. One-fifth of all workers in the industry were under twenty years of age. The impact of this type of labor force on productivity will be discussed in a subsequent section.

In coal mining, by the end of fiscal 1942 an estimated 50,000 miners had been taken by the Army alone, and this figure increased by about 10,000 per year in 1943 and 1944. In June 1944 the Army issued orders for the release of some 5,000 miners from troop units stationed in the home islands and they finally reached the mines during the last few months of the year. At the end of 1944 further conscription of mining technicians was halted and finally, in early 1945, all conscription of miners was stopped. Again the government attempted to compensate by funneling Koreans, women and students into the industry. By January 1945 Koreans made up 32 percent of the total labor force. The change in the composition of the coal mining labor force may be seen from the following figures: [56]

[55] *Working Conditions in Iron and Steel Industry*, Tekko Tosei Kai (Iron and Steel Control Association), Tokyo, November 1, 1945. p. 11.

[56] Source: Coal Control Association.

	Japanese Full-Time	*Japanese Part-Time*	*Koreans*	*Chinese*	*POWs*	*Total*
Dec. 1941 ...	287,099	12,803	41,566	....	....	341,468
Mar. 1945 ...	243,771	22,005	135,751	9,651	7,362	412,241

Of the full-time Japanese, 11 percent were women and 14 percent were students in March 1945. The Coal Control Association listed "measures taken against labor deficiencies":

(1) Importation of Koreans, Chinese, etc.;
(2) New training of skilled personnel;
(3) Transfer of laborers from well-organized factories and business;
(4) Application of the mobilization system;
(5) Use of prisoners and convicts;
(6) Student conscriptees;
(7) Permission to use "limited duty" miners (boys and girls under 16) for work underground;
(8) Extension of hours of work;
(9) Payment of part of wages by government subsidy;

and then concluded: "Around the first of 1945, however, we had to turn over our best personnel to construction of defense positions and airfields because of the requirements of the Army and Navy and consequently our labor position became impossible." [57]

Of the Korean miners in Japan, the *Economist* lamented:

About 50 percent of the coal miners in Hokkaido are working men from Korea. They make up 60 to 70 percent of the number in the pits. In two years the Korean workers attain 80 percent of Japanese efficiency, it is said. The trouble is that their contracts usually run for only two years. When the Korean miners get used to their work and begin to develop efficiency their term of contract expires and they return to their country. In some cases they remain about six months after the expiry and produce at a rate of about 80 percent but after three years almost everyone of them leaves.[58]

Obviously mere increase in numbers was no sign that the labor situation in a particular industry was satisfactory. This was even true of aircraft, which experienced the largest numerical increase. Because the industry grew so rapidly and because the base in the thirties was so small, most of the labor acquired during the war years was unskilled. There was not, as in the U.S., any large body of mechanical skill such as a large automobile industry, from which to draw experienced labor. Average monthly employment in airframe plants rose from 222,000 in 1941 to 825,000 in 1945. So rapid a growth, with every other war industry attempting either to hold on to or obtain additional technicians, stretched skill in the aircraft industry too thin for efficiency. Kurt Schmidt, the German aircraft production engineer stationed with Hitachi Aircraft Company, stated that only

[57] *Report on Workers in the Mines,* Sekitan Tosei Kai (Coal Control Association), Tokyo, November 20, 1945, p. 15.

[58] "A War of Coal," *Oriental Economist,* April 1944, p. 167.

10 percent of the workers were skilled, that the average age of machinists was nineteen years, that there were only fifteen inspectors for the engine plants and that spoilage of machined parts in engine production was 30 percent.[59] The Air Technical Intelligence Group, in its investigation of the Nakajima Aircraft Co., largest in Japan, declared:

Critical shortages of trained and experienced personnel, engineers, technicians, supervisors and workmen, are believed to account for the greatest single factor interfering with production. Engineers and technical specialists experienced in aircraft were just not available to meet requirements as Japan had only minor aircraft factories before the war. It was stated at Koizumi plant that there were approximately 400 engineers and draftsmen of which number 150 were design and research engineers. U.S. plants of comparable size had from two to three times these numbers. Although Japan had skilled industrial workers in other lines, the demands of expansion in these other war industries together with demands for military service, necessitated the use of younger and less qualified personnel by the aircraft industry as it went through its astronomical growth. The percentage of women employees increased from 7 percent in March 1942 to 36 percent in March 1945. As the war progressed the experience of the male workers continuously decreased. Shop foremen were given the impossible task of supervising up to as high as 1,000 more or less inexperienced workmen. Schools and special training programs were initially used for new workmen, but these were abandoned as the press of war became greater. New men were then dumped into the shops to learn by apprentice methods; however, this was not successful because of the high dilution by unskilled workmen and the lack of supervision.[60]

As was indicated in the previous chapter, unfortunately no accurate overall breakdown is available of the composition of the aircraft industry labor force. The Air Ordnance Bureau of the Munitions Ministry presented the following table showing approximate employment in the aircraft industry in February 1945, based on a survey of 1,260 plants:

	Male	*Female*	*Total*
Aircraft Factories	1,410,000	610,000	2,020,000
Airframes	560,000	240,000	800,000
Engines	280,000	120,000	400,000
Parts	570,000	250,000	820,000
Light Metal Factories	67,100	17,400	84,500
Grand Total	1,477,100	627,400	2,104,500

Women constituted about 30 percent of total employees. The bulk of the women operatives were drawn from the textile field; the second largest source was shops, offices, etc. More precise data are available for certain

[59] *Aircraft Production Facilities and Methods at the Hitachi Aircraft Co.*, Air Technical Intelligence Review, Report No. F-IR-51-RE, Tokyo, June 27, 1946, p. 4. (Now available in the Library of Congress, PB 33110.)

[60] *Aircraft Production Facilities and Methods at the Nakajima Aircraft Co.*, Air Technical Intelligence Group, Report No. 29, Tokyo, November 1, 1945, p. 7. (Library of Congress, PB 19202.)

individual firms. Of the 3,527 persons employed at the Yoshiwara plant of the Nissan Jidosha KK. (sixth largest airplane producer in Japan) in July 1945, 1,232 were women and 1,458 were male students. Of the 3,235 employees of the Mitaka Aircraft Company in January 1945, 1,094 were students and 440 soldiers were subsequently added. At the Eleventh Naval Air Depot, personnel in 1945 included regular employees (77 percent), conscripted students (19 percent) and military (4 percent). The Twenty-First Naval Air Depot had 16,286 employees in May 1945, of whom 4,876 were students. Of the 13,464 employees of the Chiba plant of Hitachi Aircraft Company, 7,289 were men, 1,934 women and 4,241 students. At the Tachikawa plant of the same company, of about 13,000 employees in January 1945, 8,000 were males, 3,000 females and 2,200 students. At the Kanzaki plant of the Sumitomo Propeller Company, 7,588 workers were males, 3,697 women and 1,734 students. At the Atsuta engine plant of the Aichi Aircraft Company, 58 percent of the total number of employees were conscripted laborers. At the Eitoku plant of the same company, of a total of 22,683 workers, 4,570 were students, 520 soldiers, 6,900 male conscriptees, and 2,900 women.

Despite the stress the Japanese placed on it, even the aircraft industry was not exempt from draft levies. It was reported that during the months following December 1944, approximately 4,500 workers of the Kyushu Airplane Company, or 50 percent of the total available skilled labor force, were drafted by the military.[61]

The logic of channeling conscripted workers and soldiers into some aircraft plants, while continuing to draft skilled workers from others, would be almost inexplicable were it not for two facts. Draft policy varied somewhat depending on the personality of the Army commander in the particular area or district. Secondly, as Captain Yoshida and Commander Ueda of the Labor Division of the Navy Supply Bureau explained: "The Navy took second place to the Army as far as authority for the deferment of civilian workers from military service was concerned. As a result of the Army's broad authority, the Navy suffered a manpower shortage especially in the fields of shipbuilding and aircraft production."[62]

The Kyushu Airplane Company produced aircraft and landing gear for the Navy and thus the Army would have no compunction about drafting its workers. It seems incredible but it happened. In terms of overall numbers it is probably not quite accurate that the Navy "suffered a manpower shortage," since workers drafted were replaced by conscriptees, students, women, Koreans, etc., but the problems of effectively utilizing such a miscellaneous labor force were so great that the dividing line be-

[61] *Kyushu Hikoki KK.*, Corporation Report No. XV, Aircraft Division USSBS, Washington, February 1947, p. 4.

[62] USSBS Interrogation No. 187, Tokyo, October 19 and 25, 1945, p. 3.

tween "shortage" and "inadequate" became blurred and tenuous. For example, the overall labor supply was never a primary bottleneck in merchant ship construction although it was under considerable strain during the period of peak production. The decisive factor was steel supply and the fact that the decline in output came sooner and faster than the decline in labor supply supports this conclusion. The quality of the labor force underwent a progressive weakening, however. Experience varied considerably among the yards, but for eight representative large yards the number of regular employees had been cut to one-third the prewar level by early 1945 as a result of the draft. The yards maintained and increased their labor force by the assignment of one or another of the various classes of compulsory labor. The average composition of the labor force of the eight representative large yards during October and November 1944 was as follows: [63]

Type of Labor	*Percent*
Conscripted Japanese Labor	45
Regular employees	20
Students (mostly boys)	10
Civil prisoners (Japanese)	9
Korean conscripts	8
Women (mostly clerical)	4
Prisoners of War	3
Chinese conscripts	1
Total	100

Thus in the four major industries into which conscripted workers were mainly channeled—iron and steel, coal, aircraft and shipbuilding—the absolute rise in numbers employed was not a real indication of labor conditions in the industry. There was a progressive thinning of the quality of the labor force because of faulty draft policy, and the rise in overall totals is apt to mislead. The impact upon productivity and efficiency will be discussed later, but as the Japanese themselves noted: "As the substitutes for the dependable factory laborers who were enlisted by the military mobilization, boy and girl laborers and students were mainly employed. By this measure, although the decrease in the total required number had been prevented, the decline in the quality of skill was more than imaginable." [64]

The Labor Mobilization Plans

The Japanese attempted to sum up yearly in one document their overall labor requirements and means of meeting them. The document was known as the Labor Mobilization Plan, later called the National Mobiliza-

[63] *Navy Labor Problems in Shipbuilding*, Navy Technical Dept., Tokyo, November 15, 1945, p. 17.

[64] *Report on the Labor Conditions of Manufacturing Plants, op. cit.*, p. 10.

tion Plan,[65] and consisted of three parts, (a) a statement of policy with respect to labor management and allocation, (b) a section tabulating labor requirements, and (c) a section showing the labor supply situation. While the final draft was assembled by the Cabinet Planning Board, the plan was a product of many hands and much compromise. It came up from individual firms through control associations to the respective ministries under whose jurisdiction the industry operated. The ministries then passed their consolidated requirements on to the Planning Board. All along the line requirements were overstated, and all along the line demands were consequently whittled down. Since the final requirements, when they reached the Planning Board, were always in excess of available labor supply, they had to be "adjusted," and the official requirements as finally listed and that could be met were probably below the real needs of industry. The Welfare Ministry, in cooperation with the Planning Board, made the basic studies on labor supply. In instructions for preparation of requirement estimates, the list of ministries responsible for various industries, and agencies for various other demands, required four long pages of tabulation—such was the diffused control structure. The estimates were due at the Cabinet Planning Board by February 15 and the Board then had a month to place a final draft in the hands of the Cabinet, for approval. The resultant plan was then administered in segmented fashion. Students were channeled until 1944 by the Education Ministry, technical school graduates by the Welfare Ministry, seamen by the Transportation Ministry; companies designated as "munitions" companies received their allotment quotas directly from the Munitions Ministry, and then had to either hire directly or through local labor offices. If they hired directly they had to notify the local office, which they often failed to do.

The bulk of the work of allocating and mobilizing, however, fell upon the local labor mobilization offices in the police bureaus. More was accomplished on the local level by the police power of "suggestion" than by official formal conscription, as will be indicated later. Responsibility for meeting the plan for his area was that of the prefectural governor and, late in the war, of the regional administrator appointed for each of the eight regional groupings established as part of the decentralization drive. Although requirement estimates submitted for each year were supposed to contain a statement of the actual result of the previous year's plan, the reporting procedure was so poor that the Board never really knew the exact results of the previous year's plan. It should be noted that actual implementation of the plan was in the hands of hundreds of local labor

[65] The name was changed to remove the impression that labor alone was singled out for regimentation. To strengthen this impression the 1943 mobilization plan provided that "company presidents and officers must also be commandeered."

offices. When the Welfare Ministry was called upon to supply its part of the "Report to the Diet on Causes of the Termination of the War," it presented the following figures on labor demand and supply during the war years: [66]

(in thousands)

Year	*Demand*	*Supply*
1939	1,095	1,139
1940	1,470	1,540
1941	2,212	2,213
1942	1,967	1,967
1943	2,396	2,396
1944	4,542	4,542

It concluded that the number mobilized for labor was therefore 13,104,269.[67] These were the figures of the labor mobilization plans, not the actual results of those plans; but in the absence of the results the figures were passed off as such.

In Tables 39 and 40 there are presented consolidations of the mobilization plans according to field of allocation and source of labor supply, for the war years. The Japanese divided their allocations into two broad categories, "new additions" and "replacements." New additions were for expansion while "replacements" were primarily to compensate for draft levies. The division of replacements for 1942, 1943 and 1944, excluding women to replace men in commercial enterprises, was as follows:

(in thousands)

	1942	*1943*	*1944*
Military Supplies	187	227	679
Basic Materials, Metal Working, etc.	149	173	546
Communications & Transportation	45	69	245
National Defense, Engineering & Construction	15	13	156
Civilian Consumer Goods	68	30	142
Agriculture	320	320	320
Miscellaneous	...	31	8
Total	784	863	2,096

The growing impact of the draft is apparent. Unfortunately, there was no overall plan for 1945. A draft of a plan for the first quarter had been started, but the situation got out of hand to such a degree that the pre-

[66] See *Nippon Times*, Tokyo, September 8, 1945, p. 3. The "intelligence" report on labor, referred to previously, misplaced the decimal point and reported 1941, 2.2 million, 1942, 19.6 million, 1943, 23.9 million, 1944, 4.5 million, and on this basis concluded that demand for labor in Japan reached its peak in 1943 and fell off sharply thereafter. A little troubled, the author of the report stated, "The significance of the individual figures is not entirely clear. A very considerable amount of turnover is suggested, and it is evident that 1942 and 1943 were the years when labor was most in demand."

[67] Consistent with much of Japanese statistical work in the labor field, the figures do not add up to the total given.

TABLE 39

PLANNED ALLOCATION OF WORKERS, BY ACTIVITY, JAPAN PROPER, 1940-44

(in thousands)

	Fiscal Year				
	1940	*1941*	*1942*	*1943*	*1944*
Total Allocation	1 470	2 212	1,968	2,396	4,542
A Operatives for Japan Proper	1 376	2,112	1,872	2,254	4 389
1 New Additions [a]	691	1,283	912	1,103	1,930
Military Supplies [b]	258	850	498	582	1 393
Basic Materials, Metal-working etc [c]	204	165	245	359	237
Communications & Transportation	117	107	94	106	135
National Defense Engineering & Construction	15	157	36	35	140
Civilian Consumer Goods [d]	97	4	17	7	15
Agriculture			22	10	4
Miscellaneous				4	6
2 Replacements	685	829	784	998	2 282
Non-agricultural	369	519	464	543	1 776
Agricultural	316	310	320	320	320
Commercial Enterprises women to replace men				135	186
3 Government Office Workers and Non-governmental Clerks [e]			176	153	177
B Workers for Development of Overseas Areas of Empire [e]	94	100	96	142	153

[a] New additions represent net additions planned for individual plants or establishments and not net additions for entire industry

[b] Includes aircraft and aircraft parts ships ordnance and some textile and food products

[c] Includes iron and steel coal metals mining construction machinery machine tools forgings railway cars automobiles, oil synthetic petroleum industrial salt industrial chemicals, cement electric power etc

[d] Includes medical supplies salt starches other food products and beverages tobacco certain textile products (hosiery short fiber threads, etc) etc

[e] Includes replacements and new additions

Source National Mobilization Plans Cabinet Planning Board Annually 1940-44

tense of centralized planning and control in labor was abandoned and each locality was left to its own resources [68] The degree to which reliance was placed in 1941-43 upon shifts within the labor force from unessential industry to war production, and in 1944 upon students, rather than upon bringing the unoccupied into the labor force, is striking (See Table 40) So confident were the Japanese in early 1942 that they allowed labor mobilization to slow down The number of unoccupied to be brought into the labor force was allowed to fall to almost half the previous year's figure and the internal readjustment of industry tapered off, as seen in Table 40, only to be pushed again in 1943 when the seriousness of the situation began to become apparent Another interesting feature is the attempt to maintain the agricultural labor force by providing yearly replacements

[68] See USSBS Interrogation of Saito, K , Welfare Ministry, Tokyo November 27, 1945

TABLE 40

ESTIMATED SUPPLY OF WORKERS TO MEET PLANNED ALLOCATIONS, BY SOURCE OF SUPPLY AND SEX, JAPAN PROPER, FISCAL YEARS 1940-44 [a]

(in thousands)

	1940	*1941*	*1942*	*1943*	*1944*
School Graduates	781	823	865	926	1,090
Male	442	474	474	537	586
Female	339	349	391	389	504
Undergraduate Students	...	...	...	53	2,053
Male	...	...	...	35	1,133
Female	...	...	...	18	920
Others not in Labor Force	289	169	90	255	270
Male	157	45	29	55	30
Female	132	124	61	200	240
Workers in Labor Force [b]	382	1,449	893	1,042	809
Male	319	1,138	685	789	487
Female	63	311	208	253	322
Koreans to be brought into Japan	88	81	120	120	320 [c]
Male	88	81	120	120	320
Female	...	...	...	...	...
Total	1,540 [d]	2,522 [e]	1,968	2,396	4,542
Male	1,006	1,738	1,308	1,536	2,556
Female	534	784	660	860	1,986

[a] *This table is the estimated supply of workers, by source, to fill allocation quotas shown in Table 39.*

[b] This category is an estimate of the number of workers already in the labor force who became available for allocation as a result of "economies in certain enterprises, forced curtailment in specified activities, reassignment program, voluntary shifting into essential industries," etc.

[c] Includes 30,000 Chinese.

[d] The excess of 70,000 workers in estimated supply as compared with planned allocation is for a standby reserve of women to fill positions vacated by men.

[e] The excess of 310,000 workers in estimated supply as compared with planned allocation explained by Japanese officials as consisting of an estimated 310,000 primary school graduates allotted to agriculture as replacements. In its *Summary Report to the Diet* on the "Causes for the Termination of the War," the Ministry of Welfare gave the supply figure for 1941 at 2,213,000.

Source: National Mobilization Plans, Cabinet Planning Board. Annually, 1940-44.

(See Table 39.) In its memorandum "On carrying out the third quarter Mobilization of Labor," the Welfare Ministry declared (in 1944):

The students of higher primary schools who are children of farmers and are to be mobilized for agriculture and forestry must be mobilized according to the notification "On Carrying Out Substance of Urgent Counter-Measures for Agricultural Labor," issued by Ministry of Agriculture and Commerce, No. 14023, on November 25.[69]

There is constant reference throughout the mobilization plans to the need for maintaining the agricultural labor force. A review of the mobilization plans, year by year, may provide an interesting account of the principal features of the labor problem with which the government was concerned at each period.

[69] Memorandum No. 314, Tokyo, December 1, 1944.

The first labor mobilization plan was drawn up for 1939. The Cabinet ordered the plan in September 1938 but due to delays in its preparation because the task was new, Cabinet approval of the 1939 plan did not occur until July 4, 1939. All copies of the plan were numbered and classified as "secret." Despite Japanese protestations, then, and after surrender, that they wanted to liquidate the war with China as quickly as possible,[70] the preamble to the plan declared:

In preparation for a long war, this plan aims to search out all sources of labor and to establish efficient labor controls so that the following aims may be accomplished:
(1) Speeding up the production of munitions.
(2) Carrying out the program for the expansion of production.
(3) Stimulating exports.
(4) Guaranteeing civilian necessities.

It was not long before items three and four were dropped, though the 1939 plan declared, "Women will be guided in the choice of suitable work and efforts will be made to locate them first of all in export industries where their labor is in special demand." The reluctance to use conscription was evident in the statement, "In view of the importance of avoiding all obstacles to the speedy mobilization of general labor, commandeering will be resorted to when other plans fail."

Great concern was expressed over the shortage of skilled workers, indicating that the Japanese were well aware of the problem at that early date. The report declared:

In order to furnish the necessary supplies of technicians, a very thorough census of unemployed technicians will be made as a basis for encouraging their cooperation in industry. The following plans will be laid in order to use these technicians most efficiently.
(1) The various units in a given industrial chain will draw plans for the exchange or the cooperative use of their technicians.
(2) Parent factories will enlarge their supervisory scope to include their subcontractors.
(3) All articles and manufacturing methods will be simplified and standardized.
(4) A census will be taken of the present distribution of technicians and positive efforts will be put forth to reassign them more fairly.
Commandeering of technical workers will be resorted to in case serious obstacles arise if there is no way to handle the situation. In view of the very serious shortage of skilled workers a plan shall be inaugurated immediately to train technicians in the following fields: industrial and mining technicians and skilled workers, civil engineers, medical workers, veterinarians, seamen, wireless operators, etc.

[70] Admiral Nomura, for example, declared, "The Army wished to end the China War as quickly as possible, but at the same time they wished to get something out of it. . . .our Government always wanted to finish the China War, and during my tour in Washington we requested your President to act as intermediary." USSBS Interrogation No. 429. Tokyo, November 8, 1945.

New demands for technicians were tabulated as follows:

	Machinery	*Electricity*	*Chemistry*	*Mining*	*Misc.*	*Total*
*High Class Technicians ..	6,270	3,630	1,400	2,250	3,900	17,450
*Low Class Technicians ..	15,100	8,570	1,910	3,230	22,520	51,330
Total	21,370	12,200	3,310	5,480	26,420	68,780

*High class technicians are graduates of technical schools or technicians of similar preparation. Low class technicians are graduates of middle schools or men of similar qualifications.

Supply was given at about one-quarter of demand, as follows:

High Class Technicians ..	1,090	720	580	260	1,300	3,950
Low Class Technicians ..	5,430	2,160	1,200	650	4,880	14,320
Total	6,520	2,880	1,780	910	6,180	18,270

and it is probable that the stated demands had been progressively pared down to less than the real demand.

The plan placed Japan's general labor requirements (as the government recognized them—for essential undertakings) at 1,095,000 and allocated 1,139,000. This does not mean that the government actually supplied that number. It authorized the local labor offices, by quotas, to channel that many workers into the essential fields designated. Graduates of technical schools were channeled directly by the central government. The 1,139,000 workers were to be supplied from the following sources: [71]

Source	*Men*	*Women*	*Total*
(1) Primary School Graduates	266,000	201,000	467,000
(2) Workers out of employment due to the material mobilization plan	70,000	31,000	101,000
(3) City workers not yet employed	64,000	23,000	87,000
(4) Rural workers not yet employed and agricultural workers	191,000	65,000	256,000
(5) Workers made available by industrial economies ..	82,000	11,000	93,000
(6) Females not yet in labor force	.....	50,000	50,000
(7) Laborers imported from Korea	85,000	.....	85,000
Total	758,000	381,000	1,139,000

While the primary schools and the rural areas were the two largest sources in 1939, the decline in utilization of the population of the rural areas will become apparent in due course.

The 1940 plan was concerned, among other things, with turnover, decline in labor efficiency and its control, unemployment, and protection of agriculture. The report noted:

In view of the drop in the will to produce and the physical deterioration of the laborers, special emphasis will be placed upon efforts to preserve labor efficiency, enlarge the activities of the patriotic production societies and reform the system of labor supervision. . . .all workers under 20

[71] *Summary of the 1939 Mobilization Plan,* Cabinet Planning Board, Tokyo. July 4, 1939, Table 3, p. 10.

years of age shall be placed under proper discipline. . .in order to increase efficiency, circulating groups of foremen shall be organized. . .in order to prevent the occurrence of disturbances among laborers,[72] the activities of the patriotic production association shall be strengthened.

On agriculture the report noted the growing need to prevent a drop in agricultural output and asked for formation of a student service corps to furnish labor on farms and that commercial workers be directed to return to farms to help in busy seasons. It called for a wider use of animal and machine power and urged that agricultural production be kept up. However, the plan still drew workers from the rural area, though to a lesser degree than in 1939.

The plan called for reorganization or combination of medium-sized and small enterprises to release labor and for the immediate absorption of the unemployed. One paper at the time headlined an article, "Unemployed Urged to Start Farming—Government Acts to Aid Jobless," and declared; "A large-scale 'back-to-the-land' movement and other permanent measures for the relief of the unemployed and also an effort to brighten up the lot of the people under the present economic restrictions were indicated at a recent meeting of government authorities."[73]

The plan again stressed measures to cope with the shortage of technicians, and provided for a system of registration of the unoccupied, the unemployed and seasonal workers. On turnover it declared:

In view of the fact that the increased turnover of labor makes it difficult to regulate supply and demand and in order to check this turnover in important industries, the ordinance limiting the employment of workers shall be revised and strengthened and penalties for violations shall be more severe. Special efforts shall be made to carry out the provisions of this ordinance

Demand was placed at 1,470,000 and supply at 1,540,000. Middle-school graduates were added to the list of sources of labor supply. Primary and middle-school graduates were to provide 50 percent of the supply, unemployed workers 14 percent, rural workers not employed, as well as some agricultural workers, 13 percent (compared to 22 percent in 1939), workers to be made available by readjustment of enterprises 10 percent, Koreans 8 percent, females not in the labor force 3 percent, and urban unoccupied 2 percent.[74]

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[72] The number of strikes was reduced from 628 in 1937 involving 127,730 participants to 216 cases with 6,627 participants in 1944. Welfare Ministry officials claimed that there had been only 8 strikes during the first six months of 1945.

[73] *The Transpacific*, Tokyo, November 7, 1940, p. 25. Also the *Genchi Hokoku*, No. 38, November 10, 1940, had an article entitled, "Economic Ministers Tackle Unemployment, Occupational Change," by Nozaki, Kyushichi.

[74] In discussing the 1940 Labor Mobilization Plan the Mitsubishi Economic Research Bureau noted, "A shortage of technicians and skilled workers has been keenly felt, not only in Japan but also in Manchukuo and China." *Monthly Circular*, September 1940, p. 21.

The 1941 plan was a far more detailed affair than either of the previous two. There was much delay in its adoption and it was not made available to the prefectural governors until September 1941. Hoshino (who was head of the Planning Board at that time) would not admit that the delay in the plan had anything to do with preparation for war, but the fact that it was a much more thorough inventory of manpower resources than ever before and in numbers allocated more than twice the 1939 total, would seem to indicate clearly involvement in more extended war planning.[75] There was a detailed inventory of workers in unessential fields and a large shift in occupations was planned. For example, it was estimated that there were 1,385,113 workers in the theatre, restaurant, sports, recreation and entertainment fields (including a tabulated 35,384 prostitutes and 74,704 geishas) of which 253,876 were to be transferred to other occupations. There were estimated to be 189,560 rice merchants and employees of whom 58,990 would be shifted. Workers in retail establishments under the jurisdiction of the Ministry of Commerce and Industry were placed at 2,017,858, of whom 440,528 were to be shifted. The allocation of new operatives to civilian consumer goods production was cut drastically from 97,000 in 1940 to only 4,000. The total supply of labor was estimated at 2,522,000, of which 56 percent was to come from business, involving shifts within the labor force, 32 percent from new primary and middle school graduates, 6.7 percent from the unoccupied, etc. It is interesting to note that of the 56 percent from the labor force, 3 percent were home workers. This was the beginning of a government drive to send home workers into the factories on the theory that they would be of greater value productively and contribute more to war output there than at their household industries. This was quite a departure from past practice for Japan, where home industry had traditionally flourished.

For the first time a distinction was made between temporary and other workers. It was recognized that some of the demand was really only for workers for a certain limited period, but in the absence of any provision for requesting such workers firms had been forced to request permanent workers. Also it was held that by creating the temporary category the local labor office would obtain better control over day laborers. In addition, demands might be pared down by granting temporary workers when permanent ones were requested and thus upon expiration of the temporary period force the requesting source to justify its demand again. Requirements for temporary workers were computed at 48.8 million man-days, 44 percent of which were to be supplied by students. Construction accounted for 25 percent of the demand, munitions production and agriculture for 23 percent each.

[75] The plan declared, "This plan is based on the emergency labor plan worked out by the Cabinet on August 29, 1941, and is to be carried out immediately."

The report expressed some impatience with overseas demands although 100,000 were allotted for this purpose compared to 94,000 in 1940. The plan stated: "Workers for Manchukuo agricultural colonization projects, members of the Youths' Volunteer Manchukuo Colonization Army and other workers to be supplied from Japan Proper will be kept to a minimum."

A separate report covered personnel needed in Manchuria, China and the South Pacific. Korean laborers were to be sent not only to Japan but to Manchukuo, Sakhalin and the South Pacific as well. Such emigration was to be speeded and a special instruction was dispatched to the Governor-General of Korea to this effect. Some 20,000 Chinese were to be sent to Formosa and 40,000 Formosans to the "southern territories"; in addition, 17,000 Koreans were to be sent to the South Pacific Islands. The 12,053 graduates of university engineering, industrial, mining and technical schools were to be distributed geographically as follows:

Area	*Demand*	*Supply*	*Percent Supply of Demand*
Japan Proper	27,214	8,128	30
Korea	3,014	1,094	36
Formosa	636	268	42
Sakhalin	242	142	58
South Pacific	19	13	68
Manchukuo & Kwantung	4,035	1,781	44
China	718	629	87
Total	35,878	12,055	33

Obviously only one-third of the pared-down demand could be met. It is apparent that Japan started the Pacific War fully aware of her shortage of technical ability.

The 1942 plan was somewhat late too; it was issued on May 26, 1942. It announced that the term "labor mobilization," previously used, had been changed to "national mobilization" (Kokumin Doin) and declared, "In view of the drying up of the sources of labor, requests for labor are to be trimmed down. To offset this move, efforts will be carried forward to increase production efficiency."

This was the year of confidence and the report reflected it. "Agriculture, marine products and clerical workers in banking and insurance shall also be covered in this year's demand for workers. . . .in view of the importance of furnishing enough civilian goods to give the people a feeling of security, the scope of this category shall be widened."

For the first time agriculture was given an initial allocation of new operatives totaling 22,000, in addition to a slight increase in replacements, while the civilian goods allocation was stepped up from 4,000 in 1941 to 17,000. Total allocations were cut below the previous year's total and the biggest decline came, amazingly enough, in the category "military sup-

plies" which was cut 352,000 or 41 percent below 1941. Non-agricultural replacements were also reduced.

The Board declared:

> The purpose of the 1942 mobilization plan is to bring about a sudden spurt in the war effort in view of the present situation and also to effect a far reaching reform in the occupational habits of the nation. . . .a general view of the nation's manpower situation shows that since the outbreak of the China Incident, the labor demand and supply situation has grown more stringent. . .with this in mind, the government began strengthening the mobilization plans. Present plans embody a widening of labor registration, a reform of the ordinance for commandeering labor and plans for strengthening the patriotic labor cooperation ordinance and the factory labor superintendence ordinance, etc.

In addition all students aged fourteen and over were to be mobilized, regardless of the nature of the school involved. The number of unrecognized schools was to be limited along with their employees. "Laborers destined for Manchukuo colonization enterprises and the Manchukuo Youth's Colonization Army shall be limited to the minimum number." "Workers needed by enterprises in the southern occupied territories shall be filled as a rule from local labor sources but consideration shall be given to sending out the necessary foremen." In the petroleum industry, however, as was indicated in Chapter 3, almost all available technicians were sent to the southern area and their loss was felt later and proved a severe handicap when the Japanese were forced to try and increase domestic oil sources in 1944-45.

The 1942 plan provided that thereafter quarterly estimates of needs were to be submitted and quarterly estimates of supply would be drawn up. This was to tighten control and improve the planning. More extensive use of Koreans was to be made especially in mining and stevedoring. The number to be imported was stepped up from 81,000 to 120,000. Women were to take the place of men in government and business offices. Agriculture became increasingly sacrosanct. "A large number of workers will be granted to agriculture in view of the importance of agricultural production and the situation now obtaining in the rural areas."

The 1943 plan was marked by a definite tightening of the belt. It was planned to commandeer labor to an increasing degree and the plan stated:

> In order to guarantee sources of commandeered labor, selection will be more strict and fewer permissions to be released from being commandeered will be permitted. . .in paying commandeered workers in factories and workshops, care must be taken not to pay a figure too much less than what the said individual was drawing before. Any necessary pay differential will be paid from the national treasury. The present period that commandeered labor is to serve will be lengthened and persons may be commandeered for a second period if necessary. The conditions under which commandeered persons are released will be clarified.

In addition to strengthening the conscription system the plan announced that the free employment of men would be further limited—maximum age for conscription was raised from forty to forty-five; unimportant and unrecognized schools were to be eliminated; and in addition to importing the same number of laborers from Korea as in 1942, Chinese, Korean laborers resident in Japan, prisoners-of-war, and inmates of penitentiaries were to be brought into the mobilization plan. Highest priority in manpower assignment was to be given to iron and steel, coal, aircraft, light metals and shipbuilding. To assist agriculture "a definite number of new primary school graduates will be assigned and an effort will be made to furnish more male workers than last year." No increase was to be allowed in business workers and only a small number of women were to be allotted to provide partial replacement for males whom it was necessary to take away in increased numbers. Teachers were to serve part-time as police and firemen. Allotments to the southern territories were to be limited to foremen and special technicians and the number of these was to be kept down as much as possible. All persons changing their occupation were to become subject to conscription, as were Koreans resident in Japan. The plan stated, "Heretofore, the reorganized industries furnishing labor have been limited for the most part to the retail category but from now on a great many other enterprises will be included." Still women were only to be "urged" to take work in war plants. The plan stated, "Graduates of girls' high schools and similar institutions and those who are unoccupied should be urged to accept work in suitable lines."

Finally, efforts were to be put forth "to reestablish the old imperial spirit of work," and as an aid in accomplishing this, "to give the worker a feeling of security and to increase his working efficiency, a fairer system of wages will be worked out and the necessary controls established." Of the 2.3 million workers allocated, 44 percent were to be supplied from shifts within the labor force, 41 percent by school graduates and students, 10 percent from the unoccupied, and 5 percent by Koreans. For the first time undergraduate students were to be utilized within the supply framework of the plan.

The 1944 mobilization plan made the others seem puny in comparison. It involved twice as many workers as the 1943 plan but the largest increase was in the replacement category and this was mainly to compensate for the vastly heavier military draft. In view of this the plan stressed greater mobilization of women. The percentage of women to the total allocation was 43 percent in 1944 compared to 34 percent in 1943. The plan stated: "Female laborers shall also be commandeered[76] but due consideration shall be given to the limitations of women and to strengthening the work

[76] The subsequent act applied only to unmarried women between 12 and 39, and then only in a limited fashion.

of the Women's Volunteer Corps." Also "a further mobilization of women will be effected. This will include unemployed women and many who may already have some employment." Women were to replace men wherever possible and would be permitted to work night shifts. The second point of emphasis was upon undergraduate students. Their period of mobilization was to be extended for the whole year and students in several of the lower grades were to be mobilized down to eleven year olds. The importation of both Koreans and Chinese was to be stepped up sharply. It is interesting to note that fewer males than in 1943 were to be obtained by shifts within the labor force from less to more essential industries since that source, because of the heavy military draft, was about drying up. It was for this reason that the emphasis was placed on women and students. The order of industry priority for labor supply was specified in the following sequence: "aircraft, shipbuilding, munitions, coal, production of raw materials, transportation, national defense [construction projects]." Concern was still expressed over the turnover rate and the matter of training was still given lip-service. It was rather late but the Japanese still declared:

> In order to improve work superintendence, a system of training shall be established [and] along with the reorganization of industrial chains, plans shall be laid for the increased cooperation of parent and subsidiary factories and for a more effective interchange of workers between them, especially foremen. . . . [Agriculture] shall be allotted the same number of new primary school graduates as last year.

Initial demands as presented by the various ministries totaled 7,701,516. The final allotment was 4,542,000. The request for "munitions" workers (including aircraft, shipbuilding, etc.) was cut from 3,750,469 to 2,071,516. The national defense works (construction, airfields, coast emplacements) was slashed from 637,425 to 295,104. Agricultural and forestry were left virtually untouched. The request was for 330,377, the allocation 328,172. Overseas requests were cut from 255,462 to 153,000. For the first time the replacement total, 2,282,000, exceeded the new allocations, 1,930,000. By source, students, graduates and undergraduates combined supplied 69 percent of the total, compared to 40 percent in 1943. Shifts of workers within the labor force accounted for only 17 percent of the total compared to 43 percent in 1943. Of the grand total women accounted for 43 percent compared to 34 percent in 1943. Such were the essential features of the 1944 labor mobilization plan.

In a letter dated March 27, 1945, from the Vice-Minister of Welfare to the presidents of the Regional Administrative Councils and to prefectural governors, the Welfare Ministry in effect transferred not only responsibility for carrying out labor mobilization, which had always been mostly a local affair, but also for drawing up district mobilization plans. The prefectural authorities were to draw up their plans and inform the Welfare

Ministry by April 15. It would then be approved or disapproved. The local authorities were told to be sure and provide adequately for agriculture, liquid fuels (the pine root oil project), special attack weapons, munitions, etc.[77] Such was the priority of the day. They were told to cut commerce, official and professional occupations and domestic service to the bone. Neither the communications, the organization, nor the will were there for another overall national mobilization plan.

Conscription

After the war the *Economist* reported that 6.1 million people had been drafted for labor at munitions plants, factories, etc. While the fact is broadly correct, the impression given is not quite so. The total conceals two broad and different categories. One group, the smaller, was "conscripted" for work in war plants, the other was "frozen" to the job. Some 1.6 million persons were conscripted while 4.5 million were frozen on the job. The smallness of the number of those "conscripted" is worthy of close examination. Conscription resulted from the various national registrations which, as has been shown, began in 1939 and at that time was limited to technicians only. The real broadening of the system came in November 1941, when all males between 16 and 40 and all unmarried females between 16 and 25 were required to register. Only the males, however, were subject to labor conscription. The Japanese usually state that women were not conscripted until late 1944, but that is not what they mean. Women were frozen to their jobs in war plants in late 1944 but they were never conscripted in the sense of being required by the labor mobilization office to take a job in a war plant. By February 1944 the national registration, in effect an inventory of possibly available personnel, had been extended to include males from 12 to 59 and unmarried females from 12 to 39. The women were never subjected to conscription, except in the sense described above, and married women were never required to register.

In contrast to the British who registered, examined, and then assigned to or exempted from war work an entire age-class, Japanese conscription was haphazard and came to depend much upon the whims of the local prefectural and police officials and the intransigeance of the worker. Unlike British workers, conscripts in Japan had no regularized right of appeal. Indirect channels and pressure were used but approval by the prefectural governor was final. There were charges of favoritism and discrimination and in the early days complaints because wages in the new job might be lower than previous earnings.[78] The government met this

[77] "Labor Mobilization for Victory in the first quarter of 1945," letter from Vice-Minister of Welfare, dated March 27, 1945, Tokyo.

[78] *Romu Haichi Ron* (Account of Labor Allocation), by Sahaku, Toshio, Tokyo, November 1942, p. 87.

latter complaint by agreeing to pay the difference by subsidy in the case of the conscripted worker who stood to suffer by the change. The slow extension and limited application of conscription may be seen in the following table, which shows new conscripts channeled into essential industries by years, from 1939 to 1945. The term "labor conscription" as used here is confined solely to males who entered essential industries because of formal government compulsion, according to the Welfare Ministry.

Year	*Yearly Total*	*Cumulative Total*
1939	850	850
1940	52,692	53,542
1941	258,192	311,734
1942	311,649	623,383
1943	699,728	1,323,111
1944	229,448	1,552,559
1945*	47,771	1,600,300
Total	1,600,300	1,600,300

* To August 1945.

Thus by 1944 the total number conscripted amounted to only 8 percent of the male civilian labor force. The Japanese used conscription more as a club or threat to drive workers into war industries than as a widely used tool for actual manpower allocation. The extreme reluctance of the average Japanese worker to be conscripted was a powerful motive in bringing about voluntary changeover from peacetime to wartime pursuits. A Japanese male thrown out of employment by curtailment of a non-essential industry preferred to find work through the local labor mobilization office in a nearby war plant than face the threat of being sent to some other prefecture, away from his family. If he voluntarily sought work, he could choose the type, whereas once conscripted all choice vanished. Local labor offices served conscription papers on workers only as a last resort. First the worker was called to the labor office and possible jobs were suggested. If he did not respond, the police visited him at his home. Finally he was lectured by the head of his local neighborhood association. If all this did not work, and it usually did, conscription papers were then made out. The conscription of graduates of technical schools remained in the hands of the Welfare Ministry. The decline in conscription in 1944 was attributed by the Welfare Ministry officials to the fact that the bottom of the barrel had been scraped, that there just were no more eligible males available for conscription in view of the growing demands of the military draft.[79]

[79] A report of the Osaka Police Bureau declared: "The draft system came into force since July 1939 and was applied to about 140,000 persons to be allocated to factories in Osaka Prefecture, of whom about 60,000 were drafted by the order of Osaka Prefectural Governor. But the declining tendency appeared in this field too and at last in March 1944 the order of draft was delivered to about 20 persons, of whom only one or two were eligible." See *Senji Chu Ni Okeru Doin Kiko* (Labor Mobilization System During War Time), Osaka, November 1945, p. 8.

They also indicated that it was probable that the sharp increase in the number conscripted in 1943 had a salutary effect on worker reluctance to change jobs and that many more, realizing that the government was serious about conscription, "voluntarily" went into war plants in 1944 and did not wait to be conscripted Aside from total labor force figures presented previously, showing net changes in various fields there were no statistics available showing either referrals by local labor offices or voluntary changes by workers

When conscripted workers were assigned to a plant, all the other workers in that plant were frozen to their jobs In addition, in 1944, employees of all designated "munitions companies" were also frozen regardless of whether the plant had conscripted workers or not The total number and distribution of conscripted enterprises are shown in Table 41 It is apparent that whereas the peak of worker conscription came in 1943, enterprise conscription occurred mainly in 1944 as a result of designation of munitions companies The Welfare Ministry estimated that 4 6 million male workers were frozen in jobs in conscripted enterprises over and above the 1 6 million conscripted workers and students

TABLE 41

CONSCRIPTED ENTERPRISES BY INDUSTRY, JAPAN PROPER 1939-45

Industry	*1939*	*1940*	*1941*	*1942*	*1943*	*1944*	*1945*	*Total*
A Civilian Conscripted Enterprises (including "Munitions Companies")								
Steel			18	36	30	372	23	479
Light Metal				3		72	3	78
Metals			15	11	14	221	25	286
Aircraft			52	64	63	1 027	70	1,276
Shipbuilding			9	9	17	163	16	214
Machine Tools			19	55	80	1 077	62	1,293
Chemical			3	15	6	687	61	772
Textiles				6	1	53	15	75
Foodstuffs						1		1
Other Manufacturing			1	4	7	98	11	121
Electric, Gas & Water				.		92		92
Transportation							19	19
Coal				.		277	9	286
Mining other than coal						207	20	227
Total	—	—	117	203	218	4,347	334	5,219
B Military Conscripted Units								
Army Labor Units	4		16	31	15	13	13	92
Navy Labor Units		15	29	25	17	24	11	121
Total	4	15	45	56	32	37	24	213
C Government Conscripted Units								
Transportation and Communication						16	308	324

Source Welfare Ministry

While Japanese mobilization of women for the war was better than the German effort, it fell considerably short of what might have been expected of a nation "fighting for its very national existence" Most of the

women who were at work in the war industries in 1944-45 had come from reorganized and consolidated "non-essential" enterprises, not from the unoccupied. The 1944 census showed 25 million women as "unoccupied." Half were under 15 years of age but there were about 6.3 million women between the ages of 15 and 39, classified as "unoccupied," who might easily have been forced into the labor field had it not been for the reluctance of the government to use compulsion.[80] The labor mobilization plans had called for only 750,000 "unoccupied" women to be mobilized for war work during the five years 1940-44. Up to 1930 females exceeded males in total factory employment in Japan. The textile industry, the first major industry to be developed, was staffed primarily by women. After the development of the war industries, however, males were more in demand, and by 1937 outnumbered female factory workers by 50 percent. In June 1942 women constituted about two-sevenths of the workers in factories. In 1943 the *Economist* noted:

> From these observations, it is readily perceivable that in Japan the advance of females into the labor field has been relatively tardy. The reason for this is due to the fact that despite the National Compulsory Service Ordinance, females between 16 and 25 years of age have not yet been mobilized and also to the existence of the factory workers' protective laws.[81]

The protective legislation was suspended, but though conscription was urged in some quarters it was not adopted, because, as the Welfare Ministry explained, "the upper class with prejudice against factory labor did not support the public opinion that women also should be conscripted to war production."[82] Instead, a variety of measures, designed to induce voluntary enlistment in war production and through the force of public opinion, were adopted. In 1943 a Women's Volunteer Corps (Joshi Kinro Hokoku Tai) was formed for the purpose of enlisting unmarried women for part-time work for periods of six months. In June, when the Ordinance of Labor Turnover Control (Romu Chosei Rei) was revised to prohibit men from seventeen designated occupations, the Joshi Tai personnel was used to partially fill the gap. The Volunteer Corps had an air of women's auxiliary activity about it, was not satisfactory, and was reorganized in 1944 and renamed the Joshi Kinro Teishin Tai (Women's Emergency

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[80] The number of "unoccupied" women increased slightly between 1940 and 1944. This was due largely to the decline of home industry and to the resultant fact that many women, who had responded as "gainfully occupied" in 1940 because of their household trades, did not shift to other jobs, as materials became scarce and the household industry turning out mostly consumers goods disappeared, but remained at home and were reported as "unoccupied" in 1944.

[81] *Oriental Economist*, April 1943, p. 175.

[82] *Woman Labor in Industry*, Welfare Ministry, Tokyo, December 18, 1945, p. 7.

Labor Corps). All unmarried women between 12 and 39 who had registered in February as "unoccupied" were subjected to pressure by "neighborhood" associations to join the Emergency Corps. In joining, one agreed to serve one year in a war plant. Membership reached 472,000 by March 1945 but Welfare Ministry officials estimated that half of these had been gainfully occupied in some way prior to joining the organization. An ordinance in August 1944 tackled the subject obliquely by setting standard ratios of women to total employees for various industries and prohibiting men from exceeding their percentage share. For example, women were to constitute 60 percent of employees in the electric bulb, electric communications machinery, dry battery, tools (excluding steel), bearing, gauge, and medicine industries; 40 percent in ordnance plants; 30 percent in aircraft, paints and dyes, rubber goods, etc. In offices they were to constitute 60 percent in banking and insurance, hotels and restaurants, telegraph and telephone, etc.

In October 1944 women working in munitions companies and other plants having conscripted workers were frozen to their jobs. Actual conscription to a job, as we have seen, was never used, though it was often threatened and the pressure exerted was great. One Welfare Ministry official described the procedure as a "low form of conscription" because of the frequent warnings that if women did not volunteer they would be drafted. The *Economist* commented bitterly after the war:

> During the war, women took to working in munitions factories ostensibly on their own sweet will. The sober fact, however, was that they were drafted into war work through "neighborhood associations" of which they were members. Daughters of upper class families were, in many instances, able to evade compulsory work by being adroitly employed as office girls at companies by their fathers or relatives. Needless to say these girls were able to work in a half-hearted way at places little exposed to danger from air raids.[83]

A survey in June 1944 by the Cabinet Bureau of Statistics of factory, mines, offices and shops, employing 11 million workers, placed female labor at 32 percent of this total. The only other evidence[84] beyond the February 1944 census, which would provide a clue to the outcome of the 1944-45 drive to enlist women in war production, was the national registrations of February and November 1944 and May 1945. Only unmarried women between 12 and 39 were required to register. Those in the labor force showed an increase of 370,000 between February and November and then a decline of 290,000 between November and May. Those

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[83] *Oriental Economist*, April 5, 1947, p. 260.

[84] An estimate of the Ministry of Welfare placed the total increase in the female labor force between March 1944 and March 1945 at 1.4 million. This included women of all ages and students.

registered as "unoccupied" declined by 100,000 between February and November and by an additional 60,000 between November and May.[85] It is probable, however, that the disorganization resulting from urban air attacks made the May 1945 registration less complete than it should have been. On the other hand, many workers had fled from factories to rural areas as a result of the raids. All in all it appears that the authorities were more successful in inducing changeovers from non-essential to war plants than they were in drawing "unoccupied" women into the labor force.

Students comprised the largest source of replacement labor for those drafted into military service during 1944-45. The student mobilization program got under way slowly and late. The 1943 mobilization plan contemplated using only 53,000 (undergraduates, as distinguished from graduates). At first the Ministry of Education ruled that no student could work more than thirty consecutive days. After a trial period under this system, employers protested that it was too short and wasteful of effort and did not enable them to make effective use of students. As a result in January 1944 the period was lengthened to 120 days. In February the ban on the number of working days was lifted entirely. Prior to February the Education Ministry handled all requests for student labor and officials indicated that they made an effort to keep the primary emphasis on education rather than on labor.[86] However, in February, the Welfare Ministry assumed responsibility for the allocation of student labor. Prior to July 1944 instruction was held as a rule for six hours a week. The student would either report at the school one day a week or teachers would visit the factories in turn. After July, however, instruction was abandoned for the most part, in a few cases held on holidays or before and after work at the schools. The authorities discovered that students worked better when their teachers were assigned to work with and supervise them in the plants. As a result teachers were assigned to factories too. In some cases the school itself was turned into a factory. The Education Ministry favored this but the Welfare Ministry did not. The Education Ministry declared:

From an educational point of view the school factory was better than the stationing of students in factories, hence we promoted to reorganize schools to factories, but in actual number of school factories were not so many, because construction of schools was not fitable for factories and many industries had not space of materials or establishments. However,

[85] *Comparative Statement of Results of National Registrations*, Mobilization Division, Labor Bureau, Welfare Ministry, Tokyo, October 11, 1945.

[86] See Interrogation of Omura. Seiichi, and Nakane, Hideo, of Ministry of Education, No. 14, Tokyo, October 8, 1945.

many girls' middle schools made clothing of military, etc in their schools and technical schools engaged in assembling parts of airplanes, radio, etc [87]

Students were paid not by the work they performed but according to grade in school and sex Moreover the students were not paid directly but through the school, which first deducted its fees, etc, and required forced savings which were to be paid to the student upon graduation This was not a very effective incentive for hard work and, consequently, whereas the authorities had hoped that the spirit and enthusiasm of the students would give the regular workers a boost in morale, the opposite

TABLE 42

NUMBER OF STUDENTS MOBILIZED FOR WORK, BY SCHOOL AND TYPE OF WORK JAPAN PROPER, 1944-45 [a]

(in thousands)

School & Sex	Total	Type of Work: War Production	Food Production	National Defense and Evacuation	Misc
October 1944					
University, Technical & Normal Schools	126	85	26	12	3 [b]
Middle School	1,149	761	280	108	
Primary School	723	129	560	34	
Total	1,998 [c]	975	866	154	3 [b]
February 1945					
University, Technical & Normal Schools	180	139	25	16	
Middle School	1,629	1,220	280	129	
Primary School	1,297	587	710		
Total	3,106	1 946	1,015	145	
Male	1 777	1,109	547	121	
Female	1,329	837	468	24	
July 1945					
University, Technical & Normal Schools	195	145	31	19	
Middle School	1,603	1,046	342	176	39 [d]
Primary School	1 634	517	753	211	153 [d]
Total	3,432	1,708	1,126	406	192
Male	1 925	985	604	237	99
Female	1 507	723	522	169	93

[a] Data in this table represents the degree of mobilization on the successive dates shown Since totals for each date do not represent successive separate mobilizations, they should not be added

University school students were about 17 years and older Middle school students were from 13 to 17 years of age and students mobilized from primary schools from 12 to 14 years of age

[b] Mobilized for medical work

[c] Breakdown by sex not available

[d] Mobilized for communications and transportation industry

Source Ministry of Education

[87] *Report on Student Labor Mobilization*, Gakuto Doin Kyoku (Student Mobilization Bureau), Mombusho (Ministry of Education), Tokyo, November 27, 1945, p 8.

proved to be the case. Students resented the low level of their wages compared to regular workers and the fact that they were not paid directly. The hours, as the Japanese put it, were ten but employers were allowed to let students work two hours overtime at no additional compensation, to manifest their patriotic spirit. It is little wonder, therefore, that special investigators were assigned to watch for "dangerous thoughts" among the students.

The 1944 mobilization plan called for the assignment of more than 2 million students, a marked contrast to the 53,000 of 1943. The number of students mobilized for work on three successive dates may be seen in Table 42. By October 1944, close to 2 million had actually been mobilized and this represented 40 percent of those old enough to be called. By February 1945 more than 3 million had been mobilized; this represented 70 percent of those eligible and about 9 to 10 percent of the total 1944 civilian labor force. By July 1945 some 3.4 million had been mobilized but there was a decline in the number assigned to war production and an increase in those engaged in dispersal and defense and earthwork construction projects. How many of the 3.4 million mobilized by July 1945 were actually at work is not known, but probably many had gone home or had been sent to rural districts by concerned parents. The Japanese relied far more heavily upon the mobilization of students than upon inducing "unoccupied" women to come into the labor force. This was due to the traditional social stigma which in Japan attached to women who worked, most of whom, in the past, had come from the poorer rural groups.

To meet the need for able-bodied, heavy workers in the mines and metal plants in construction and as stevedores, for which, of course, neither women nor students could be used, the Japanese resorted to importation of Korean laborers. It was estimated that at the outbreak of the Pacific War there were 1.4 million Koreans resident in Japan, of whom 777,000 were in the labor force and 692,000 were not. Of those in the labor force 220,000 were in construction, 208,000 in manufacturing, 94,000 in mining, 27,000 were stevedores, etc. Only 9,400 were in agriculture or fishing.[88] The Japanese would have liked to have imported many more than they actually scheduled but the opposition of the Governor-General of Korea prevented this. The Governor repeatedly protested that war production

[88] See *Plan For Carrying Out 1943 National Mobilization*, Cabinet Planning Board, Tokyo, June 14, 1943, p. 128.

in Korea was being impeded by draining off the best workers to Japan.[89] It was planned to bring in 907,697 Koreans over the years 1939-45 but only 73 percent of the quota was met. Approximately half of the Koreans brought in were sent to work in the coal mines. The need for them in the mines was repeatedly pleaded by the Coal Control Association. In a report at the end of the war the Association declared:

The outstanding feature of mining in Japan is that little use is made of machine power because the occurrence and grade of ores is poor and as an operational economy. Laborers are in great demand. Because of the great emphasis on the aircraft industry a shortage of shoring timbers, blasting powder, heavy oil, equipment, etc. accompanied the shortage of labor. An increasing number of those drafted or who have enlisted have been skilled youths and men most essential to mine work. The increase in accidents, the decrease in labor results due to an accumulated exhaustion which is again due to the increase in working days and hours, had resulted in a poor feeling by Japanese toward working underground. For that reason we had to transfer Korean and Chinese laborers[90]

In addition, 31,229 Chinese laborers were imported, mainly for use in the coal mines.[91] Both Korean and Chinese laborers were brought in

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[89] The changes in Korea's population and labor force between 1940 and 1944 were as follows:

(in thousands)

Industry	1940 Total	1940 Percent of Total Occupied	1944 Total	1944 Percent of Total Occupied
Agriculture	6 670	74 8	7 305	71 2
Fishing . .	130	1.5	191	1 9
Mining	166	1 9	223	2 1
Manufacturing	425	4 8	694	6 8
Commerce ...	537	6 0	435	4 2
Communications	109	1 2	167	1 6
Public Services & Professions	171	1 9	285	2 8
Others	707	7 9	966	9 4
Total Occupied .	8.915	100 0	10 266	100 0
Total Population	23 548	100 0	25 120	100 0
Occupied .	8 915	37 9	10 271 *	40 9
Unoccupied	14 633	62 1	14 849	59 1

* Source states, "Total differs from 1944 figure due to rounding of percentages"

Source: *The Impact of War and Japanese Imperialism Upon the Economic and Political Rehabilitation of Korea*, by Suagee, J T, and Stalheim N W., Civil Affairs Division, War Dept January 1947, p 6 1944 data are estimates.

[90] *Report on Workers in the Mines, op cit*, p. 11

[91] A Welfare Ministry report declared: "The importation was carried out on the basis of the Treaty to Supply Labor to Japan, concluded between our Government and the North China Labor Association in Showa 19 (Chinese Republic 33) (1944). The labor was to be supplied for two years and Japan was to bear the whole burden of the expense" *The Use of Imported Chinese Labor*, Welfare Ministry Memorandum, Tokyo October 10, 1945, p 2

under contract to work for two years. Toward the end of 1944 those whose contracts had expired or were about to expire were "advised" to stay another year. Those who did not take the advice but asked to return were told that unfortunately no shipping facilities were available. At the same time the Home Ministry issued a bulletin urging better treatment of Koreans and Formosans declaring:

To devote Koreans and Formosans to war efforts, they are to be treated better politically and in other respects. The measures for better treatment in general are as follows:

(1) The Japanese people must be enlightened to understand Koreans and Formosans.

(2) The police must treat them with the same consideration as the Japanese people.

(3) The administration of Korean laborers must be improved.

(4) Equality of opportunity as far as education is concerned will be realized, etc.[92]

Since educational opportunities in Japan had almost vanished, the last point was easy to achieve. Proportionately few Koreans were used in agriculture because supervision would have been difficult and the Japanese did not trust them. As one Ministry of Agriculture official remarked, "If we had wanted them to grow rice, we might just as well have left them in Korea." In 1945 they were extensively employed as day laborers in construction, dispersal and defense projects. Even in 1944 they constituted over half of the employees of the forty-four largest contractors in Japan. While the 667,684 Koreans brought in constituted only a small percentage of the male civilian labor force, they filled a particular need for able-bodied males in coal mining and construction.

Several other minor sources of labor were tapped by the Japanese. They used convicts, POW's, and formed a Labor Corps to enlist for part-time work those already holding jobs or the unoccupied for short periods. Since the Japanese felt they could trust the convicts more than the Koreans, they used them principally in shipbuilding and aircraft manufacture and to a lesser extent in construction. Of a reported 51,758 prison inmates in Japan proper, as of March 1945, 56 percent were being utilized in some form of war work.

While the number of prisoners of war held in Japan proper was small, they were put to work in greater proportion than were the Japanese convicts. The total number of prisoners of war in Japan proper was reported as 20,828 in May 1944 and 32,418 in August 1945. The later figure, according to the Japanese, represented only the number able to be repatriated from Japan proper. In the period January 1, 1942-August 1945, 3,432 were reported to have died in prison camps on the four home islands.

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[92] *Project to Better the Treatment of Koreans and Formosans*, Home Ministry, Tokyo, December 5, 1944.

Approximately 80 percent of those held were at work in May 1944 and 60 percent in August 1945.

The Patriotic Labor Service Corps (Kokumin Kinro Hokoku Tai) was organized in November 1941. Its purpose was basically to mobilize workers in non-essential fields, as well as the unoccupied, for either part-time work or for short-period full-time work on "vital" projects. While the *Economist* during the war announced that members of the Corps "work with the order and precision of the Imperial Army,"[93] a Welfare Ministry official after the war declared that services performed were not very satisfactory due to lack of experience, reluctance to work, short periods at work, frequent turnover, but that "there was no other way to get some jobs done."[94] The number of man-days reportedly worked by members of the corps in various fields shows that the bulk of the effort was centered in agriculture and most of the hours worked were put in by students or by farm women who would have worked even if there had been no corps but who enrolled and were given credit for it. In the spring of 1945 a People's Volunteer Corps and a Labor Command System were both provided for on paper. The former was to include the Kinro Tai and was to assist the Army in defense projects and, when the invasion came, to fight alongside the Army. The latter authorized the Welfare Ministry and the prefectural governors to requisition workers for mobile labor groups, to aid dispersal, repair damage, etc. Because of the breakdown of controls attendant upon the urban air raids, neither was at all effective. As Hoshino declared, "The whole thing was far too feeble and with the bombings the people were too busy looking after themselves."

Wages

The Japanese wage system was the antithesis of the American "equal pay for equal work" practice. Japanese wages are compounded of many factors. The basic wage varied according to sex, age, education, and experience. Upon this were heaped a series of special allowances, bonuses and payments in kind. The system was a queer mixture—the employers' birthday bonus, a product of traditional paternalism and the "incentive" payment of modern "scientific management" were combined, among other factors, in the same brew. There were family allowances, commodity price allowances, dwelling allowances and allowances for leadership, special positions, night work, holiday work, regular attendance, first-class skill, second-class skill, overtime, seniority, etc. There were also deductions for health insurance, retirement, savings and food charges. There were

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[93] *Oriental Economist*, October 1943, pp. 465-67.

[94] Interrogation of Suzuki, S., Labor Bureau, Welfare Ministry, Tokyo, November 16, 1945.

special bonuses paid either at New Year's or at the O-Bon Festival in July. There were also payments in kind such as food, clothing, housing, subsidized lunches, welfare activities and commuters' train tickets. The Research and Statistics Division of SCAP declared:

> The complexities of the Japanese wage structure, with its combination of elements of feudalism, paternalism, efficiency systems and government interference, make it very difficult to get complete reports. It is even doubtful whether many employers have sufficiently adapted their practices to a capitalistic type of accounting to know what their labor costs are. Workers frequently do not understand what is owed them.[95]

An account by the Iron and Steel Control Association of wages paid in the industry helps to portray the infinite variation. Out of 140 iron and steel mills covered in the report, only three small factories followed a monthly system. The daily wage system was usually limited "to workers in warehouses and workers engaged in miscellaneous tasks." Most of the iron and steel workers were paid a basic salary plus incentive bonuses. The association declared. "Since there were many variations in the details of the system, it is difficult to find an illustration. On the whole the incentive bonus usually ranged from 20 percent to 200 percent. As a rule the figures were between 40 and 70 percent."

The bonus for light work was usually less than that for heavy work. Women received less than half the average male wage. Male workers under 20 received half the wage of those between 20 and 30, while those over 30 received a basic wage higher than the 20-30 group. Beginners, regardless of age, were for a short period paid less than the regular wage, then their wage was automatically raised to whatever prevailed for men in their age and status group. Koreans were paid, on the average, less than the lowest male Japanese worker, and their wage varied, not according to their age, but according to the length of time they had been in the industry. If they had been in the industry six months they received 72 yen a month; after a year and a half they received 97 yen. Students were paid according to a table prepared by the Ministry of Education, which was roughly as follows:

Class of Students	*Basic Compensation (yen per month)*	
	Male	*Female*
University	70	..
Technical	60	50
Normal	60	50
Middle	50	40
Higher Primary	33	28

Normally, one-thirtieth of a month's salary was deducted for each day's absence, but not all plants followed this practice. One-two-hundredth of

[95] Special Report No. 13, Economic and Scientific Section, SCAP-GHQ, Tokyo, August 9, 1946, p. 3.

a month's wage was added for each hour of overtime. Carfare was paid to and from work. Work clothes were supplied or loaned. Special allowances of food and drink were granted. There was a special family allowance, to be discussed later. "Earnest" workers were rewarded by a special bonus of 10 yen per month.[96]

Tables of wage scales paid in Army arsenals in Japan from August 1944 on show standard base pay variations by age, sex and years of experience. Thus a 29-year-old male worker with three years of experience would receive 46 sen per day more than a female of the same age and work experience, regardless of the tasks to which both were assigned. A 39-year-old male worker with three years experience would receive 20 sen per day more than the 29-year-old with the three years experience even though both did exactly the same work. If the 39-year-old had two children he would probably have received 30 yen more per month than the unmarried 29-year-old.

Salaries of company employees, as against laborers' wages, depended to a considerable degree upon what school they had graduated from, as well as age, size of family, and length of time in employ of the company. An interesting study by the research division of the Bank of Japan on this subject declares: "Naturally, also, the salaries vary according to the period of time after graduation from school. In this latter case the new employees cannot receive a salary higher than that which is being given to the old employees who graduated from school in the same year and who are already in service of same company."[97]

A 25-year-old graduate of a university automatically received 56 yen per month more than a 25-year-old middle-school graduate. Moreover, large bonuses and allowances were paid to graduates of higher schools. Graduates of government universities rated higher salaries than graduates of private universities. Bonuses and allowances were usually far in excess of the basic salary and varied to a considerable degree with business conditions. Bonuses up to nine months' salary were customary and could be distributed without government permission. Older employees usually received bonuses in excess of their yearly basic salaries.[98]

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[96] *Labor in Iron and Steel,* Iron and Steel Control Association, Tokyo, November 1, 1945.

[97] *Study of Regulations Controlling Salaries of Company Employees Engaged in Industrial and Economic Activities in Japan,* Research Bureau, Bank of Japan, Tokyo, December 1945.

[98] Salaries of office workers were controlled by the Ordinance for Control of Company Accounts (Kaisha Keiri Tosei Rei), whereas factory workers' wages were subject to the Ordinance of Wage Control (Chingin Tosei Rei).

While this affords only a brief picture of the complex nature of the Japanese wage structure,[99] further details will be presented in the following discussion of the nature of wage control in Japan during the war period. The basic wage controls were adopted during the China War Period; the Pacific War period for the most part witnessed a progressive relaxation of these controls under the growing inflationary pressure and rising cost of living. The controls were never abandoned entirely but, as the black market, particularly in day labor, grew and firms were forced to bid higher for workers, the controls were either relaxed or ignored. Wage control must be divided into two parts: that which pertained to general factory labor and that which applied to casual day labor. The latter was far more difficult to regulate, and the black market which developed in it tended to draw regular labor from the factories. Wage control was based on the National General Mobilization Law of 1938 which authorized the government to "give necessary orders. . .with respect to wages, salaries and other conditions of work."

Wages rose appreciably during the China War period, the average monthly factory money wage for males rising from 65.42 yen in 1936 to 71.02 in 1939. Commodity prices rose more sharply and in 1939, when the government took the first steps to control prices, it also moved to place a ceiling on wages. The first wage regulation order was promulgated on March 31, 1939, to take effect August 8. It fixed initial wages for unskilled labor in mining and heavy industry. The country was divided into four districts and standard initial wages were fixed for each group in each district for factories and mines, wages in mines being further divided into in- and out-of-pit work. The initial wage, which did not apply to "peacetime" industry, was a reduction of from 10 to 20 percent under the prevailing rate. As a result it could not be enforced, and, as a matter of fact, very little enforcement, which was left to prefectural authorities, was actually attempted.[100]

Shortly after the German invasion of Poland, Japan moved to freeze both prices and wages. The Temporary Wage-Regulation Order of October 18, 1939, froze wages at the levels prevailing on September 18, 1939. The measure had some braking effect on the wage trend. Whereas average monthly money wages of factory workers had risen from 66.48 yen in 1938 to 71.02 in 1939, the figure for 1940 rose to only 72.89. When the ordinance expired in October 1940, however, it was replaced by another Wage Control Ordinance which became the basic wartime wage control

[99] For a great many additional illustrations see "Shikin Tosei Rei Kankei Hoki" (Rules Relating to Control of Wage Payments), *Kinro Kyoku*, Koseisho (Welfare Ministry) Tokyo. August 1944, or for an earlier account "Wage Systems in Factories and Mines," *Rodo Kyoku*, Koseisho, Tokyo, June 1940.

[100] *Hompo Zaikai Josei*, Mitsubishi Keizai Kenkyu Kyoku, Tokyo, September 1940, p. 21.

measure. There were three essential features to this measure and its many subsequent amendments. It provided for a maximum entrance or initial wage, for a minimum wage, and since it was not deemed feasible to fix the precise wage of the individual worker by means of average hourly rates, a limit was placed on the total wage payments of individual companies and plants. The Ministry of Welfare, in conjunction with the prefectural authorities, was to work out the various age, sex and regional differentials. Workers whose piecework rates or commission rates were approved by the authorities, day laborers, office workers, and certain other groups were exempt from these restrictions.

The maximum entrance wage was designed to prevent labor pirating, reduce turnover and migration. Maximum entrance wages remained in effect in the case of unskilled workers for a period of three months; in the case of skilled workers for one year. By requiring that during the first six months in a new job the worker should receive 20 percent less than would ordinarily be paid, the Japanese had hoped to reduce turnover. Since this worked a hardship on those changing occupations from non-essential industries to war plants, it was soon necessary to provide that the 20 percent provision could be waived with permission of the prefectural governor. On the other hand, in order to encourage transfers from non-essentional to war industries, the maximum entrance wages in the former were set at lower levels than in the latter. To a degree, however, this was merely recognition of existing conditions. A contrast between a war and a non-war industry is shown in the table below. The figures are maximum hourly entrance wages for class-I districts, for male workers under 30.[101]

A—"METAL AND ENGINEERING INDUSTRIES"

(sen per day)

Years of Experience	*Age Group*						
	12–13	*14–15*	*16–17*	*18–19*	*20–21*	*22–24*	*25–30*
Under 1 year	95	123	149	173	192	208	230
1 to 3	125	142	168	193	213	231	257
3 to 5		178	196	218	240	262	288
5 to 10			224	238	257	280	311
10 and over						308	339

[101] Three wage differentiations on a geographic basis were provided: Class I consisted of Tokyo, Kanagawa, Aichi (Nagoya), Osaka, Hyogo, and Fukuoka. Class II, Hokkaido, Fukushima, Ibaraki, Gumma, Saitama, Chiba, Niigata, Toyama, Gifu, Shizuoka, Mie, Shiga, Kyoto, Nara, Wakayama, Okayama, Hiroshima, Yamaguchi, Ehime, and Nagasaki. Class III, Aomori, Iwate, Miyagi, Akita, Yamagata, Ishikawa, Fukui, Yamanashi, Nagano, Tottori, Shimane, Tokushima, Kagawa, Kochi, Saga, Kumamoto, Oita, Miyazaki and Kagoshima.

B—TEXTILES

(sen per day)

Years of Experience	*Age Group*						
	12–13	*14–15*	*16–17*	*18–19*	*20–21*	*22–24*	*25–30*
Under 1 year	90	114	140	166	185	204	223
1 to 3	105	119	145	169	188	208	232
3 to 5		134	149	172	190	212	245
5 to 10			161	177	194	215	250
10 and over						225	260

Source: *Wage Structure of Japanese Industry Under Wartime Control*, Welfare Ministry, Tokyo, October 29, 1945.

The minimum wage was designed to protect the worker but neither at this time nor for the subsequent war years was the worker very likely to be offered a wage near the minimum. In view of the freezing of workers, however, it provided a needed legal safeguard. The relationship between the fixed minimum wages and the maximum entrance wage for an unskilled male manual worker under 30 years of age, in industry, is shown below (sen per day).[102]

A—MINIMUM WAGE

District	*Age*										
	12	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20–21*	*22–24*	*25–29*
1st Class ..	52	55	59	66	73	80	87	94	105	116	128
2nd Class ..	48	51	55	58	66	73	80	87	94	101	109
3rd Class ..	40	43	47	51	54	61	68	75	83	90	98

B—MAXIMUM ENTRANCE WAGE

District	*Age*										
	12	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20–21*	*22–24*	*25–29*
1st Class ..	78	85	91	104	117	130	143	156	175	194	213
2nd Class ..	72	79	85	92	104	117	130	143	156	169	181
3rd Class ..	60	67	73	79	86	99	112	125	138	150	163

The third control, the average hourly wage rate, was an interesting device.[103] It was not used to set wages but to keep a factory's total payroll in line. Total man-hours worked in a given period were multiplied by the "average hourly wage" used as a standard for that industry by age and by sex and the result was compared with the actual payroll. If the payroll exceeded the computed amount and no satisfactory or acceptable reason was given for the difference, the plant was ordered to bring its wages into line. The following table compares the average hourly wage standard set by the Ministry of Welfare for certain industries with the hourly rates prevailing in the same industries in Tokyo (Welfare Ministry rates for Class-I districts are used for comparability) during the period

[102] Source: *Wage Structure of Japanese Industry Under Wartime Control, op. cit.*

[103] For a discussion of the development of this form of control, see *Rodosha Seisaku No Kompon Mondai* (Basic Problems of Labor Policy), by Fujihashi, Keizo, Tokyo, 1943, Chapter 4.

January-March 1944. The results provide an interesting commentary on the effectiveness of wage control.[104]

A—Welfare Ministry Hourly Earnings Standards, Oct. 1, 1941

(in sen)

Industry	Male			Female		
	Under 20	20–29	30 & Over	Under 20	20–29	30 & Over
Metal Refining	18.1	31.6	42.7	13.7	15.5	16.0
Electrical Machinery ..	17.4	31.5	43.4	13.7	15.5	16.0
Aircraft	19.0	36.1	45.7	13.7	15.5	16.0
Shipbuilding	19.0	36.1	45.7	13.7	15.5	16.0
Optical Instruments ...	16.6	31.8	42.0	13.7	15.5	16.0
Ordnance	17.4	31.5	43.4	13.7	15.5	16.0

B—Actual Hourly Earnings—Tokyo, Jan.-March 1944

(in sen)

Industry	Male			Female		
	Under 20	20–29	30 & Over	Under 20	20–29	30 & Over
Metal Refining	24.3	39.3	46.5	13.3	19.6	23.3
Electrical Machinery ..	22.6	40.1	51.4	18.0	26.4	25.7
Aircraft	26.1	43.2	52.9	22.7	28.7	33.7
Shipbuilding	27.1	50.7	48.5	18.5	23.7	26.2
Optical Instruments ...	24.9	61.2	81.4	16.9	31.5	32.1
Ordnance	25.3	43.4	48.2	18.4	23.7	24.3

It should be noted, however, that various changes in the three controls mentioned were progressively relaxed. In January 1943 family allowances were excluded from the calculation of maximum entrance wages. The family allowance system had been established in 1940 and twice extended. It provided initially for payment of 2 yen per month per child to each worker who earned less than 70 yen per month and had dependent children under 14 years. The extensions wiped out the earnings limitation, extended definition of dependents to parents and grandparents, and finally raised the amount to 10 yen per month for each dependent. The exclusion of family allowances from the restrictions of the entrance wage meant, in effect, an increase in the ceiling. In addition, at the same time, a new allowance, called a "beginner's allowance," was permitted, over and above the maximum entrance wage. It amounted to 30 sen per day for male factory workers and 20 sen for women; to 50 sen per day for male miners and 30 sen for women. In February 1943 the period of application of the maximum entrance wage for skilled workers was shortened from one year to six months. Later in the year the five war industries that were being favored at that time—iron and steel, coal, aircraft, light metals and shipbuilding—were permitted to ignore the total wages limitation provided the prefectural governor approved any increases in wage payments.[105] Since

[104] *Ibid.*, p. 7.

[105] *Oriental Economist*, July 1943, pp. 320-22, declared: "Under the proposed system when an employer in the designated industries revises regulations governing wages

firms in these industries were always able to justify increases on the ground that they were necessary to obtain and keep workers, it was difficult for the prefectural governors to refuse to grant increases especially as the cost of living rose. However, the combination of a maximum entrance wage plus freezing of workers on the job did serve to prevent runaway wage increases. A 10 percent increase in hourly wage rates for coal miners was approved as was a 15 percent increase to stimulate wooden shipbuilding. In 1944 an "agreement" wage system was legalized. All the existing controls remained with their varying states of enforcement, but if the Welfare Ministry, prefectural authorities and employers worked out an agreement for a higher wage rate it could then be granted regardless of the provisions of any existing ordinances. This applied to all industry and particularly to day laborers. Communications workers and seamen were given substantial increases under an "agreement," to mention but a few.

Supplementary payments had also been subject to control under the 1940 wage ordinance. Approval of the prefectural governor was necessary to grant bonuses amounting to more than either an average per person per year of 60 yen or 40 days' standard pay. This applied to workmen's wages. With respect to salaried company employees (executive category), any bonus over nine months' basic salary could not be granted without government permission except that a bonus amounting to an additional six months' basic salary could be granted in government bonds, without permission. Similar limitations were placed on other allowances, but in 1943 and 1944 approvals of exceptions increased as the price level rose.

The administration of wage controls was very poor. The burden fell on the prefectural authorities and they were not equipped to do the job. It would have taken a very large staff of expert accountants to control the situation. The local labor offices were swamped with the mobilization problem. The economic police could swagger and bluster and intimidate the little fellow but against the larger firms they were powerless. In a wartime report, the police of one prefecture complained:

Certain industrialists are engaging in illegal practices under the pretext of supreme necessity and do not fear punishment in accordance with the laws of the land. Those who have fallen into these practices, blindly relying too much upon military protection, distrust the officials, are dissatisfied with the controls, and give indication of their open opposition thereto. Such actions by industrialists can never be tolerated and they must be made to suffer for them. The prefectural authorities are making many surprise visits to industrial establishments in order to nip wage increases in the bud, but because of the infinite variety of methods of wage payments,

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and wage increases and obtains the approval of the Prefectural Governor, he is no longer subject to the restriction of wage payment on the basis of a collective total. He may determine wages or increase wages according to his new schedule free from the restrictions provided by the order."

and the opposition of the industrial world, intended objectives are not achieved.[106]

The trend of factory wages in Japan is shown in Table 43. Wage figures in Japan were given in terms of daily averages because wage rates were set on a daily basis though payment was monthly, usually. The figures are those of the Cabinet Bureau of Statistics, which claimed that the averages covered the major part of the complex wage payments, including all regular short-term money payments and allowances. They do not, however, include bonuses for periods of longer than three months or payments in kind. Such limitations, and others of sampling technique, must be excused on the ground that the figures are all that are available to show wage trends.

An examination of Table 43 indicates that money wages more than doubled over the war years. In the U.S., over the same period, average annual earnings per full-time employee in manufacturing also doubled.[107] In view of the nine-year drain on Japan's manpower, the reluctance to draw married women into the labor force, etc., this was a rather contained expansion. It was probably due more to the overall restriction of labor than to direct wage control. Smashing the unions, freezing labor in war factories, restricting turnover by the workbook system, police supervision of the laborers' movements and whereabouts, all combined to limit the worker's ability to take advantage of conditions of labor scarcity. Only by individual effort and pressure via offering of services on the black market were workers able to exert any influence on wage trends. Probably more of the wage increase was due to employer competition, one with the other, under conditions of absolute scarcity, than to the workers' ineffective individual grumbling. These things, however, are incapable of statistical proof or disproof. It is nevertheless clear that, as with price trends, currency and credit expansion and government expenditures, the tempo of the expansion was speeding up markedly in the last year of the war and becoming increasingly difficult to contain. Wages of male factory workers rose 40 points on the index between 1944 and 1945, a much larger increase than in any previous year. Wages of female factory workers rose 100 points compared to a 35-point increase the previous year, pointing up the impact of the military draft on industry's increasing requirements for female workers. Women's factory wages had averaged one-third of male wages in 1936. By 1945 their relatively sharper rise had brought them up to one-half the men's average wage.

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[106] *Present Situation As Regards Control of Wages*, Yamaguchi Prefecture, Police Bureau, Labor Control Dept., May 20, 1944, from the files of the Welfare Ministry, Administration Bureau, Wage Section.

[107] The figure for 1936 was $1.287, for 1945, $2,525. *National Income and Product Statistics of the United States*, 1929-1946, National Income Division, U.S. Dept. of Commerce, Washington 1947, p. 38.

TABLE 43

AVERAGE DAILY MONEY WAGES IN FACTORIES, MINES AND TRANSPORTATION, JAPAN PROPER, 1936-45

(yen per day)

March	All Factories		Metal		Machines & Implements [a]		Chemicals		Textiles		Food & Beverages		Printing & Binding		Transportation & Communications		Mining [b]	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1936	2.45	0.75	3.15	1.12	2.65	1.21	2.07	1.02	1.32	0.65	2.05	1.00	2.06	1.05	2.00	1.03	1.93	1 30
1937	2.51	0.79	3.18	1.13	2.66	1.26	2.01	0.91	1.34	0.68	2.14	1.05	2.06	1.04	2.02	1.04	2.15	1.53
1938	2.49	0.84	3.26	1.16	2.46	1.31	1.94	0.97	1.37	0.69	2.18	1.04	2.12	1.06	2.06	1.15	2.43	1.91
1940	2.73	1.02	3.14	1.23	2.74	1.39	2.35	1.11	1.75	0.87	2.16	1.07	2.44	1.10	2.33	1.36	3.31	2.45
1941	3.06	1.15	3.50	1.35	3.06	1.60	2.75	1.28	1.98	0.94	2.44	1.18	2.77	1.27	2.47	1.37	3.78	2 66
1942	3.24	1.29	3.64	1.46	3.29	1.61	3.09	1.48	2.25	1.06	2.57	1.25	3.16	1.47	2.90	1.41	3.94	2.71
1943	3.63	1.45	4.14	1.61	3.64	1.81	3.45	1.56	2.64	1.16	3.00	1.41	3.63	1.71	3.23	1.68	4.33	3.00
1944	4.25	1.71	4.56	1.92	4.31	1.98	3.85	1.77	3.06	1.34	3.50	1.60	4.09	2.17	3.83	1.74	4.56	3.00
1945	5.29	2.46	5.91	2.38	5.25	2.61	4.77	2.20	5.35	2.28	4.60	2.10	5.18	2.46	5.14	2.13	6.13	4.23

[a] *Includes machine tools, shipbuilding, aircraft, etc.*

[b] Underground workers only.

Source: *Cabinet Bureau of Statistics.*

The Japanese encountered their greatest difficulty in handling the problem of day or casual labor, carpenters, ditch diggers, stevedores, etc. The basic 1940 Wage Control Ordinance covered day laborers, but control was left to the localities since the Welfare Ministry had its hands full determining average hourly rates, minimum wages and maximum entrance wages for manufacturing, mining, etc. As a result various local authorities fixed different rates from area to area. For example, in 1941, the labor section of the metropolitan police in Tokyo fixed day-labor wage rates in consultation with contractors. Since the rates were set at less than the prevailing wages, a number of day laborers went elsewhere and the resultant shortage forced rates beyond the point at which they had been before they were fixed. As a result of such developments, the Welfare Ministry in February 1942 promulgated maximum standard wage rates for day laborers. A sample of these rates was as follows:[108]

MAXIMUM WAGE RATES FOR DAY LABORERS

(yen per day)

Occupation	*Class of District*	*Official Maximum Rate (1942)*	*Agreement Maximum Rate (1944)*	
			Under 3 mos. exp.	*Over 3 mos. exp.*
Carpenter	A	4.00	4.00	5.20
	B	3.20	3.20	4.20
Plasterer	A	4.00	4.00	5.20
	B	3.20	3.20	4.20
Stone Mason	A	4.30	4.30	5.60
	B	3.40	3.40	4.50
Earthworker	A	3.50	3.50	4.00
	B	2.80	2.80	3.20
Coolie	A	3.00	3.00	3.50
	B	2.40	2.40	2.80
Stevedore	A	4.40	4.40	5.20
	B	3.50	3.50	4.20
Driver	A	3.60	3.60	4.80
	B	2.80	2.80	3.80
Bricklayer	A	4.20	4.20	4.80
	B	3.30	3.30	3.80
Gardener	A	3.70	3.70	4.10
	B	2.90	2.90	3.30

Source: *History of Wage Control of Day Laborers*, by Kaneko, Yoshio, Chief, Wage Section, Administration Bureau, Welfare Ministry, Tokyo, November 17, 1945.

To skip the intervening period for a moment, this table throws a very revealing light on the day-labor situation. So pressing did the demand become and so high did black-market wages for day laborers rise that by 1944 what had been the maximum permissible scale in early 1942 became the 1944 rate for inexperienced workers. The 1944 scale for experienced

[108] District A included Tokyo, Hokkaido, Kanagawa, Aichi, Kyoto, Osaka, Hyogo, Okayama, Hiroshima, Yamaguchi and Fukuoka prefectures; District B, all others.

workers (last column) was wholly unrealistic in terms of what was actually being paid, but in view of other wage rates set for industrial establishments the Welfare Ministry had little choice. Through the use of various extra allowances, however, the Ministry attempted to meet the pressure of the sharp actual rise in rates. The day rates fixed for 1942 were for 10 hours in March, April, September and October, for 11 hours in May through August, and for 9 hours in November through February. Any time over these limits brought 15 percent extra. An extra allowance of 30 percent of of the rate set could be paid to foremen, gang leaders, etc. A special bonus of 50 sen per day could be paid for "good efficiency," and 30 percent extra for special work such as dangerous work, heavy work, work in bad weather,[109] on holidays, etc. If the work was compensated on a piece-rate basis maximum earnings had to be limited to 130 percent of the fixed day rate. This became a big loophole. In December 1942 the allowance for "good efficiency" was raised from 50 sen to 1 yen per day.

A Welfare Ministry investigation of day laborers in September 1943 concluded that actual wages were 100 percent (in industrial prefectures) and 40 to 60 percent (in agricultural prefectures) above the official rates.[110] The report stated:

Though in the official wage rates, the time wage system was generally adopted, the actual wages were paid according to piece work wage system through which the official control of wages was made ineffective. . . . day laborers' wages did not rise in all fields but only in emergency works especially in the works connected directly with military affairs. . . . though the flight of labor from factories into outdoor works was remarkable in 1942, this tendency declined in 1943 because the wages of factory workers were raised up and the control of labor turnover was made stricter.

Actual wages for day laborers at the time (September 1943) and in March 1944 were reported as follows:

(yen per day)

	Tokyo		*Osaka*		*Aichi*		*Hyogo*	
	1943	*1944*	*1943*	*1944*	*1943*	*1944*	*1943*	*1944*
Stevedore	9.50	11.75	14.57	17.00	12.00	14.00	9.40	9.80
Coolie	4.50	8.00	4.60	9.00	4.00	5.00	5.25	5.33
Carpenter	6.75	9.00	11.00	15.00	7.50	9.33	8.83	9.11
Plasterer	6.00	7.83	11.00	12.00	6.60	7.25	8.80	9.00
Mason	7.00	7.90	8.50	20.00	7.90	8.50	10.50	11.25
Navvy (Earth Worker)	6.13	7.90	7.80	10.00	7.10	7.50	7.00	7.50

The subsequent investigation in March 1944, by inquiry through the prefectural police bureaus with summary and conclusions by the Welfare Ministry, contained some revealing observations:

[109] Traditionally, Japanese day laborers did not work on rainy days.

[110] "Actual Condition of Day Laborers," *Rodo Kyoku, Koseisho* (Welfare Ministry), Tokyo, September 18, 1943.

In view of the present social and economic conditions, the current maximum wage rates are too low, and so opinion is that they should be increased considerably. However, prescribed wage rates have already been increased to the limit. Raising them would only result in a general increase in black market rates, and so there would be nothing gained thereby. The beginning of arrests of violators and the enforcement of controls, etc. has created such problems as labor migrations and restlessness, which interfered with production. As a result, arrests cannot be carried out under existing conditions and the lack of these make a lie out of wage rate control and promote an additional rise in black market wage rates. . . .In view of the fact that illegal wage rates cause labor pirating, it is necessary that companies increase the degree of mutual cooperation in order to prevent this practice.

The Romu Hokoku Kai was established to cope with and keep track of the day laborers but the Ministry noted that the laborers were reluctant to join because of membership dues and because they would then lose some freedom of movement. It proposed to strengthen the association and declared, "We are now studying a plan of prohibiting the employment of those who do not possess the membership badge." The Saitama police bureau was quoted as reporting:

Wage rates are increasinging daily. A majority of labor is not directly connected with the war effort and is constantly changing jobs in a search for higher wages. Industry is aggravating the situation and making additional profits by overstating labor costs in contracts. Koreans, especially, are earning between 10 and 15 yen per day and are able to spend half their time making purchases in the producing districts. When wage rates increase the number of working days decrease.[111]

The Ministry tried a number of further special allowances. In June 1944 increased allowances for experience were added to the daily wage rate. Three yen more per day might be paid to a man with over seven years' experience, two yen to one with more than three years' experience, and one yen additional to all those with over a year's experience. Kaneko reported the reaction of the local authorities to this boost.

Most of the prefectural governors had opinion that they cannot control day-workers' wages with such low amount. They requested (1) to suppress reckless advances of money for military construction, (2) to establish rigid control over manpower supply and job distribution for day laborers, (3) to raise official day-rate to meet high cost of living.[112]

As a result the Ministry decided to adopt the "agreement" system and also promulgated the scale shown in the "1944" column of the table, "Maximum Wage Rates for Day Laborers," in which, it was noted, the 1942 maximum became the new scale for inexperienced workers. However,

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[111] From *Investigation of Day Workers*, Labor Bureau, Welfare Ministry, Tokyo, March 1944.

[112] Interrogation of Kaneko, Yoshio, Tokyo, October 31 and November 6, 1945.

the new scale was not a hard-and-fast rule but could be made flexible by "agreement." Subsequently it was badly "bent" by agreements and in 1945, with the vast increase in the draft, the construction of firebreaks, the dispersal program and feverish construction of defenses against invasion, the demand for day laborers became so great that all pretense at wage control was abandoned. The climax came when the municipal authorities of Tokyo publicly offered 70 yen a day for common labor to build firebreaks. There was a public outcry and the municipal chiefs defended themselves by stating that the military had been paying almost as much and everyone knew it and no one said anything. The job had to be done in a hurry and that was the only way to get the labor.[113] The Japanese were never able to solve the problem of day-labor control largely because the military and the contractors, with their cost-plus contracts, were willing to pay any price to obtain needed labor.

Hours

Since hours of work were already high, by occidental standards, before the war in Japan, it was not possible to increase them sharply during the war years. Average daily working hours rose slightly from 10:07 in 1935 to 10:13 in 1939.[114]

The slow upward trend thereafter may be seen from the following table from the Cabinet Bureau of Statistics which shows average daily working hours in manufacturing and mining for Japan proper in hours and minutes.

Year and Month	*Manufacturing*		*Mining*			
			Out of Pit		*In Pit*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*
1941—Jan.	10.33	9 51	11.09	10.19	10.08	9.19
1941—Dec.	11.00	10.15	11.10	10.30	10.20	9.45
1942—Dec.	10.54	10.09	11.23	10.43	10.27	9.58
1943—Dec.	11.10	10.15	11.38	10.42	10.36	10.22
1944—Dec.	11.23	10.47	11.31	11.00	10.39	10.44
1945—March	11 25	10.22	11.27	11.02	10.48	10.45

The quotation at the beginning of the Chapter may well be recalled: "The hours of work are ten but since workers cannot come out of the pits until their day's task is done the actual hours put in are twelve." The Bureau labor statistician, Mori, claimed that the figures presented were actual hours of work, inclusive of rest periods, as taken from the records of the sample of companies customarily surveyed.

Prior to the outbreak of the China War, there were no legal limitations on hours for male workers except in mining. The protective legislation of the twenties afforded a measure of safeguard for women and children. Factories employing ten or more persons could not work women or youths

[113] See USSBS Interrogation No. 13, Tokyo, October 8, 1945.

[114] *Japan Yearbook, 1943-44*, Tokyo, p. 627.

under sixteen more than eleven hours a day. Night work for these categories of workers was prohibited between hours of 10:00 P.M. and 5:30 A.M. Hours of work for adult males in Japan were limited for the first time by the 1928 amendment to the Mining Regulations. Neither males nor females were permitted to work underground more than ten hours a day. Exceptions in all cases were permitted with the approval of the prefectural authorities. In 1939 a general order fixed twelve hours as the limit for all work in factories and workshops and since a day a week rest was not traditional in Japan, the government urged industry to grant two days a month provided for in the Factory Act. Most workers, however, solved the problem of lack of rest days by simply being absent. The government seemed to be unable to make up its mind at first during the war years about hour limitations. In 1941 hours of labor for adult males were extended to thirteen hours, inclusive of a one-hour rest period.[115] Workers simply took more days off and in 1942 the twelve-hour limit was restored. There is no record of any large group of laborers having ever worked thirteen hours. In 1943 the pressure of the labor shortage grew and the twelve-hour limit was again abandoned and hours of work left to the discretion of employers. The flimsy protective legislation for women and boys was also swept aside during 1943. Boys of any age might work the same hours as adult males, if they could, and women were permitted to work nights. The two day per month rest period provision of the Factory Act was also suspended, but, as may be seen in Table 44, this had little effect on actual working conditions.[116] The "days per month" worked figure may come as a surprise to those who were taken in by Japanese propaganda during the war to the effect that "workers were organ-

TABLE 44

AVERAGE WORKING HOURS PER DAY AND WORKING DAYS PER MONTH IN SELECT INDUSTRIES, JAPAN PROPER, MAY 1944

	Male		*Female*	
	Hours per Day	*Days per Month*	*Hours per Day*	*Days per Month*
All mfg. industry .	11.3	23.4	10.5	22.6
Metals	11.4	24.0	10.4	23.2
Automobiles	11.0	23.8	10.3	26.6
Shipbuilding	11.5	22.7	10.5	23.6
Aircraft	11.4	23.2	10.4	24.6
Optical Instruments	12 1	20.9	10.0	21.8
Chemicals	11.7	23.2	10.8	23.4
Cement	12.4	23.1	10.0	22.9
Textiles	11.0	23.5	10.3	24.1
Woodworking	12.0	24.8	11.3	21.2
Munitions	11.7	23.9	10.9	25.8

Source: Labor Division, General Mobilization Bureau, Munitions Ministry.

[115] See *Oriental Economist*, August 1941, p. 404; also *Japan Yearbook, 1943-44*, p. 422.

[116] For a discussion, see *Oriental Economist*, April 1944, pp. 150-51.

izing special units pledged to increase production by working from 7:30 A.M. to 11 P.M. for a period of seven days without being absent or late."

The statistics in Table 44 were taken from a study, by the Labor Division of the Munitions Ministry, of wage ledgers in 4,000 plants in May 1944.[117] Since the officials never expected the study to see the light of day, they were free to note that workers were averaging twenty-three days a month. The abolition of the two days rest per month provision was just a gesture. Workers stayed home when either so inclined, when necessary to obtain food in the country, when they could enhance their earnings by pretending to be sick and then working as day laborers, or when they became frightened of air raids. Day laborers, according to Welfare Ministry officials, ordinarily worked only about twenty days a month, despite the increased demand for labor. The officials said they doubted whether the physical stamina of the workers or weather conditions would have permitted a longer working month. Japanese day laborers, despite increasingly high wages, could not be persuaded to work in the rain.

Absenteeism became a serious problem in 1944 and a major one in 1945.[118] The causes in 1944 were mostly unrelated to the air attack and it may be said that until March 1945 the rise in absenteeism was due largely to other factors. Thereafter, the increase was mostly the result of the air raids. The problem of absenteeism aroused enough comment even in early 1944 to bring about a statistical study by the Cabinet Bureau in June 1944. The study represents a minimum picture of absenteeism since it covered only those absent continuously for more than three months. The plants surveyed employed 8,770,057 workers and of these 289,105 had been away more than three months. A study in terms of man-hour loss by the Urban Areas Division of the USSBS placed absenteeism during the period October 1943-September 1944 at 20 percent and then noted an increase in the rate by July 1945 to 49 percent. The report stated:

In Japanese data, lost hours are ascribed to general absence, enforced idleness, illness, air alerts and bomb damage. The total figures cannot be broken down accurately by causes because of the loose interpretation of those causes by Japanese plant managers. However, examination of the labor force in plants which were damaged by the raids and in plants which received no damage, reveals that lost hours increased from 20 percent to 56 percent (between base period Oct. 1943-Sept. 1944 and July 1945) in

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[117] *Statistics on Wages and Hours of Factory and Mine Workers, Based on Wage Ledgers for May 1944,* Labor Division, General Mobilization Bureau, Munitions Ministry, Tokyo, September 1944.

[118] In March of 1943, however, the Welfare Ministry had published a bulletin entitled "Data and Methods of Counteracting Absenteeism" (Kikkin Boshin Taisaku Shiryo), *Kinro Kyoku,* Koseisho, Tokyo.

the case of the former, and from 20 percent to 34 percent in the case of the latter, and from 20 percent to 49 percent overall for both hit and unhit plants.[119]

The following table was presented to indicate the increase in lost hours in bombed and unbombed areas. The percentages are for lost man-hours against total scheduled man-hours.

Area	*Base Year Oct.'43-Sept.'44 Percent*	*July 1945 Percent*
All Japan—Hit Plants	20	56
All Japan—Unhit Plants	20	34
All Japan—Hit and Unhit	20	49
Tokyo Complex—Unhit Plants	17	40
Kyoto[a]	24	40
Hokkaido[b]	28	44[b]
Hiroshima[c]	25	40

[a] Unbombed. [b] Bombed in July 1945—percentage figure for June 1945.
[c] Not bombed until August 1945.

The report concluded: "This suggests that the general breakdown of the economic and social structure had a comparable impact on industrial labor in all the urban areas. . . .Even in Hiroshima and the cities of Hokkaido, which were relatively isolated from heavily bombed areas, and were closer to sources of materials, the rate of increase in lost hours by July was comparable to that in the unhit plants in the heavily bombed areas."

At the Nikko Works of the Furukawa Electric Company, in an area that was never bombed, of the 9,500 employees, the absentee rate rose from 13 percent in January 1944 to 26 percent in February 1945. The plant manager, Kishino, stated that he thought the increase was due to employees earning higher wages temporarily as day laborers, though of course he could not prove it.[120] A further clue to the causes of the growth of absenteeism resulted from an examination of the records of a number of plants in unbombed Kyoto. The greatest absenteeism occurred in the spring and fall and it was suggested that workers were probably returning to the countryside to assist in spring planting and fall harvesting. Furthermore, workers customarily took a number of unauthorized days off before going into military service and as the draft grew in volume the resultant absenteeism would increase. Probably a major factor in the growth of absenteeism was the food situation. If you worked an eleven-hour day and the government had deprived you of your two days off a month and you had to go out into the countryside to forage for food for

[119] From *The Effects of Air Attack on Japanese Urban Economy*, Summary Report, Urban Areas Division, USSBS, Washington, March 1947, p. 25.

[120] Memorandum on Absenteeism by Kishino, Sakichi, Nikko, December 15, 1945.

your family, the only way was to take a day or two off now and then. The manager of the Atsuta plant of Daido Steel recognized this:

In spite of considerable decrease in efficiency, due to loss of comparatively skilled workers, absolute production had gradually increased till November 1944, as a result of conscripted personnel forced into service since 1942, but, of course, fall in quality and decrease in yield were inevitable. Workmen thus forced into service lacked positive working will and had low attendance rate due to incomplete management of forage institution by the government, and discontents of those forced into service. So it was true that food became most difficult problem in labor management.

Labor conscription itself increased absenteeism both because of resentment and, more important, because of the desire to visit one's home and often the necessity for handling family affairs. Most of the workers conscripted for war plants in 1943 probably went home for at least a week or two in 1944, particularly if their home was a farm where help in planting and harvest was needed. Of all the stated causes for absenteeism, illness was the largest. While, of course, this would be given in any case as an excuse for absence due to causes to be concealed, nevertheless it is true that disease and fatigue grew in 1944 and 1945. Long hours of work and poor diet took their toll. The manager of Mitsubishi glass factory at Tsurumi declared that a health examination in August 1944 had revealed that 30 percent of the female workers and boys were suffering from beriberi. The manager of the Furukawa Copper Co., in an unbombed area, attributed a 23 percent absenteeism rate at his plant in 1944 to "general physical fatigue." The Army had less trouble with absenteeism than private companies because most of its regular arsenal workers were "Gunzoku," civilians who took an oath to submit to military discipline and to maintain secrecy. With respect to day laborers the Army paid sufficiently to secure what it needed. Transportation also played a role in the growing absenteeism. As local transportation broke down under the impact of depreciation, lack of replacement, army seizure, lack of fuel, etc., it became increasingly difficult for workers living any distance from a plant to get to work. A survey at the Tsurumi plant of the Mitsubishi glass company, mentioned above, indicated that as late as March 1945 attendance at work of those who lived in adjacent company dormitories was much better than of those who lived at home.

Absenteeism, of course, increased as a result of the air raids but the Welfare Ministry in an inspection, in late June 1945, of forty-eight factories being restored after raid damage, noted a new element. A considerable number of workers failed permanently to return to work. It summarized its findings at these plants in the following figures which show workers reporting for work as a percentage of total workers on the

Category of Worker	*Before Bombing*	*Present on Date of Inspection after Bombing*
Students—Male	82.2	62.1
Female	79.9	59.0
Factory Workers—Male	83.6	60.4
Female	81.3	56.4

rolls.[121] Reasons for this were set forth in an interesting account by the Ministry in its report.

The main reasons for the absenteeism are as follows:

1. The necessity of having to look out for the family after the bombing. Those who lost homes and belongings had to find a new place to live. Some had to build huts and gather together a few articles of furniture with which to live. This took some time. Furthermore the huts did not have doors and locks at first and so could not be left alone.

2. The evacuation of families. Workers usually had to accompany their families who evacuated to their former home or to the country or to the home of acquaintances. With the evacuation many problems often arose requiring the presence of the head of the house. These conditions delayed the return to work.

3. The need to secure the necessities of life. It often took considerable time to secure food, clothing, etc. from friends after evacuation.

4. Some who have evacuated with their families often found it difficult to return. Due to the shortage of labor in agricultural areas, they usually lent a hand with the plowing, digging out pine stumps, etc., and became too valuable for the farmers to permit their return.

5. The danger or the impossibility of sending funds to the families. It is difficult to send money so they decide to deliver the same in person.

6. Difficulties of transportation. Whereas the worker attended regularly when he lived nearby, the bombing of his house often meant that he had to move to some distant house where transportation was poor.

7. The fact that there was no production going on at the factory. Often there was no work except cleanup and repair of machines. Many didn't like to do that kind of work and left (particularly conscripts) with the excuse that there was no work. As a matter of fact since it is impossible to hire coolies, all, including skilled workers, should really pitch in and do whatever work was necessary. . .The fact that workers cannot be made to jump in and assist in the clearing of the debris or in other miscellaneous work is clear proof of selfishness and stubbornness on the part of said workers.

We would not give the impression that factory authorities are just folding their arms and standing idly by doing nothing. All the prefectures are laying and carrying out the best possible plans under the circumstances. For example, those in charge of production secure the assistance of the police, mobilization officers and other administrative officials and urgent letters to return are dispatched to the evacuees. These letters are quite effective but the number who actually return is about 50 percent of the total. Some letters are undelivered and many who answer stating that they are returning never show up.[122]

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[121] *Report of an Inspection of Factories Now Being Restored*, Welfare Ministry, Tokyo, July 1945, p. 5.

[122] *Ibid.*, pp. 7-8.

While absenteeism was the number-one problem for labor management in early 1945, it was by no means the most important problem confronting industry. So great was the lack of materials and so inadequate the transportation facilities that there was sufficient labor on hand to produce what could be produced under the circumstances. A Japanese study, very near the end of the war, concluded: "As compared with material resources there is a relative surplus of manpower, but there is no efficient exploitation of it. Although distribution and mobilization of manpower do not respond to shifting of production, there is still room for increasing war potential depending on its efficient application."[123]

Although the labor situation had grown progressively tighter there is no evidence to indicate that it was the main factor responsible for the decline in production that set in during the fall of 1944. Indeed, the Urban Areas Division, in the study cited earlier, declared, "It is clear from the declines in various production and labor factors, that there would have been sufficient labor, in terms of the number of workers and even in terms of productive hours, for the volume of production which was possible by July (1945)."[124] Lack of steel, lack of oil, lack of bauxite, lack of ferro-alloys, lack of ships and vehicles, dispersal, had all slowed the Japanese economy by the summer of 1945 to the degree that the labor on hand was actually excess in terms of plant output. Or, to put it another way, every plant study on hand indicates that declines in availability of raw materials and in output were far greater than in labor attendance.

Prior to the Pacific War, Japanese industry other than textiles had operated for the most part on a one-shift, ten-hour basis. This was retained with the addition of some overtime during the war period. There was no round-the-clock operation as in the case of the U.S. There were two basic reasons why not even a second shift was added by most Japanese war plants—shortage of raw materials and lack of skilled labor. Most industries developed excess capacity very early. In 1943, for example, output in the steel industry was only half of capacity on a single shift. Only three small plants, turning out special steel, worked two twelve-hour

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[123] *A Survey of National Resources as of June 1-10, 1945*, by Sakomizu, H., Chief Cabinet Secretary, Tokyo, June 20, 1945, p. 7. The study noted a labor reserve of 3,000,000 (industry 2,000,000, commerce, 500,000 and others, 500,000) and declared "at present, effort is being made to apply this surplus to agriculture and transportation where shortages exist." It also noted the under-utilization of the unoccupied, in the following tabulation:

"Workers available for various industries in Dec. 1944 (between ages of 16 and 60):

Male	20,300,000	
Female	24,000,000	
Total	44,300,000	(of these 37,500,000 already engaged in industries and armed forces)."

[124] *The Effects of Air Attack on Japanese Urban Economy, op. cit.*, p. 25.

shifts. Had plant capacity been short, additional shifts would have been desirable, but without full utilization on one shift it was illogical to think of another. The prohibition of night labor for female industrial workers was suspended to permit the aircraft industry to operate a second shift, but so short was the industry of skilled supervisors that the additional shift had to be abandoned in fully half the plants because it proved to be unproductive. A few of the coal mines which obtained quotas of Korean laborers were able to operate on a second shift but in general this was not true of the industry as a whole. Shipbuilding was limited by both factors. Sufficient steel was not available to support a second shift nor were skilled workers. As a matter of fact, while total employees in the industry rose between 1943 and 1944, man-hours worked per employee per year were lower, reflecting the increase in student and women employees and the rise in absenteeism. When the ban on night work for women was lifted, the communications equipment industry attempted a second shift since in a number of plants, particularly in radio and radar, more than 50 percent of the employees were women. Most of the plants abandoned the night shift because efficiency was so low. The manager of the Mataka plant of Nihon Mu-en declared that the shift was abandoned because efficiency was low, due to the fact that employees to keep warm had to huddle around charcoal burners. The manager of the Tamagawa plant of the Sumitomo Tsushin Kogyo explained that due to lack of skilled supervision spoilage was so great on the night shift that it was abandoned and workers were put on a 12-hour day instead.[125] It became apparent that where materials were available, skilled labor was the bottleneck which prevented effective use of a second shift, but that in most cases it was the materials limitation which made it impracticable. At all events Japanese wartime industry was predominantly on a one-shift basis and therefore the building of additional capacity in some industries, such as iron and steel, when existing capacity was not fully used, was another indication of overconfidence and poor planning.

Productivity and Efficiency

Unfortunately, Japanese statisticians had not engaged in measurement of productivity and were unable to furnish an overall index of productivity such as the U.S. Bureau of Labor Statistics compiles. A set of tentative minimum-efficiency standards had been drawn up by the Welfare Ministry at the beginning of the war but there was so much disagreement over the figures that the project was abandoned and copies were nowhere to be found at the end of the war. Since the Ministry was denied access to

[125] See *Short Survey of Japanese Radar*, ATIG Report No. 115, Tokyo, November 20, 1945, Vol. 1, pp. 43-45. (Available in the Library of Congress, PB 8709.)

basic production figures by the Army, Navy and Munitions Ministry, any index it might have compiled would not have been of much value. Nor, apparently, was industry any better equipped to measure efficiency. Matsuichi Noguchi, a director of Mitsubishi Heavy Industries, said in an interview on December 7, 1945, that his organization had made no studies of worker efficiency. When the military made new demands, he explained, the company estimated how many additional workers they would need on the basis of the number working at the time and then padded the figure sufficiently to insure obtaining the minimum number required.

To answer two basic questions, therefore—how did the wartime efficiency of the Japanese worker, as measured by output, compare with that of other major belligerents, and, did efficiency in Japan increase or decrease during the war years—it will be necessary to rely on such fragmentary statistical data and general testimony as are available. While this may be admittedly unsatisfactory, in the absence of refined overall data, it will permit a fairly clear answer to both questions.

The progressive weakening of the labor force in Japan during the war, the drafting of able-bodied males, of skilled workers, the introduction of women, students, Koreans, etc., had the expected result in Japan's two basic industries, iron and steel, and coal. Per-capita output of the German steel industry in 1941 was 81 tons of ingot steel per worker. The comparable Japanese figure was 54 tons per worker. By 1944 German output per worker had dropped to 56 tons while Japanese was down to 21 tons. Thus Japanese 1944 output, on a per-capita basis, was only two-fifths of the 1941 figure while the German figure was two-thirds. In Japan total workers in the industry had more than doubled while output had declined. One interesting commentary on the reasons for this was supplied by the Kanzaki plant of the Daido Steel Works.

As chief operation in this plant is rolling one by hand driven rolling mill it required very strong elbow strength, we cannot mechanize the same to cover labor which is one of the specialities of this plant, so the workers must possess anti-heat bodies under high heat operation.

Under these operating circumstances the sudden shortage of labor (due to sickness, shortage of foodstuff and removal) and the difficulties of replacing them are based on their skillfulness instead of absolute number which showed not so big discrepancy.

Thus the replacement of unsuitable workers resulted in very little increase of manufacturing efficiency so we planned strengthen of labor by prolonging operating hours since 1943 but the efficiency went down by and by, and that this tendency went to the extreme since the end of last year owing to loss of labor-mind and from fear by frequent air-raids.

Until Chino-Japanese Trouble a regular numbers of 31 workers (6 heating men, 17 rolling men and 8 adjusters) for 1 set of rolling mill, output 500 tons of iron sheet but the same machine with same number of

workers at the end of war produced 250 tons. There will be many reasons in the above fact we think the replacement of skillful workers will be the most effective one.[126]

The Iron and Steel Control Association, in commenting on the decline in efficiency, listed conscription of skilled workers and the increase in inexperienced workers as the chief cause; as secondary cause it added interruption in flow of materials and deterioration of equipment. It noted the increase in older workers, that is, males over forty, and women and young boys, and in a section on "personal efficiency of workers," listed the main causes as (a) shortage of food, (b) shortage of transportation, (c) shortage of homes, (d) danger of air raids and absence from air raids, and (e) evacuation of families. It noted that much of the commandeered labor was living at a distance which necessitated a long trip to and from work. It declared:

The shortage of food was the largest factor in the drop in personnel efficiency. Although extra rations were given to the workers and some meals were furnished, it was still necessary for them to go into the country to buy food. Because of the rise in the prices in food, many hired out as coolies evidently to earn more money. . . . .Furthermore, inasmuch as team work is very important in iron and steel manufacturing the loss of key men or skilled workers due to absences or being called to the Army greatly cut down the efficiency of the whole team. This was a very serious situation.

Efficiency in coal production not only declined during the war years, it started declining from the 1933 peak of per-capita output. The 1933 figure of 227 tons dropped to 164 tons per capita by 1940. The subsequent decline during the war years, as well as a comparison with output in the U.S. and Great Britain, may be seen in the following table:[127]

Employees (in thousands)	*1941*	*1942*	*1943*	*1944*
Japan—Total	339	375	393	416
Japanese Workers	279	273	265	266
Koreans and others	60	102	128	150
Great Britain	698	709	708	710
United States	457	462	416	393
Annual Production (in million metric tons)				
Japan	55.6	54.2	55.5	49.3
Great Britain	209.6	206.9	197.6	191.0
United States	466.4	528.7	535.5	562.1
Output per Employee per Year (in metric tons)				
Japan	164	144	141	119
Great Britain	300	292	279	269
United States	1,021	1,144	1,287	1,430

[126] English as submitted by the Japanese. Not a translation.

[127] Sources: Japan, Coal Control Association, Tokyo, 1945; Great Britain, *Statistical Digest*, Ministry of Fuel and Power, London, 1945; U.S., *Bituminous Coal in 1944, Including Lignite*, U.S. Bureau of Mines, Washington, 1945.

While U.S. per-capita output rose significantly during the war period, Japan's and Great Britain's declined markedly, the former by 28 percent and the latter by 11 percent. By 1944 Japanese per-capita output was less than one-half the British, and only one-twelfth that of the U.S. Reasons for the decline in Japan were for the most part similar to those described for iron and steel, with the probability that deterioration of equipment and lack of repair of mines played a larger role in coal than depreciation of equipment did in steel. It will be recalled that it was shown in Chapter 3 that equipment breakdowns in the mines of the Mitsubishi Mining Company, which accounted for 13.5 percent of the coal mined in Japan proper, rose, on an index basis from 100 in 1940 to 608 in 1944.[128]

In aircraft, as was indicated in the previous chapter, the specially constructed efficiency index rose slightly from .63 in 1941 to .71 in 1944 and then declined to .42 in 1945, but it will also be recalled that compared to the U.S. index which rose from 1.42 to 2.76, the relationship between the Japanese index and the U.S. index declined from 44 percent in 1941 to 25 percent in 1944, and then to 17 percent in 1945. In other words, output on a weighted per-pound per-employee per-day basis in Japan in 1944 was only one-quarter of that in the U.S. even though aircraft in Japan was a new industry and had highest priority in everything. The composition of the labor force was not essentially different from that of the U.S. As a matter of fact women constituted a larger percentage of employees in the U.S. aircraft industry than in the Japanese, though our draft exemption policy was much more considerate of skilled workers.[129] The Japanese aircraft workers, however, did not have the advantage of the special jigs and tools designed to simplify operations for the new and inexperienced worker.

The chief of the Bureau of Crews of the Transportation Ministry reported that, because of the loss of experienced seamen and merchant marine officers, it required 20 percent more personnel to man the average 6,000-ton Japanese cargo ship in 1944.[130] Major Ishikawa of the Army

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[128] For a discussion of productivity in coal mining, see *Economic Condition of Japan*, Official White Paper submitted by the Japanese Government on July 4, 1947, published as special supplement of *Nippon Times*, July 16, 1947, p. 4. Average monthly output of coal per miner in tons was given as: 1933—18.9; 1936—17.5; 1941—13.9; 1945—5.9; 1946—5.4 tons.

[129] Of the 42,000 skilled workers demobilized from the Japanese armed forces between March 1943 and April 1945, as a result of industry's complaint that it had been stripped of technicians, foremen, etc., 30,000 were channeled into aircraft production. Of the remainder 5,500 went into coal mining, 2,600 into shipbuilding, 2,500 into communications and transportation, and 1,400 other.

[130] Interrogation of Shiraishi, Kazutaka, Tokyo, October 13, 1945.

Intendance Bureau testified that it required 5,000 men six months to build an airfield; all the work was done by hand. He cited Chofu Field, west of Tokyo, which required one full year to build.[131] In oil, 8.18 barrels were refined per man per day in 1940; by 1943 this had declined to 3.25 barrels per man per day. Japan required one man-day of labor for every 4 barrels of crude oil charged while in the U.S. the comparable figure was 53 barrels. Small size of the Japanese units and lack of labor-saving devices accounted for the difference. The last source to which the Japanese turned to obtain oil, the pine root oil project described in Chapter 3, was about the most inefficient method of obtaining oil yet devised. The production of one gallon of crude pine root oil required 2.5 man-days of work. Japanese plans for the project called for an output of 12,000 barrels of crude per day. Labor requirements would then have been 1,250,000 persons per day. As it was the number of persons engaged in crude oil production in Japan proper more than doubled between 1942 and 1944, but production decreased by 10 percent. In chemicals, a combination of poor equipment, unsatisfactory processes and inefficient labor—and there was no way of unraveling the combined impact—made explosives production very costly in terms of man-hours per unit of output. Japan required 1,012 man-hours to produce a ton of single-base smokeless powder. The U.S. required 5.5 hours. For a ton of TNT Japan required 272 man-hours, the United States, 10. Japan expended 1,178 man-hours per ton of tetryl and 1,025 per ton of hexogen while comparable U.S. figures were 67 and 20 man-hours per ton respectively. The Industrial Bureau of the Ministry of Commerce and Industry, under whose jurisdiction the chemical industry fell, noted that 40 percent of the workers involved in the output of nitric acid were drafted and of all the industries under its jurisdiction declared:

> Before the termination of the war, against the total male factory laborers of approximately 1,500,000 (in the industries under our jurisdiction), about 500,000 were recruited and called out for the military services. The effect of such large number of recruitment and calling out, on the production efficiency was tremendous and looked as if the balance of military mobilization and the industrial mobilization had been broken.[132]

While a further array of fragmentary statistics might be marshaled, the picture was almost everywhere the same—declining per-capita output over the war years and when compared with industries abroad very low production per worker. While mastery of production techniques in textiles had given the Japanese industrial confidence, it could not be carried over to mass production in war industries on anything like a competitive basis. As Martin Bennett, a U.S. engineer on the Reparations Commission, concluded:

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[131] Interrogation of Ishikawa, Y., Tokyo, November 17, 1945.

[132] *Report on Labor Conditions of Manufacturing Plants, op. cit.*, p. 6.

They could not be called efficient managers. The waste of labor in Japan is appalling. Because wages are traditionally very low, there has been no incentive to improve the efficiency of labor by even such commonly accepted means as illumination and safety devices. Most Japanese factories have saw-tooth roofs, a design perfected to catch the diffuse northern light through the vertical glass sections of the roof, but the Japanese have not bothered to place their buildings with the glass facing the north. Their electric lighting is unbelievably poor in spite of the tremendous development of their hydro-electric resources. Workers are forced to run precision tools by the yellow light of a dim, bare bulb hanging by its wire; electric wires are not protected; switches are exposed; no guards are placed around moving parts or open manholes. Measured by any standards, the Japanese, technically, are far behind the Americans.[133]

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[133] "Japan's Capacity to Produce," *Far Eastern Survey*, New York, May 8, 1946, p. 133.

Chapter Six

THE CIVILIAN SECTOR

As one step toward the solution of the food problem, the Government, at the regular vice-minister's meeting on July 30, decided on definite plans to collect acorns in abundance everywhere in Japan and to turn these into food. The entire people will be called upon to give their aid. School children and evacuees in particular will be enjoined to collect the maximum goal of five million koku of acorns.—Nippon Times. [1]

The Japanese civilian was hit harder by the war than the consumer in Germany, Great Britain or the United States.[2] Suzuki-san started with little and ended with less. In contrast to Germany there was no overall plan for maintaining the supply of consumer goods at even a minimum level.[3] Price control was haphazard, rationing incomplete. Nor was there any cushion of previously accumulated consumer goods to fall back upon. It was the Bombing Survey's conclusion that the destruction inflicted upon the Japanese civilian economy in six and a half months was as great as that inflicted upon Germany during a three-year period. This was attributed to the heavier and more concentrated attacks with incendiary bombs, to the greater inflammability of the Japanese urban areas, to the inadequate air-defense measures taken for the feeding, reclothing and rehousing of those whose houses were destroyed by the air raids, and finally, to the lack of any cushion in the civilian economy as a result of the progressive curtailment and privations which began as early as 1937.

Nowhere was the urban air attack more effective than in its impact upon the civilian sector of the economy. Fatigue, malnutrition, loss of weight, growing tuberculosis. excessive over-crowding, all played their part in bringing the civilian population virtually to the breaking point.

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[1] Tokyo, August 2, 1945. p. 2.

[2] See Table 71.

[3] In Germany the problem of civilian supply had, from the outset. been recognized as an essential factor in the war plan and consumer goods production did not fall substantially below the 1936-37 level until the last 8 to 10 months of the war. Germany is the only valid comparison with Japan from the standpoint of duration of time under control. See *The Effects of Strategic Bombing on the German War Economy*, USSBS (Europe), Chapter VII, p. 130.

Even in Kyoto, the only large unbombed city, the Medical Division of the Survey noted that the entire adult population had lost about 10 pounds per capita, while 65 percent of the adult population had lost as much as 20 pounds. Konoye, in advising the Emperor to surrender in February of 1945, mentioned the great danger of a Communist revolution and pointed to the "rapid deterioration of the people's living conditions" as one of the most dangerous factors.[4] So desperate did the food situation become in the spring of 1945 that the government decided to curtail the importation of badly needed industrial raw materials from the continent, in favor of foodstuffs essential to keep the population from starvation.

Even before the outbreak of the war with China, Suzuki-san's level of living was considerably below that of the West. He lived in a house of wood and paper, ate rice, bean paste and fish, rarely or never meat, milk or butter, wore clothing of cotton or staple fiber (contrary to Western impressions, silk was a luxury product in Japan, reserved largely for the export trade prior to 1937) and wore shoes of cloth with rubber soles (rarely leather), or more likely the even cheaper wooden geta. Automobiles, washing machines, flush toilets, radios, etc., were beyond his ken. More scientifically, on a per-capita basis, consumer expenditures in Japan during 1936-37 averaged roughly $98, compared with $473 for the United States and $354 for Germany.[5] The trend of consumers' expenditures thereafter for all three countries may be seen in Table 45. The decline

TABLE 45

INDICES OF REAL VALUE OF CONSUMER EXPENDITURES
JAPAN, GERMANY AND UNITED STATES, 1936-44

(average 1936-37 = 100)

Country	Average *1936–37*	*1938*	*1939*	*1940*	*1941*	*1942*	*1943*	*1944*
Japan[a]	100	107	109	111	108	99	93	78
Germany[b]	100	108	117	108	105	95	94	85
United States[c]	100	96	103	108	116	115	118	122

Sources: [a] Japan—Appendix B, "Gross National Product of Japan," *The Effects of Strategic Bombing on Japan's War Economy*, USSBS (Pacific), Washington, December 1946. Figures adjusted to 1940 price level.

[b] Germany (pre-war)—Special Paper No. 1, *The Gross National Products of Germany*, Overall Economic Effects Division, USSBS (Europe), Washington, 1945. Figures adjusted to 1939 price level.

[c] National Income Division, Office of Business Economics, U.S. Department of Commerce. Figures adjusted to 1939 price level.

during the war years for Japan brought real consumer expenditures down 30 percent from the 1940 peak (50 percent if we use the estimated index

[4] "Memorandum of Konoye Conversation with Hirohito," February 14, 1945, translated by Ushiba, T., *Bombing Survey*, Karuizawa, November 30, 1945.

[5] The corresponding figure for the United Kingdom for 1938 was $351.

figure of 59 for 1945) in marked contrast to the United States, where the real value rose steadily throughout the war period.[6]

As food, clothing, household items, footwear, etc., grew scarce, a larger percentage of consumers' income found its way into savings and taxes. The Savings Bureau of the Ministry of Finance[7] estimates of consumer expenditures for Japan proper indicate that savings and taxes together increased from 21 percent of total civilian income in 1936 to 41.1 percent in 1940 and to 61.4 percent in 1944. Expenditures for food fell from 28.7 percent in 1936 to 14.9 in 1944 while clothing expenditures dropped from 9.1 percent of the total to 1.3 percent, over the same period. While there was progressively less and less to buy and strong moral pressure was exerted by the government, through the neighborhood associations, to stimulate savings, the Savings Bureau figures are undoubtedly exaggerated and hardly typical. A more detailed and realistic survey by the Mitsubishi Economic Research Bureau of the distribution of income for an average family of two adults and three children in the lower income brackets indicates a larger and more constant proportion spent on food. As is shown in Table 46, the percentage absorbed by savings and taxes

TABLE 46

ESTIMATED PERCENTAGE DISTRIBUTION OF INCOME OF AN AVERAGE FAMILY *
JAPAN PROPER, 1936-44

Use	*1936*	*1938*	*1940*	*1942*	*1944*
Food	33.1	33.1	35.7	36.2	30.6
Housing	14.9	13.9	11.6	12.0	7.8
Fuel and Electricity	4.4	4.4	4.5	4.2	3.1
Clothing	10.0	9.2	8.1	8.9	6.3
Medical Care	6.1	6.0	5.9	6.5	6.4
Miscellaneous	19.2	18.0	17.5	20.5	22.2
Savings	11.6	14.5	15 7	10.7	21.5
Taxes	.7	.9	1.0	1.0	2.1

* Two adults and three children in the 100-150 yen per month income group.
Source: Mitsubishi Economic Research Bureau, Tokyo, 1945.

together rose from 12.3 percent in 1936 to 23.6 in 1944. In addition to moral-suasion savings there was an income tax paid by everyone with a monthly income of over 50 yen. This tax, which rose from 6 percent in 1939 to 15 percent in 1944, was computed on the gross income less a flat-sum deduction of 50 yen per month; a further deduction of 2 yen per

[6] Real per-capita consumer expenditures rose 16 percent in the United States during the period 1939-44. In Great Britain over the period 1938-44, there was a 16 percent decline. Most of the decline, however, came between 1938 and 1941 since there was only an additional one percent fall in Britain between 1941-44. See *The Impact of the War on Civilian Consumption in the United Kingdom, The United States and Canada*, London, HMSO, 1945, p. 23.

[7] See Interrogation of Imai, Director of the National Savings Bureau of the Ministry of Finance, Tokyo, November 1, 1945.

month for each dependent from the calculated tax was allowed. Thus a man with a monthly income of 200 yen and three dependents would pay an income tax of 16.5 yen per month in 1944, or 8.2 percent of his gross income.

While savings and taxes combined to reduce the purchasing power of the consumer, the rising price level coupled with the acute shortage of supplies worked the hardship. Although the most reliable official price indices, based on ceiling prices, indicate an average rise from 100 in 1937 to 250 in 1945 they fail to take into consideration the fact that the bulk of all purchases other than the staple food ration had to be made on the black market at much higher than official prices. The Morita index in Table 47 was constructed after the end of the war, for the Survey, and

TABLE 47

CONSUMER PRICE TRENDS, JAPAN PROPER, 1936-45

Year	*Morita Retail Prices* [a]	*Bank of Japan Retail Prices in Tokyo* [b]	*CBS Consumer Price Index for Wage Earners in Tokyo* [c]	*CBS Cost of Living* [d]	*Asahi Shimbun Cost of Living* [e]	*Min. of Agr. & Forestry Retail Prices* [f]	*Bank of Japan Retail Prices* [g]
1936 ..	100	91	...	...	...	91	159
1937 ..	109	100	100	100	100	100	174
1938 ..	120	115	109	110	107	117	200
1939 ..	135	128	119	121	114	133	224
1940 ..	175	149	149	143	128	156	260
1941 ..	204	151	150	147	131	161	263
1942 ..	266	155	152	154	134	170	271
1943 ..	312	165	169	165	143	185	287
1944 ..	390	184	208	199	164	227	321
1945 ..	...	247	254	...	...	...	431

Sources: [a] Index constructed by Prof. Yuso Morita, in 1945 adviser to Bank of Japan and Professor at Yokohama College of Commerce, now chief of the Bureau of Statistics, Office of the Prime Minister, to include effects of black-market transactions. 1936 = 100.

[b] Bank of Japan, Index of Retail Prices in Tokyo, 1937 = 100; figure for 1945 is for August.

[c] Cabinet Bureau of Statistics. 1937 = 100; figure for 1945 is for May.

[d] Cabinet Bureau of Statistics, 1937 = 100; weights are Food 48 percent, Housing 22 percent, Fuel & Light 7 percent, Clothing 14 percent, Miscellaneous 9 percent.

[e] *Asahi Shimbun*, 1937 = 100; weights not known but it includes food and drink, dwelling costs, heat and light, clothing and "culture".

[f] Retail Price Index of Ministry of Agriculture and Forestry, 1937 = 100; figure for 1944 is as of November.

[g] Bank of Japan, Index of Retail Prices, July, 1914 = 100; figure for 1945 is for August.

it attempts to take into consideration the actual volume of transactions both legal and extra-legal and the probable prices paid in both cases. While it has statistical limitations, the indication it gives that retail prices rose from 100 in 1936 to over 400 in 1945 is more in line with observable facts than the official indices. It serves to highlight the fact that price

control in Japan was a poor brake. About all that can be said for it is that it served to prevent a runaway inflation in the face of enormous credit and currency expansion and growing shortages of goods.

When the war with China was started, no attempt was made to institute sweeping price-control measures. An advisory committee on price policy, established by the short-lived government of General Hayashi in the spring of 1937, continued a shadowy and inactive existence for a short time until it was dissolved in November 1937, principally because of objections from business interests. On August 3, 1937, the government resorted to the Anti-Profiteering Ordinance of 1917. Legally this ordinance had remained valid for rice, flour, iron and steel, coal, cotton yarn and cloth, paper, dyestuffs, fertilizer, etc. The ordinance did not provide directly for price fixing but for the punishment of actions aimed at raising prices by restraint of trade. Punishment under this ordinance was mild: imprisonment up to three months or a fine of 100 yen or both. The economic police (Keizai Keisatsu) of the Home Ministry were responsible for its enforcement and as a result it was enforced only against those who did not have the means to buy exemption from the police. The list of commodities was progressively extended and in December 1939 the Ordinance was applied to all commodities. Selling at "excessive profit," hoarding, or refusing to sell were forbidden. The measure remained in force throughout the war.

During the fall months of 1937 the government attempted to regulate prices of imported goods mainly by autonomous control through government-supervised trade associations, under the authority of the Export and Import Trade Control Ordinance. By agreement between producers and dealers, maximum prices were fixed late in October 1937 for raw cotton and cotton yarn, on the basis of the New York cotton quotations. Soon after, such price control was extended to cotton textile. In December 1937 crude rubber was subjected to similar control. Early in 1938 a wide range of commodities was brought under such control, including staple fiber which became increasingly a substitute for cotton and wool. These measures rested on agreements among producers and dealers and could hardly be enforced. As a result prices tended sharply upward and further steps were taken by the government. In April 1938 a Central Price Committee was established with the Minister of Commerce and Industry as chairman. Parallel commissions were organized in each of the prefectures. The national commission was to work out a general program of price policy and to determine standard national prices for commodities which it thought should be subject to control. The local commissions were to determine local prices on the basis of the recommended standard national prices. Final decision to put maximum prices into effect was, however, reserved to the Minister of Commerce and Industry and to the prefectural governors. They were enabled to act upon the Central Price Committee's

advice by the Commodity Price Regulation Ordinance of July 9, 1938, which empowered both the Minister of Commerce and Industry and the prefectural governors to establish maximum prices. Enforcement was left to the economic police. Moreover, on August 10, 1938, an Imperial Ordinance authorized the appointment of 3,000 price investigators throughout the country with the double function of supervising the enforcement of price decrees and of assisting in price fixing.

By February 1939 prices of more than 60 commodities, including more than 1,000 varieties and sub-products, had been officially fixed but the price trend continued upward and the government made another gesture toward better control. The Central Price Committee was reorganized in February 1939; membership was increased from 30 to 50 and the Minister of Commerce and Industry ceased to preside ex officio. In order to enhance the prestige of the Committee an independent chairman, Ikeda, formerly general manager of Mitsui and one-time president of the Bank of Japan and Minister of Commerce and Industry, was appointed by the Cabinet. No new powers were, however, added to the purely advisory functions of the Committee. Price-fixing authority remained with the Minister of Commerce and Industry and enforcement with the economic police.

In April 1939 the Committee published a lengthy set of principles for price control which defined in detail the objectives and methods of efficient price control. The government, under business pressure, did not adopt these principles and in August the Committee published "working principles for price control" which went into even greater detail in describing possible measures of control. The beginning of the European War in September 1939 led to a sharp speculative increase in prices and as a result, the government adopted one of the recommendations of the Committee, and by the Price Freezing Ordinance of September 19, 1939, prohibited any advance in prices, rents, fees, freight, wages, and salaries above the level prevailing on the preceding day. Rents were frozen as of the August 1938 level. Foreign trade articles, shipping charges, perishable foodstuffs, land, buildings and securities were not included in the freeze. No real attempt was made, however, to hold the line and in fact the government shortly thereafter raised the official price of rice 13.2 percent,[8] without consulting the Central Price Committee, and the Monopoly Bureau raised the prices of cigarettes and tobacco. The Committee protested. It worked out plans for enforcing the freeze and extending it to cover perishable foodstuffs, land and buildings. Business-men protested that the freeze cemented impossible economic distortions. Hatta declared:

The fixed level of prices set on September 19, 1939, was an extreme blunder. It was fair for some but unfair for others. . . .we introduced the 'nail down' price system, following the German model of 1936. Ger-

[8] The official buying price for rice was raised 5 yen on November 6, 1939.

many adjusted her prices smoothly, but Japan failed to make necessary adjustments in the system. So industry lost hope and many articles went out of production—especially small items, like nails which were highly important in the technical sphere. . . ."[9]

The existence of the Committee was proving embarrassing to the government and as a result it was dissolved in March 1940. It was replaced by a Price Policy Council of twenty members under the chairmanship of the Prime Minister himself, and a Central Price Formation Committee under the chairmanship of the Minister of Commerce and Industry. In addition a special Agricultural Price Formation Committee was organized. The price freeze, however, was renewed year after year and remained in force throughout the war.[10] Adjustments were granted when pressure was strong enough and for the more important basic commodities separate prices were fixed by either the Ministry of Commerce and Industry or the Ministry of Agriculture. An interesting picture of the increase in official ceilings for certain consumer items between the date of the original freeze and the end of the war, may be seen in Table 48. It might also be added that none of these items could be obtained in legitimate markets by August 1945.

TABLE 48

CHANGES IN OFFICIAL CEILING PRICES FOR SELECTED CONSUMER GOODS
SEPT. 1939-SEPT. 1945

(in yen)

Article	*Date*	*Manufacturer*	*Control Body*	*Wholesale*	*Retail*
Pots—Pig Iron	Sept. 1939	2.80	.....	3.13	3.93
	Sept. 1945	11.70	14.10	.....	17.90
Shoes—Men's Machine Made	Sept. 1939	.....	.....	14.55	19.90
	Sept. 1945	27.90	29.40	30.40	36.00
Auto Tires—32" × 6"	Sept. 1939	85.00	.....	.....	98.00
	Sept. 1945	150.00	153.00	168.75	168.75
Rubber Soled Canvas Shoes	Sept. 1939	.....	.....	.....	.82
	Sept. 1945	1.75	1.83	1.98	2.15
Bicycles—26" wheel	Sept. 1939	71.70	.....	76.70	90.80
	Sept. 1945	310.00	317.50	.....	340.00
Matches—box of 2,800	Sept. 1939	.10	.25	.27	.29
	Sept. 1945	.52	1.53	1.61	1.70
Soap, Laundry, 1 kg.	Sept. 1939	.08	.....	.....	.10
	Sept. 1945	.16	.17	.18	.20
Umbrellas, Japanese	Sept. 1939	.....	.....	.....	1.10
	Sept. 1945	3.97	.....	4.20	4.64

Source: Ministry of Finance.

[9] USSBS Interrogation No. 380, Tokyo, November 17, 1945.

[10] For an account of price control through 1942, see "Price Control Regulations" by Matsuta, Seishin, in *Keizai Toseiho Nempo* for 1942, Tokyo, 1943, p. 207.

The rise of prices during 1940-41 led the government to resort increasingly to the use of subsidies to hold down basic material and food costs.[11] It was the easiest way out. Both producers and consumers were satisfied and the pressure which either a strict price policy or a runaway inflation would have engendered was somewhat mollified. For example, from 1940 through the end of the war the retail price of fertilizer was kept constant by means of a subsidy to the control company which bought all commercial fertilizer, despite a 261-470 percent increase in the price paid to producers. As may be seen in Table 49, the government subsidy on super-

TABLE 49

FERTILIZER PRICE STRUCTURE, 1940-45

(yen per metric ton)

		Superphosphate *				
Date		*Producer's Price*	*Control Co. Price*	*Subsidy*	*Wholesale*	*Retail*
1940	Jan.-July	57.92	58.59	4.46	60.21	62.37
	Aug.-Dec.	71.25	58.59	17.79	60.21	62.37
1941	Jan.-July	67.04	58.59	13.58	60.21	62.37
	Aug.-Dec	68 93	58 59	15.47	60.21	62.37
1942	Jan.-July	72.87	58.59	19.41	60.21	62.37
	Aug.-Dec.	70.01	58.59	16.55	60.21	62.37
1943	Jan.-July	75 01	58 59	21.55	60.21	62.37
	Aug.-Dec.	86.35	58.59	32.89	60.21	62.37
1944	Jan.-July	115.97	58.59	62.51	60.21	62.37
	Aug.-Dec.	115.97	58 59	62.51	60.21	62.37
1945	Jan.-July	269.73	58.59	216.27	60.21	62.37

* Contains 16 percent phosphate salt.

Source: Ministry of Agriculture and Forestry.

phosphate rose from 4.5 yen per metric ton in 1940 to 216 yen per ton in 1945. Ammonium sulphate subsidy rose from 16.9 yen to 204 yen per metric ton. In the case of rice, the producers' subsidy rose from 5 yen per koku[12] in 1941 to 45.5 yen per koku in 1945. With an average retail price of 47 yen per koku in 1944, the amount paid to farmers by the government for their rice was 62.5 yen per koku. In addition, bonuses of 55 yen per koku for filling the last 10 percent of the predetermined quota,

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[11] Clothing and household furnishings were not subsidized; coal, electric power, iron and steel, and copper were. As Nakamura, Chief of the Commercial Affairs Bureau of the Ministry of Commerce and Industry, stated: "revisions of price control measures were always one step behind actual developments" and subsidies appeared to be the only means by which the government could hold the rise in check. See his interrogation, Tokyo, October 15, 1945.

[12] Originally the koku differed according to locality and period but as standardized later it is 4.96006 English bushels, or 5.11902 American bushels, or 1.80391 hectoliters. Honjo, Eijiro, *The Social and Economic History of Japan*, Kyoto, 1935 (Appendix 2), p. 370.

and 175 yen per koku for everything in excess of the quota, were inaugurated in 1944.

Fertilizers provide a good example of the divided responsibility for control and pricing which characterized the Japanese administrative structure during the war. Establishment of prices of raw-material ingredients and control over the production of fertilizers was the function of the Ministry of Commerce and Industry. Establishment of prices of fertilizer products at all levels was the function of the Ministry of Agriculture and Forestry which fixed fertilizer prices at cost plus 5 percent of paid-up capital. The work of both Ministries in this and the food field was supposed to have been coordinated by the Food Policy Investigating Committee, an independent body, but there is no evidence of its effective operation. No overall, independent price-control agency similar to the U.S. Office of Price Administration was established during the war. Price fixing remained the responsibility of the individual Ministries. The cost-plus method was widely employed in the heavy industries, but the price freeze of September 18, 1939, was used as the basis for setting ceilings of consumer goods. Where it was desired to increase the production of certain goods, subsidies were employed. From time to time when pressure or outcry against ineffective price policy grew strong, the government appointed another committee. In May 1943 the *Economist* noted:

> In view of the demand for a re-appraisal of its price policy, the government at its meeting on April 26 decided on two-fold commodity price counter-measures, important and fundamental.[13]

As late as March 1945 it noted:

> The deliberative body for the formulation of a coordinated price policy, called the Wartime Price Investigation Committee, an organ which it had been known for some time the government was planning to create, was finally established on February 19. . . .Above all things, it's necessary to examine why the price policy, since the preceding Cabinet, had fallen into an impasse. . . . The Price Investigation Committee of the Cabinet, for instance, held a few meetings at the time of its formation and submitted once its reply to the government inquiry but that was all. As for the Central Committee for Price Formulation, during the past two or three years, it has never held any meeting that can properly be called a meeting of the Committee to investigate general price measures. Some members of the Committee, regretting this, expressed their misgivings and even made representations to the Minister concerned, but there was no response. The reason for this, as we have learned, was that, frankly speaking, the government was not prepared to address questions to the Committee, even if meetings were held, owing to its inability to fix the basic principles for formulating a price policy.[14]

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[13] *Oriental Economist*, May 1943, pp. 209-10

[14] *Oriental Economist*, March 1945, p. 97.

Rationing began in 1939 on a local scale as various municipalities took measures to secure an even distribution of limited supplies. On a national basis, rationing started in 1940 with matches and sugar. For sugar the Minister of Commerce and Industry established national per-capita rations. For matches, he decreed national rations on the basis of size of family. Administration of these rations, however, was left to the local authorities and practices differed considerably.[15] The Rice Distribution Control law was enacted in April 1939, establishing the Japan Rice Company, and a Rice Distribution Control Ordinance was promulgated in August 1940 to control rice distribution through local agricultural associations and control organs of rice merchants, but rice rationing to consumers was not inaugurated until April 1941. This will be discussed later. The use of electricity for neon signs, floodlights, etc., was prohibited after 1939. Sales of gasoline, auto tires and tubes were restricted in 1938 and gasoline was rationed locally, the monthly allowance for a medium-sized passenger car averaging seven gallons. After 1938 no hides or leather could be used in the production of sporting goods, luggage, handbags, etc. The use of rubber was restricted in 1939. Copper could not be used for household utensils. A number of textile goods distribution control ordinances were promulgated extending control even to waste fibers and rags. The use of cotton for domestic consumption in yarns and cloths was curtailed. This will be examined later. In July of 1940 a very drastic step in curtailing civilian consumption was taken. A ministerial order prohibiting the production and sale of luxury goods was issued. The production of a wide range of articles such as jewelry, silver-ware, expensive textiles such as velvet, chiffon, silk lace, etc., was prohibited, while for a wide range of articles of clothing, furniture, watches, etc., production of types to sell above a set price was prohibited. For example, neckties selling for more than 4 yen, watches selling for more than 50 yen, fountain pens selling for more than 5 yen, could not be manufactured. Even restaurant meals above a fixed price could not be served.[16]

The net result of such restriction orders, coupled with the price freeze and the corruption of the economic police, was the rapid growth of the "black market" in Japan. This began to develop on a wide scale during the latter part of 1939. Although no statistics were available, of course, on the overall volume of black-market transactions, various reports give some clue and the statisticians of the Bank of Japan kept an informal record of the trend of black-market prices. In March 1940, illegal prices for second-hand imported automobiles were 30 to 60 percent higher than

[15] *Asahi Shimbun*, December 15, 1940.

[16] See "Ticket Distribution System and Purchasing Power" by Takeshima, Tomisaburo, in *Koron*, July 1940; also "Price Policy and Ticket Rationing" by Iwasaki, Matsuyoshi, in *Zaisei*, July 1940.

TABLE 50

OFFICIAL VS. BLACK-MARKET PRICES FOR SELECTED CONSUMER GOODS, JAPAN PROPER, 1943-45

(Unit: 1 yen)

Commodity	*Unit*	*Official Price Dec. '43-July '45*	*Black Market Price*							
			Dec. 1943	*March 1944*	*June 1944*	*Sept. 1944*	*Nov. 1944*	*March 1945*	*June 1945*	*July 1945*
Rice	1 sho	0.5	3.0	7.0	14.0	18.0	22.0	25.0	28.0	35.0
Soy-beans	1 sho	0.4	3.0	5.0	5.5	5.5	7.0	10.0	11.0	12.0
Sweet Potatoes	1 Kan	0.4	4.0	5.0	6.0	6.0	8.0	8.0	8.5	9.0
Beer	1 Btl.	0.9	2.0	4.0	7.5	9.0	9.5	10.0	11.0	15.0
Sugar	1 Kan.	2.2	50.0	100.0	200.0	260.0	300.0	390.0	450.0	530.0
Dried-Bonito	1 Kan.	14.6	70.0	84.0	150.0	200.0	220.0	250.0	350.0	520.0
Cotton Cloth	1 Tan	3.8	17.0	30.0	60.0	70.0	90.0	100.0	130.0	150.0
Silk Cloth	1 Tan	23.0	50.0	70.0	80.0	120.0	140.0	160.0	180.0	220.0
Shoes, leather	1 Pair	22.7	100.0	130.0	300.0	350.0	500.0	800.0	1000.0	1000.0
Soap	1 Cake	0.1	2.0	3.0	5.0	5.0	6.0	15.0	20 0	20.0
Matches	1 Box	0.4	1.0	1.2	6.0	18.0	30.0	45.0	60.0	80.0
Tabi (socks)	1 Pair	0.8	3.5	7.0	10.0	12.0	20.0	37.0	52.0	60.0
Charcoal	1 Bag	2.2	10.0	25.0	35.0	40.0	80.0	65.0	65.0	85.0
Firewood	1 Bundle	0.4	1.5	3.5	4.5	4.5	4.5	6.0	6.0	8.0
Kama (iron kettles)	1	7.6	25.0	45.0	50.0	60.0	60.0	120.0	180.0	230.0
Nabe (saucepans)	1	3.1	15.0	30.0	40.0	50.0	60.0	90.0	100.0	120 0
Bicycle	1	76.8	225.0	400.0	600.0	800.0	1000.0	1300.0	1500.0	2000.0

Source: Bank of Japan.

official prices. Japanese domestic cedar rose to more than 140 percent of the officially-fixed price. In April 1940 the sale of dyestuffs was reported at six times the official price. In June 1940 illegal prices of hides ranged from 250 to 350 percent above fixed prices. In November 1940 celluloid toy prices were quoted at more than five times the official price. In the same month coal prices in a free, illegal market around Nagasaki were reported more than 40 percent higher than official coal prices. It will be shown in subsequent pages that the official allowances of food, clothing and house furnishings during the 1941-45 period were not sufficient to meet consumers' needs, thus forcing resort to the black market. As is shown in Table 50, throughout the pre-air raid period of the war, black-market prices rose steadily, jumping sharply when the air raids began. By July 1945 black-market prices of most consumer goods were on the average 42 times higher than the official prices for these goods, ranging from 10 times higher in the case of silk cloth to 240 times higher for sugar.[17] The most acute sufferers from this condition were the urban residents who were bombed out, and who were forced to resort to the black market to replace minimum essentials.[18]

Food

Because of the predominantly mountainous character of the terrain, the cultivated land area of Japan is only 16 percent of total land area. In 1944 the average size of the Japanese farm was very small—just 2.4 acres. Only one percent of all Japanese farmers operated farms larger than 12.25 acres.[19] Tiny individual farms, endless division of ownership into minute parcels, a predominance of tenancy, intensive cultivation, great use of fertilizer and high land prices and ground rent, are characteristic of Japanese agriculture. The Minister of Commerce and Industry reported that in 1942 there were only 99 farm tractors in all of Japan, 65 of which were on the island of Hokkaido where the size of the farm is somewhat larger than on Honshu.

In 1943 almost 70 percent of the Japanese farmers rented a part of the land they cultivated; approximately 50 percent rented more than one half the land they cultivated; and about 30 percent rented 90 percent or more of the land they cultivated. There was a Japanese feudal adage that

[17] See Interrogation of Yamamoto, Y., Research Director, Bank of Japan, Tokyo, October 27, 1945, on the subject of black-market prices.

[18] Two surprisingly outspoken attacks upon profiteering in the black market, the greed of distributors and the inadequacies and shortcomings of price control and rationing, during the war period, were "Speeding Up the Readjustment of Enterprises," by Mutsu, Rikizo, in *Daigi Zasshi* (Great Righteousness), Tokyo, October 1943, and "Reasonable Rationing and War Living," in *Diamondo Zasshi*, Tokyo, January 21, 1944.

[19] "Japanese Farm Tenancy" by Wakukawa, Seiyei, in *Far Eastern Survey*, December 19, 1945, p. 365.

"farmers should neither live nor die" and this was very descriptive of Japanese farm conditions. A SCAP report declared:

Tenancy practices in Japan place the tenant in a disadvantageous position. Rent is exorbitant, tenure is precarious, and income from farming is so low that it cannot satisfy even his frugal needs. Hence, the discontent and social unrest that characterize the Japanese village.[20]

Total arable land reached a peak of 14,945,000 acres in 1937, and thereafter a gradual reduction set in which accelerated rapidly in 1943 and 1944.[21] Abandonment due to lack of labor and the establishment of new building sites, military installations such as airports, etc., were the chief causes of the return of the land to nonagricultural use. Even though the arable land area decreased after 1937, however, the extension of double cropping resulted in an increased cultivated crop acreage through 1942. Thereafter, cultivated acreage, even for food crops, fell off, with the greatest reduction coming in mulberry acreage as the government pushed a shift from nonfood to food crops.[22] Mulberry acreage fell from 1,749,000 acres in 1930 to 524,000 acres in 1945. Even rice acreage fell until the middle of 1944 and then increased slightly until the end of the war. The per acre yield of most crops in Japan also tended to decline during the war years. Wheat yield per acre, for example, fell from .91 metric tons in 1939 to .67 metric tons in 1945. Shortages of fertilizer, farm labor, etc., were mainly responsible. Rice yields, however, were maintained at prewar levels due largely to the precedence given rice with respect to fertilizer, labor, etc. The rice yield averaged 1 33 tons per acre during 1941-44 compared to 1.32 tons per acre during the 1931-40 decade.

Japan depends more on fertilizer than any other country in the world. In 1938 an average of 105 pounds of chemical fertilizers was used for each acre of arable land in Japan, compared to 9 pounds for the United States, and 56 pounds for Germany. The Japanese succeeded in increasing average rice yields by 75 percent between 1878 and 1939 by the increased application of chemical fertilizers and the development of new varieties of rice adapted to such treatment. Fearing the reaction of such new varieties if fertilizer should become scarce, they sought, just prior to Pearl Harbor, to obtain the seeds of their obsolete varieties.[23] The importance

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[20] *Farm Tenancy in Japan*, Report No. 79, Natural Resources Section, SCAP-GHQ, Tokyo, June 25, 1947, p. 6.

[21] *Noji Tokeihyo* (Statistics of Agriculture), Ministry of Agriculture and Forestry, Tokyo, respective years.

[22] Tea and pyrethrum acreage was sharply reduced as well. Tea production reached a peak of 137 million pounds in 1941 and then fell to 54 million pounds in 1945. The pyrethrum plant, a member of the chrysanthemum family, is the source of an important insecticide and prior to the Pacific War was exported in considerable quantities by Japan.

[23] USSBS Interrogation of Hidaka, Hiroshi, Head of General Affairs Bureau of Agriculture Ministry, Tokyo, November 1945.

of fertilizer for Japanese agriculture is indicated by experiments of the Ministry of Agriculture and Forestry. An increase in yields of 43 percent for rice and 109 percent for other grains occurred when ammonium sulphate (nitrogenous fertilizer) was applied to otherwise unfertilized plots. Superphosphate increased the yield of rice 5 percent and other grains 50 percent.[24]

Consumption of inorganic fertilizer increased from 1,420,000 metric tons in 1926 to a peak of 3,674,000 in 1937. Thereafter application declined until in the last year of the war (August 1, 1944-July 31, 1945) it was only one-sixth of the 1937 peak. The figure for the 1945 fertilizer year was still lower, dropping to 490,000 metric tons. Monthly application of ammonium sulphate declined from 103,500 tons in 1941 to 20,250 in 1945, while superphosphate application fell from 136,667 metric tons per month in 1940 to 917 tons in 1945.[25]

There was also a material decline in the output of agricultural tools as indicated in Table 51. Beginning in 1940 these were subject to the Agricultural Tools Distribution Control Ordinance and were parceled out via neighborhood associations with preference given to rice farmers.

TABLE 51

MONTHLY AVERAGE PRODUCTION OF SELECTED AGRICULTURAL IMPLEMENTS

(units)

Period	*Plows*	*Harrows*	*Forks*	*Sprayers*	*Threshing Machines*	*Rice Hullers*
1940	32,881	7,204	34,433	6,174	15,596	1,361
1941	30,998	6,659	31,424	5,349	14,608	1,301
1942	30,067	6,363	29,368	4,416	13,703	1,269
1943	21,672	4,758	14,718	4,967	7,600	734
1944	9,799	2,467	5,153	3,701	3,566	289
1945	5,226	1,263	1,266	2,488	3,492	167

Source: Japan Agricultural Implement Control Union.

To obtain a complete picture of the supply situation it is necessary to examine three factors—the food reserve carried over from the previous year, domestic annual production, and imports. Rice is the only food in Japan which has a substantial carry-over from one year to the next and is the most sensitive barometer of the Japanese over-all food position. Before the Pacific War Japan normally had on hand from one to one and a half million tons of rice on October 31, the end of the rice year. On November 1, 1941, the beginning of the 1942 rice year, Japanese carry-

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[24] *The Effect of Ammonium Sulphate and Superphosphate Fertilizers on Yields of Grains in Japan*, Ministry of Agriculture and Forestry, Tokyo, 1943. See also Interrogation of Kakide, S., Chief of Fertilizer Section, Ministry of Agriculture and Forestry, Tokyo, November 13, 1945.

[25] *Japanese Economic Statistics*, Research and Statistics Division, SCAP-GHQ, Bulletin No. 18, February 1948, Tokyo, p. 39.

over stocks of rice amounted to 1,178,000 tons. This fell to 392,000 tons on November 1, 1942 and by October 1945 was down to 133,000. With total annual requirements of staple food in the neighborhood of 13 million tons, this carry-over represented about a four-day supply, not enough to act even as a "pipeline" stock to prevent interruptions in the distribution of supplies. Food stocks on hand are shown in Table 52.

TABLE 52

FOOD STOCKS ON HAND, JAPAN PROPER, 1937-45 [a]

(in metric tons)

Year	*Rice*	*Other Grain* [b]	*Canned Foods*	*Sugar*
1937	1,251,955	.....	78,953	69,603
1938	1,451,550	.....	91,147	63,631
1939	676,900	.....	102,642	55,381
1940	716,124	2,642,431	64,721	66,693
1941	1,178,377	2,264,042	73,721	89,744
1942	392,000	1,855,614	47,224	167,159
1943	435,333	1,543,092	61,014	105,956
1944	384,167	.....	50,128	11,272
1945	133,000	.....	.....	4,583

[a] Figures for rice represent stocks on hand as of Oct. 31; figures for other grains represent stocks on hand as of June 30; figures for canned foods and sugar represent stocks on hand as of Dec. 31.

[b] Barley, naked barley and wheat. Since these figures are as of June 30 they are not carry-over figures to the next crop year.

Source: Compiled from data furnished by the Ministry of Agriculture and Forestry.

In addition to these normally computed reserves there was a further reserve of 245,000 tons of rice distributed among the principal rice-consuming centers. This had been created from military hoards in November 1944 and was earmarked for use in emergencies due to air raids. Of this, 130,000 tons were destroyed by air raids from February 1945 to the end of the war. In addition, 71,000 tons of rice were destroyed by bombing while in transit across the Japan Sea.

The composition of the Japanese family diet, excluding imports, consisted of rice (56 percent), other cereals (16 percent), potatoes (14 percent), fish (4 percent), other vegetables (4 percent), legumes (4 percent), others including meat, eggs, dairy products, etc. (2 percent), at the end of the war, in terms of caloric intake. Table 53 presents the actual production data for the principal foods, excluding fish. It will be seen that while the production of everything fell off in 1945, the disastrous decline was in the rice crop. The 1945 rice crop was the smallest since 1909 and was 27 percent less than the 1944 crop. This was due to the weather which had also affected the crop in 1941 but not as seriously and not at so crucial a time.

On the basis of domestic production, the Japanese were unable to maintain prewar levels during the war years, except for 1942. An index of the total caloric value of the principal foods, with the period 1931-40 as a base of 100, fell to 91 in 1941, then rose to 102 in 1942 and thereafter

TABLE 53

DOMESTIC PRODUCTION OF PRINCIPAL FOODS, JAPAN PROPER, 1931-45

(1000 metric tons)

Year	Rice	Wheat	Barley	Naked Barley	Sweet Potatoes	White Potatoes	Vegetables and Melons	Fruits and Nuts
1937 ...	9,928	1,367	747	827	3,294	2,066	6,787	1,273
1938 ...	9,862	1,228	687	710	3,224	1,847	6,611	1,259
1939 ...	10,324	1,656	844	933	2,920	1,882	6,717	1,400
1940 ...	9,107	1,790	817	869	2,958	1,644	6,877	1,423
1941 ...	8,245	1,458	706	936	3,437	1,964	6,302	1,437
1942 ...	9,999	1,382	733	918	3,134	1,964	6,288	1,490
1943 ...	9,422	1,092	572	732	4,021	2,062	6,549	1,282
1944 ...	8,784	1,383	781	912	3,950	2,000	5,819	1,047
1945 ...	6,445	943	535	720	3,897	1,771	4,640	687

Source: *Crop Statistics for Japan, 1878-1946*, Natural Resources Section, SCAP-GHQ, Report No. 108, Tokyo. June 29, 1948.

dropped steadily, reaching 74 in 1945.[26] This was based on domestic production.

For a complete picture of the food-supply situation the import phase must be considered. On a caloric basis, in 1941, Japan depended upon overseas sources for 20 percent of her food. As the war progressed, both domestic production and imports declined, the latter more sharply, with the result that by 1945 only 9 percent of Japan's food supply was derived from imports. In 1941 Japan depended upon imports for 22 percent of her rice, 72 percent of her soy beans, 82 percent of her sugar. Even more basic a weakness than the fact that arable land cultivation in Japan had virtually reached its maximum possible expansion by the beginning of the war, than the non-mechanized, extremely small-scale character of Japanese farms, was this dependence upon overseas areas for that margin of foodstuffs which meant the difference between adequate supply and starvation for large segments of the population.

Prior to the China War, the Japanese government had initiated a program to make the Empire self-sufficient in rice. It was put into effect through the expansion of rice acreage, the development of more productive varieties,[27] government subsidies, and a tariff of 1 yen per 100 kin (132.3 pounds) on foreign rice, while colonial rice entered free of duty. As shown in Table 54, between 1920 and 1930 the proportion of Japan's rice imports supplied by foreign sources decreased from 36 to 22 percent, while by the late 1930's only about 2 percent of Japan's rice imports were coming from non-Empire sources. The failure of the 1940 Korean rice crop brought imports from this source down to only 66,000 tons and caused Japan to resort to heavy imports from Indochina, Thailand and Burma. This is

[26] See *United States Strategic Bombing Survey*, "The Japanese Wartime Standard of Living," Washington, 1947, p. 2.

[27] In the thirties the Japanese rice yield was 78 bushels to the acre compared with a world average of 37 bushels. See *Kome Tokeihyo* (Statistics of Rice), Ministry of Agriculture and Forestry, Tokyo, 1940.

TABLE 54

SOURCES OF RICE IMPORTS INTO JAPAN PROPER, 1921-38

(in percent)

Period	*Korea*	*Formosa*	*Non-Empire Sources*
1921-25	47	17	36
1926-30	57	21	22
1931-35	65	30	5
1936-38	63	35	2

Source: Wickizer, V. D., and Bennett, M. K., *The Rice Economy of Monsoon Asia*, Food Research Institute, Stanford University, 1941.

shown in Table 55. The poor 1941 rice crop in Japan resulted in continued reliance upon these areas but the freezing of Japanese assets abroad brought about a virtual cessation of imports from Burma after June of 1941, and even after their seizure of this area the Japanese were not able to obtain any appreciable amount of rice from it. No rice imports were secured from Korea in 1943 due to another disastrous crop failure and only 881,000 tons were obtained from Southeast Asia, due to the tightening of the air-sea blockade. As a result total imports fell to 1,183,000 metric tons, or about 50 percent of normal. In 1944 imports from Korea were resumed once again but the interdiction of shipping lanes to Southeast Asia was so great that total rice imports from that area fell to a mere 74,000 tons.[28] Thus total rice imports in 1944 fell to 30 percent of normal

TABLE 55

IMPORTS OF RICE, JAPAN PROPER, 1936-45

(in thousand metric tons)

Year *	*Foreign*				*Colonies*		*Grand Total*
	Indochina	*Thailand*	*Burma*	*Total*	*Korea*	*Formosa*	
1936 ...	0	67	0	67	1495	804	2366
1937 ...	0	48	0	48	1123	809	1980
1938 ...	0	25	0	25	1692	829	2546
1939 ...	0	26	0	26	948	660	1634
1940 ...	461	313	556	1330	66	464	1860
1941 ...	677	461	500	1638	551	328	2517
1942 ...	741	628	55	1424	873	284	2581
1943 ...	688	164	29	881	0	302	1183
1944 ...	39	35	0	74	583	217	874
1945 ...	0	0	0	0	227	41	268

* Crop year Nov. 1 to Oct. 31.

Source: Ministry of Agriculture and Forestry, except "foreign" for 1944 from Munitions Ministry.

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[28] This is the figure found in the document summarizing the results of the Material Mobilization Plan for 1944 (Munitions Ministry). Ministry of Agriculture and Forestry figures for this are contradictory. The Food Control Bureau put imports of rice from Southeast Asia in 1944 at 171,000 tons, while Staple Foods Bureau lists no imports at all. The report of the Ministry of Agriculture and Forestry to the Diet at the end of the war also stated "rice imports stopped altogether in 1944." See *Nippon Times*, Tokyo, September 9, 1945.

and Japan, realizing that further imports from the southern regions were unlikely, turned to importation of substitute grains from Manchuria over the shorter sea route. During 1944 millet, kaoliang, and corn imports from Manchuria tripled as compared with previous years, rising to approximately 300,000 tons. Rice imports from Formosa were cut off after January of 1945 and those from Korea were cut sharply over the previous year despite the desperate Japanese sacrifice of foregoing the importation of essential basic materials from the continent in favor of foodstuffs. Rice imports in 1945 were only 11 percent of normal and, had the war continued, would have been cut off entirely.

As rice became more difficult to obtain, soybeans[29] became a more important item in the Japanese diet. The bulk of the soybean imports came from Manchuria, the volume rising from 464,000 metric tons in 1940 to 628,900 in 1944; the figure for 1945 is 596,100 tons but this decline is apparent, not real. To shorten shipping hauls, commodities were shipped by rail to Korean ports and then sent by ship to Japan. Such freight was known as "tenka" and caused considerable confusion in import statistics. Total Japanese soybean supply declined during the early war years but increased toward the end as the Japanese tried to find substitutes for the diminishing rice supply. The 262,000-ton increase in soybean imports from 1943 through 1945 could hardly compensate, however, for the 915,000-ton decrease in rice imports over the same period. While total rice supply was 5,867,000 tons less in 1945 than in 1942, soybean increase was only 246,000 tons.

Approximately 82 percent of Japan's sugar was imported in 1941. There was some home production of cane sugar in Okinawa and beet sugar in Hokkaido but the great dependence was upon Formosa. Despite the acquisition of the Philippines and the N.E.I., sugar imports fell during the war years, from 940,500 tons in 1937 to 678,000 tons in 1941, to 116,000 in 1945. Japan did not have sufficient shipping to move all the sugar output of Formosa alone, much less to draw upon the resources of the captured areas. While sugar was the main industry of the Mandated Islands, they only accounted for 4 percent of total Empire production of sugar in 1940 and by mid-1944 were eliminated as a source of supply. Imports of sugar

[29] In Japan the soybean forms the basis of the salty miso paste which in turn is made into bean soup, misoshiru. This bean soup, together with rice and pickles, is the standard breakfast throughout the country, and is eaten as part of dinner by millions of Japanese. If they are available, bits of vegetables and fish are added to the thick, salty soup. In cities miso is made by specialists and sold in small food shops, but each summer in the country every housewife makes her own annual supply. Soy sauce or shoyu is an indispensable adjunct to a fish or rice dish. It is to the Japanese what salt at a meal is to an Occidental. Tofu is a bean-curd cake. It forms a substitute for fish at a modest meal. As a rule it is prepared in square blocks by special tofu makers who peddle it.

from Formosa ceased after the U.S. occupation of Okinawa and so scarce did sugar become in Japan that the black-market price soared to 240 times the official price. Consumption, which prior to the Pacific War had averaged 30 pounds per capita, went down to three pounds per capita in 1945.

Because of commandeering of fishing vessels by the military, growing restriction of fishing areas due to the ever-enveloping war, decline in the number of persons engaged in the fishing industry, shortage of nets and fuel oil, etc.,[30] the fishing yield decreased from 4,793,428 tons in 1939 to 2,079,216 in 1945, a decline of 57 percent, while the total supply of fish (production and imports) dropped from 6,017,233 tons to 2,079,216 over the same period, a decline of 65 percent.

On the supply side of the food picture, therefore, the salient points were an increase in soybean supply, but a drastic decline in everything else. The most significant factor was the sharp drop in the rice supply in 1945, with imports cut off and a very subnormal domestic crop due to adverse weather conditions. A last, desperate effort to improve supply was made in 1945 when priority in the allocation of shipping space was given to foodstuffs. As was shown in Table 10, the tonnage of coal actually shipped was cut from 605,500 tons or 51 percent of allocated shipping space in April 1945, to 268,398 tons or 31 percent in June 1945. Iron and steel were reduced from 75,200 tons or 6.4 percent to 27,744 tons or 3.2 percent, while foodstuffs were raised from 194,900 tons or 16 percent in April to 345,786 tons or 40 percent in June.[31] By the end of August, it was estimated that, of the minimum requirement of 2,165 calories and 76 grams of protein per head per day, the then current food supply could provide but 1,782 calories and 58 grams, and even this was falling steadily.[32]

Even before the China War, government control in the sphere of agriculture was quite extensive. One might go back to the period just after the first World War. Large rice crops in 1919 and 1920 led to agitation among producers and the Rice Act of 1921 was passed. It gave the Minister of Agriculture power to buy, store and sell rice under specific circumstances and to adjust supply and demand, and appropriated funds for these purposes. The decline in rice prices during the early thirties and the spectacularly large crops of 1930 and 1933 led to a new rice control

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[30] For a more detailed discussion of these problems, see Interrogation of Toshimitsu, Y., Chief of Marine Products Section, Bureau of Fisheries, Ministry of Agriculture and Forestry, Tokyo. November 18, 1945.

[31] *Comparative Table of Transportation Plan and Actual Transportation Results of Essential Materials Since the Outbreak of the War*, by Tanaka, Shinichi, Transportation Section, Total Mobilization Bureau, Munitions Ministry, Tokyo, 1945.

[32] *Food Supply and Its Demand in Japan*, Japanese Central Liaison Office Report No. 108. September 1945. The Medical Division of the USSBS estimated that per-capita food consumption in 1945 averaged 1,680 calories per day.

act in the latter year, increasing the powers of the Minister of Agriculture to control rice markets and prices. The government set official maximum and minimum prices every year and when market prices went below the set minimum, the government purchased rice, or if prices rose above maximum, sold its holdings to bring prices back into line. It was also empowered to purchase and to sell in order to regulate seasonal supplies. By reason of such control, price fluctuations narrowed. Those most affected by such operations were the speculative rice merchants. The total volume of future transactions in the Tokyo and Osaka rice markets declined from 137 million koku in 1932 to only 3 million koku in 1939, at which point they were forbidden.

The China War, with its speculative stimulation and resultant full employment, brought increased food consumption, rising prices and, as a result, increased government control. The Rice Control Special Account, which had accumulated a tremendous volume of rice during the depression period, had virtually no rice left by 1938-39 and therefore no power to hold prices down. In 1939 a new Rice Distribution Control law was passed which was designed to end all speculative transactions in rice and to control activities of, and ultimately eliminate, middlemen. By an ordinance of August 1939 distribution was concentrated in the Japan Rice Company[33] and all middlemen were required to become members of sales federations or of the control organization. Independent operations were eliminated. In 1940 additional steps were taken to control distribution.[34] A ladder or pattern of rice collection and distribution was established. Farmers could sell only to designated purchasing agencies such as local agricultural associations, these in turn to prefectural federations of selling associations, these in turn to the Japan Federation of Selling Associations or to the Control Association of Rice Merchants, and

[33] Established and opened for business for this purpose in October 1939. See "Control Machinery in Agriculture," by Sumikawa, Hideo, in *Keizai Joho Seikei Hen*, Tokyo, July 1940.

[34] A large number of food distribution control measures were promulgated during 1940. Among others there were: Temporary Rice Distribution Control Ordinance—August; New Rice Administration Ordinance—October; Rice Bran Distribution Control Ordinance—February; Wheat, Barley, Oats Distribution Control Ordinance—June; Wheat Flour Distribution Control Ordinance—August; Special Wheat Distribution Control Ordinance—July; Starch Distribution Control Ordinance—August; Soybean and Soybean Oil Distribution Control Ordinance—October; Miscellaneous Cereals Distribution Control Ordinance—November. There followed in 1941-42: Meat Distribution Control Ordinance—September, 1941; Fruits and Vegetables Distribution Control Order—August, 1941; "Miso" Distribution Control Order—January, 1942; Vegetable Oil and Fat Distribution Control Order—September, 1942; Animal Oil and Fat Distribution Control Order—September, 1942; Aquatic Products Control Ordinance—May, 1942, etc. See *Summary of Principal Economic Control Laws Enforced on August 15, 1945*. Report submitted by Central Liaison Office to SCAP, Tokyo, December 1945.

these in turn only to the Japan Rice Company. This company in turn went down the ladder, selling only to designated organizations and finally to associations of retail dealers designated by prefectural governors. All exports and imports were to be handled exclusively by the Japan Rice Company. By this means it was hoped to prevent hoarding, speculation, excessive markups, etc. Obviously this structure was a makeshift which could hardly stand up well under total war conditions and, therefore, simultaneously with the attack on the United States, the Agricultural Products Control Law was passed in an effort to simplify the structure and strengthen government control.[35]

A Central Foodstuffs Management Corporation (Chuo Shokuryo Eidan) and a local Foodstuffs Management Corporation for each prefecture were established. The Central Foodstuffs Management Corporation was capitalized at 100 million yen and absorbed the Japan Rice Company, the National Flour Distribution Company, the National Federation of Rice Merchants, the Japan Vermicelli Manufacturers' Federation and the Japan Wheat Federation. The government contributed 50 million yen and the remaining portion was provided by the food associations. The local Foodstuffs Management Corporations were established by combining guilds of rice, barley, wheat and rye traders, the wheat flour distribution organization, vermicelli wholesale dealers, etc. They contributed half the capital of the local Corporation while the Central Foodstuffs Management Corporation contributed the other half. The Central Foodstuffs Management Corporation had its office in Tokyo and was under direct control of the Ministry of Agriculture and Forestry. The articles handled by the Foodstuffs Management Corporations were rice, barley, and allied cereals and their processed articles, sweet and white potatoes, starch, etc. Purchases and sales were handled by the local corporations while the Central Corporation handled imports, exports, storage, reserves, etc. The government was the exclusive purchaser via the local units and then turned the produce over to them, usually at a lower price than it had paid, thus subsidizing the producers and keeping the resale price lower than would otherwise have been the case.[36] Many middlemen, though not all, were eliminated by this structure. Some were absorbed into the Foodstuffs Management Corporations, others were funneled into war industries, while some continued in operation. In some localities the Foodstuffs Corporation resold through dealers' associations and in turn through retail stores. In others it sold directly to neighborhood associations, while in still others its local office served as a distribution station. The pattern was not uniform.

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[35] See *Food Control Regulations*, by Murato, Toyozo, in *Keizai Toseiho Nempo* for 1942, Tokyo, 1943, p. 144.

[36] See Interrogation of Baron Ishiguro, Tadaatsu, President of All-Japan Agricultural Cooperative Society, Tokyo, October 18, 1945.

The distribution of the staple ration was carried out by the Foodstuffs Management Corporations. Distribution was made on the basis of a ration book (Haikyu Tsucho) which showed the quantity a family was entitled to receive and contained ledger entries of distribution actually made. The ration books were issued by the Ministry and were usually retained by the neighborhood association[37] rather than by the family, though there were some localities where the family retained the ration book. The distribution agency maintained a duplicate card for each association or each family as the case might be. The economic police were in charge of distribution of the ration books. Coupons were also used for meals obtained in restaurants. Restaurant owners used these coupons as claims to purchase supplies from the foodstuff corporation. Large food processors received special coupons from the government to obtain their raw materials. Food processors, such as flour mills, operated under this system on a commission basis and did not actually purchase the products they processed.

The Japanese food rationing system was never complete. At no time did the people obtain all of their food supplies or requirements via the rationing system. Rather the Japanese concentrated upon the "staple"

[37] The neighborhood association was supposed to have been founded in the Taika era (A.D. 645-9). During the Tokugawa period (1603-1868) it was extensively utilized for collecting taxes, suppressing anti-Tokukawa elements, etc. As a result it was officially abolished at the time of the Meiji Restoration (1868) but in practice it remained in operation on a limited basis in certain rural areas. It was reestablished by Home Ministry orders in 1940 and during the war came to have a wide variety of functions, such as registration of members, administration of the official ration system, certifying changes of address and vital statistics, distribution of essential civilian commodities, sale of bonds, enforcement of savings, collection of scrap metal and of certain taxes, supplying labor for special wartime activities, disseminating government propaganda, supplying police information, welcoming returning servicemen, certification of war damage, conducting census surveys, air raid activities, etc. As established by the Home Ministry order of 1940, the system consisted of two levels of organization below the usual units of local government. At the lowest level was the Tonari Gumi (neighborhood association, in some areas known as the Rimpo Han), composed of from 10 to 20 households. In rural areas a number of Tonari Gumi made up the Buraku-Kai (hamlet association), which was based upon the traditional unit of rural community government within the village. In urban areas the counterpart of the Buraku-Kai was the Chonai-Kai (district or block association), composed of 400 to 600 households. In 1942 the neighborhood association system was brought under the control of the Imperial Rule Assistance Association. IRAA advisers were placed in each Buraku-Kai and Chonai-Kai. In 1943 the heads of the neighborhood associations were brought under direct control of the heads of cities, towns and villages. There is considerable evidence to indicate that the use of the neighborhood associations for rationing resulted in widespread maldistribution of civilian supplies. Goods were handled at each level in the system and at each level goods were diverted into the black market. The volume of complaints to the police and to local newspapers indicates this. See *Oriental Economist*, January 1944, pp. 25-26; also "Neighborhood Associations in Japan," by John W. Masland, in *Far Eastern Survey*, November 20, 1946, Vol. XV, No. 23, pp. 355-58.

ration, that is, the rationing of rice, on the theory that if the minimum essential could be assured, the public would be able to supplement this by open-market purchases of additional foodstuffs, according to their means. The rice-rationing system was established in April 1941 in the six large cities (Tokyo, Yokohama, Osaka, Nagoya, Kyoto, and Kobe). It was extended to the entire country by February 1942. A number of Japanese officials of the Ministry of Agriculture and Forestry were asked whether rationing was introduced in 1941 in anticipation of the opening of the Pacific War. None would commit themselves though there was an indication that they were advised from above that "war conditions were expected to grow more critical." Quantity of rice rationed was not uniform but varied according to age and occupation. Three general classifications based on the strenuousness of occupation were established. The purpose was twofold—actually to grant food necessary to support type of work and to induce workers to take less desirable jobs in war plants by using food as the incentive. The ration system operated selectively in that individuals most useful to the war effort not only received larger allotments of rice, but their allotments also constituted a higher proportion of their total caloric food requirements. On the average, the ration allotment of the "heavy labor" class was of sufficient quantity to provide approximately 75 percent of the recipient's necessary caloric intake. In contrast, only about 55 percent of the food requirements of the "general" ration class were obtainable from the official ration. The staple ration by consumer categories from April 1941 to May 1945 is shown in the following table:

STAPLE FOOD RATION STRUCTURE, JAPAN PROPER
APRIL 1941 TO MAY 1945

Age	Type of Labor	Men		Women	
		Grams Per Day	*Caloric Value*	*Grams Per Day*	*Caloric Value*
1–5	....	120	421	120	421
6–10	....	200	702	200	702
11–60	General	330	1,158	300	1,053
	Light Labor ...	390	1,369	350	1,228
	Heavy Labor ..	570	2,001	420	1,474
Over 60	General	300	1,053	300	1,053
	Light Labor	350	1,228	320	1,123
	Heavy Labor ..	480	1,685	380	1,334

Source: Ministry of Agriculture and Forestry.

This structure was modified slightly from time to time as deficiencies were noted or pressure was brought to bear. For example, beginning in December 1941, laborers in shipbuilding, iron and steel, coal and other mines, and stevedores received an additional ration of 140 grams (491 calories) per day, while in March 1942 pregnant women in the six large cities were given an extra allotment of 70 grams (246 calories) per day. In December 1942 charcoal makers received an additional 140 grams per

day while in April 1944 school children in the six large cities obtained a further 100 grams per day. In June 1944 children 3-5 years of age were given an additional 40 grams per day.

To combat growing absenteeism in early 1945, a basic change was made in the staple ration system and in the method of distribution in May 1945. Prior to this date all the staple ration had been distributed to all consumers on a household basis either directly through retail stores or neighborhood associations depending on the locality. In May, however, the system was revised so that consumers belonging to the "light" or "heavy" labor classes could obtain only part of their ration locally and had to obtain the balance at their places of employment. The household allotment for "light" labor was made identical with that for "general," as may be seen in Table 56, while "heavy" labor received only a slightly larger

TABLE 56

STAPLE RATION STRUCTURE AS REVISED ON MAY 16, 1945

(a) *Portion of Ration Distributed to Households*

Age	*Type of Labor*	*Sex*	*Grams*	*Caloric Value*
1- 2		No discrimination	120	421
3- 5		"	170	597
6-10	(In 6 large cities) *	"	280	983
6-10	(In rest of country)	"	250	878
11-15	(In 6 large cities) *	"	400	1,404
11-15	(In rest of country)	"	360	1,264
16-60	General & light labor	"	330	1,158
Over 60	Heavy labor	"	400	1,404
Any age	Pregnant women	.....	50	176

* Tokyo, Yokohama, Osaka, Nagoya, Kyoto and Kobe.

(b) *Portion of Ration Distributed at Place of Work*

Age	*Labor*	*Workers in Special Industries* *		*Workers in Other Industries*	
		Male (Grams)	*Female (Grams)*	*Male (Grams)*	*Female (Grams)*
16-60	Light labor	200	160	60-130	20- 90
16-60	Heavy labor	310	230	170-240	90-160
Over 60	Light labor	190	160	50-120	20- 90
Over 60	Heavy labor	300	220	180-250	80-150

* Workers in shipbuilding, iron and steel industries (up to pressing process), coal miners, mineral miners, stevedores, charcoal makers (exclusively engaged) and lumbermen (exclusively engaged).

Source: Ministry of Agriculture and Forestry.

household allotment. In theory this attempt to hold workers to the job by food should have worked; in practice, however, absenteeism, due to air attacks and to the necessity of foraging for food in the countryside to supplement the ration, continued unabated.

Although the staple ration consisted entirely of rice at first, as early as 1942 the government was forced to begin the substitution of wheat, barley, naked barley, etc., for a portion of the rice in the ration in order

to maintain the gram amount in the face of the decline in rice supply due to the poor 1941 crop. Substitution of such grains for rice amounted to only 393,000 tons in 1942 or only 2 percent of the total staple ration. In 1943 it became necessary to resort to the substitution of sweet potatoes and white potatoes and by 1945, 2,265,000 metric tons, or 17.6 percent of the staple ration, consisted of such substitutes. While the Japanese claimed that the staple ration had been maintained all through the war until July 1945, without deterioration in the caloric content of the ration since the substitution had been on a caloric basis, the Medical Division of USSBS found that such substitutes had not been on a caloric basis and noted a material decline in the caloric value of the ration. Furthermore the use of such supplementary foods in the staple ration resulted in a proportional decrease in the availability of such foods on the open market and thereby a reduction in total per-capita intake of food.

In addition to utilizing substitute foodstuffs to maintain the staple ration, the Japanese resorted to consuming part of the current rice crop before the official beginning of the rice year on November 1. This was contrary to prewar practice and the volume of such consumption mounted from 99,000 metric tons in 1941 to 467,000 in 1945.[38] The poor 1944 rice crop, disastrous spring crops of wheat and barley in 1945, due to storms and floods, the sharp decline in food imports due to the blockade, and finally low food reserves, forced the government to make a flat 10 percent cut in all staple rations, effective July 11, 1945, generally, and effective August 11, 1945, for the six large cities. It was announced that this cut would be only temporary and would be restored when the 1945 rice crop was harvested later in the year, but so disastrous was this harvest, that, had the war continued, additional drastic cuts would have been necessary.

The most important supplementary foods which were rationed were fruits and vegetables, fish, and soybean products. The ration system for supplementary foods provided allotments which were considerably below the average daily per-capita amounts of food actually available for consumption. The fact that more of these foods were physically available for consumption than the ration allotments provided for, illustrates two important weaknesses in the ration system: (a) the fact that it was difficult, if not impossible, to achieve a smooth and equitable distribution of these commodities, and (b) the fact that the Army, Navy, and certain favored worker groups received considerably more than the average consumer did under the ration system. Moreover, these supplementary foods

[38] See "Supply and Disappearance of Staple Foods, 1937-1945," report submitted to Japanese Diet at the end of the War by Ministry of Agriculture and Forestry, included in Higashi-Kuni's report to the Diet on *Causes for Japan Losing the War*, Tokyo, September 1945.

played a prominent role in the black market and commanded exceptionally high black-market prices.

Rationing of fruits and vegetables was carried out in the six large cities under the authority of the central government but elsewhere under prefectural and local authority, and since conditions varied greatly from locality to locality, it was not possible to obtain data for the whole country on the amount rationed. The Japanese stated that 250 grams of vegetables per capita were required daily but the ration never reached this. A peak of 217.5 grams was obtained in 1943, declining to 75 in 1945, while fruit distributed in 1945 declined to almost one-quarter of this 1943 figure. The very small quantities distributed in 1945 reflect the almost complete collapse of the rationing system in these products due largely to the growth of black-market diversions. Japanese officials also pointed to the decline in production and stated that farmers consumed more of these products as the government pressed them more closely for staple foods. The black market, however, was the primary cause for breakdown of rationing in this field.[39]

The official distribution of vegetables had become merely a token distribution. In Tokyo the per-capita distribution in August 1945 was down to 52 grams per day. The actual distribution was accomplished by the daily migration of thousands of consumers into the country to purchase vegetables directly from the farmers at black-market prices. The trains were jammed with people bringing back potatoes, vegetables and fruits. It is estimated that as many as 900,000 persons made such expeditions from Tokyo on a single Sunday.[40] While transportation of foodstuffs by individuals in passenger trains was a violation of a public ordinance, no effort to enforce it had been made for many months prior to surrender. Effective enforcement in the case of fruit and vegetable rationing was difficult because of the irregular nature of production and the importance of suburban producers who did not market through regular channels. Also great variations in quality and numerous varieties of a single type of vegetable were factors in the situation. It was estimated that 80 percent of all perishable foods were sold on the black market.

The rationing of fish was also carried out by the central government in the six large cities only. Elsewhere it was handled by local authorities. It has previously been indicated that the supply of fish declined 57 percent between 1939 and 1945. The consumption of fish, however, declined

[39] See *Effects of Black Market Upon Japanese Food Controls*, by Ogura, M., Price and Loan Section, Ministry of Agriculture and Forestry, Tokyo, September 1945. The black market also completely disrupted the rationing of sugar. Supplies fell so sharply in 1944 and 1945 that what little sugar was available almost all found its way to the black market and none was available for rationing.

[40] *Monthly Summation of Non-Military Activities in Japan and Korea*, SCAP-GHQ, Vol. II, Tokyo, November 1945, p. 118.

only 35 percent over the same period due to cessation of exports and to diversion from use as fertilizer and feed.[41] The quantity of fresh fish consumed, however, fell to 171,913 metric tons or 87 percent less than 1939. Estimates vary, as on most other things, on the normal consumer needs for fish in Japan. The most recurrent figure is that of 65 pounds per capita per year. This is based on the weight of the edible dressed fish and is roughly equal to two-thirds of the weight of raw whole fish. On this basis the consumption needs would be approximately 3,300,000 metric tons per year. Availability in 1945 was less than two-thirds of this figure. The average daily per-capita fish ration set for the six large cities was 50 grams per day, but the actual quantity rationed to the average consumer was only 60 percent of the set figure at the outset and fell to much less later. The actual distribution of fish in Tokyo, for example, fell from 36.6 grams per day in 1942 to 10.5 in January 1945, and to nothing in August of 1945.[42] The rationing of fish was just as ineffective as the rationing of fruits and vegetables.

The rationing of shoyu and miso was instituted in February 1942 and the per-capita allotment remained unchanged until July 1945. As was explained in an earlier footnote, miso is a paste normally made from soybeans, rice or barley and salt, through a process of fermentation, while shoyu is a sauce made of soybeans, wheat and salt, also by fermentation. Production of miso declined from 593,900 metric tons in 1940 to 482,300 tons in 1945, while output of shoyu fell from 1,104,782 metric tons in 1940 to 592,913 tons in 1945. The colder areas of Japan normally consume more miso per capita than the warmer regions; the reverse is true in the consumption of shoyu. Consequently, the ration allotments varied locally according to the climate, the daily per-capita ration of miso ranging from 33.8 grams per day in Hokkaido to 12.4 in Hiroshima-Ken. On the other hand, the shoyu ration ranged from 0.82 liters per month in Hiroshima-Ken to 0.54 liters per month in Hokkaido. In July 1945 changes were made in the ration structure. Allotments of miso were not lowered substantially but shoyu rations were cut sharply. Moreover, the shoyu produced in 1945 was much less concentrated and had a lower caloric content. On the whole, rationing of miso and shoyu was more successful than fruits and vegetables or fish, largely because the central government set the pattern for the whole country and also because of the greater availability of soybeans, the basic ingredient.

The armed forces enjoyed a higher food intake, especially of supplementary foods, than any other class of consumers in Japan. The total amount of food going to the Army and Navy, however, was not large

[41] Use of fish as fertilizer and feed in 1945 was only 7 percent of the 1939 figure.

[42] From a report, *Consumption of Aquatic Products in Japan*, submitted to SCAP-GHQ by Ministry of Agriculture and Forestry, November 5, 1945.

compared with the total food supply of the country. For example, the proportion of the total available rice going to the military ranged from about 2 percent in 1942 to 6.5 percent in 1945. This rise was due not only to the increasing size of the armed forces but also to the smaller overall supply.

The standard daily per-capita ration for Army troops based in Japan proper up to 1944 was 600 grams of rice and 186 grams of wheat, barley or substitutes. Naval personnel in home islands received 540 grams of rice and 180 grams of barley or other staples as the normal daily per-capita ration until 1942. The various components of both the Army and Navy rations were reduced several times before the end of the war. Nevertheless, the rations of the armed forces were relatively high when compared with average per-capita consumption, even though reductions were made as Japan's overall food position deteriorated. The first change in the Navy ration was minor in magnitude and occurred on July 16, 1941, when the meat allotment was cut 10 percent and the sugar allotment 16 percent. The first significant reduction took place in October 11, 1943, when rice and barley allotments were cut a total of 80 grams per day, or 11 percent; meat was cut 14 percent; fish 23 percent; pickles 17 percent; and shoyu 20 percent. Simultaneously, however, sugar and salt rations were raised 10 percent and 45 percent respectively. On July 14, 1945, the grain ration was reduced another 10 percent, coinciding with the 10 percent cut in all civilian staple rations.

Both the Army and the Navy reduced the loss in milling rice in order to increase both its quantity and quality. White rice (100 percent of the bran from brown rice removed)[43] was provided the armed forces until April 1942. Thereafter, until April 1943, 70 percent polished rice (70 percent of the bran removed) was standard. From April 1943 until September 1944, 30 percent polished rice (30 percent of the bran removed) was adopted. In September 1944 the use of wholly unpolished rice (brown rice) was attempted; however, because of its unpalatableness and the digestive disorders it caused, its use was discontinued in October 1944. From then until the end of the war 20 percent polished rice (20 percent of the bran removed) was used in the ration.[44]

Many local Army and Navy units supplemented their food supplies by raising gardens and keeping livestock. There was not, however, any overall unified program of this nature until April 1945. At that time the Navy Minister inaugurated a program to encourage local naval units to cultivate rice and other staples on reclaimed land and on land which

[43] Complete (100 percent) polishing of brown rice results in a 10 percent loss in total weight.

[44] From the testimony of Col. Shimakawa, head of Japanese Military Food and Clothing Board, (Iryokacho), Tokyo, October 22 and 23, 1945.

farmers had abandoned because of labor shortage.[45] The Japanese Army's supply program for forces stationed overseas aimed at complete self-sufficiency within each theater. In Korea, Formosa and China, all the Army's rice requirements were met locally. In Manchuria, the Army obtained its rice from Korea, securing other grains such as barley and wheat from the local area. In the Philippines, the Army received its rice from French Indochina, and in Malaya from Java and other nearby areas. Deficiencies which could not be met from any source in the theater were placed on requisition from other theaters or from Japan itself.[46] The Army and Navy claimed that all records of food shipped from Japan proper to overseas forces had been burned, but estimated that from 30 to 50 percent of such shipments were destroyed or damaged by ship sinkings, spoilage, etc.

Early in the war, farmers were jealous of the relatively high wages paid industrial workers in the urban centers. As the urban position deteriorated and city inhabitants were forced to make daily trips to the country to obtain food supplies at black-market prices, or exchange scarce civilian supplies for food, the position of the farmer improved relatively. This despite the fact that as the food situation grew tight the government changed its methods of collection from the farmers. At first (1941) farmers were permitted to retain the quantities of rice, wheat, barley, etc., necessary for seed[47] and household food requirements. The remainder was purchased by the government at fixed prices. Beginning in 1943, however, the government changed that method of collection by demanding a set quota of rice and allowing farmers to keep the balance. The government hoped to collect more rice by this method.

Under the revised system the central government decided upon the quantity of rice which must be supplied by domestic producers for meeting total ration requirements. This quantity was apportioned for collection to prefectural authorities, thence to village authorities, and then on to individual farmers. Although farming districts, in general, normally had sufficient food remaining after the quotas were met, the system tended to work hardships on farmers with small holdings and on those who, because of bad weather or for other reasons, had low production in a particular year, since the government insisted that farmers sell their assigned quota and promised to ration rice to them if their supplies were exhausted. The amount which a farmer was to receive as a ration, however, was not

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[45] According to Captain Matsubara, Chief, Third Section, Naval Stores Depot of Navy Ministry, Tokyo, November 1, 1945.

[46] *The Japanese Army Food Supply System*, Report No. 41, Quartermaster Analysis Section, 5250th Technical Intelligence Co., Tokyo, March 9, 1946, p. 9. (Available in the Library of Congress, PB 23844.)

[47] For rice, each farmer was allowed 3 sho per tan (41 pounds per acre) for seed purposes.

guaranteed but depended on the quantity returned by the central government to the prefectural authorities for redistribution under ration to farmers who were without sufficient household requirements. In practice the quantity thus rationed to these farmers was always less than the amount they had "loaned" the government. As a result farmers had a strong motive for concealing rice and keeping adequate supplies for themselves. This practice of withholding rice became more pronounced as the government began demanding wheat, barley, potatoes and sweet potatoes in addition to rice, and as city residents began flocking to the countryside to purchase food directly from farmers at black-market prices.

The official figures show a declining percentage of farm consumption to domestic production of staple foods. For example, 38 percent of the rice produced in 1940 was consumed on the farm compared to 33 percent in 1945. In the case of sweet potatoes the percentage dropped from 77 in 1940 to 39 in 1945. Wheat was the exception, the percentage rising from 51 in 1940 to 61 in 1945.[48] However, the various government measures adopted to counteract farm withholding of food, such as patriotic appeals to farmers, stricter police surveillance, and increased subsidy payments to farmers, would indicate that the government had more and more difficulty in the face of the black market lure.

Prices had been rising steadily ever since the outbreak of the China War. By 1938 the Rice Control Special Account had exhausted its depression-acquired supply of surplus rice and had no power to maintain low prices by releasing stock. The maximum price of rice for the crop years 1938 and 1939 was fixed at 35.40 yen per koku but the market price rose above this in May 1939 and by July exceeded 40 yen.[49] In the fall all prices of foods were frozen, except perishables, at the September 18 level. On November 6, however, the government raised the official rice price by 5 yen. In August 1940 ceiling prices on perishables, including fish, were established, after the prices of these commodities had risen to such an extent that it was feared that land, fertilizer, labor, etc., would be diverted to the production of perishables at the expense of staple crops. Farmers began agitating for higher prices for rice and other crops, maintaining that production costs were too high compared to farm income. Accordingly, in August 1941, the government raised the base price paid to producers for rice to 44 yen per koku and provided for a production-incentive subsidy of 5 yen per koku. Control of other staples was strengthened on July 1, 1942, when the purchase and distribution of wheat,

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[48] If farm consumption were compared to total food supply, the farmers' relative position would be more favorable, since imported rice, the supply of which fell more precipitously, had gone almost entirely to urban consumers.

[49] *Kome Tokeihyo* (Statistics of Rice), Ministry of Agriculture and Forestry, Tokyo, 1940.

barley, naked barley, and other cereals were made an exclusive government monopoly

The base purchase price, as may be seen in Table 57, and the production-incentive subsidy for rice was not changed during 1942, but in 1943 and 1944 the government paid a base price of 47 yen per koku and a production-incentive subsidy of 15 50 yen per koku, bringing the total price to producers to 62 50 yen per koku Prices paid to landlords for rice they received in payment for rent, however, remained at 47 yen per koku throughout the war Landlords, moreover, were not paid the production-incentive subsidies In 1944 another premium, in addition to all other payments, was granted to both producers and landlords for the 1944 rice

TABLE 57

FARM PRICES OF RICE, JAPAN PROPER 1933-45

(yen per koku)

Year	Stabilized Farm Price Range		Official Base Price		Production-Incentive Subsidy	
	Minimum	Maximum	To Producers	To Landlords	Producers	Landlords
1933	23 30	30 50				
1934	24 30	31 50				
1935	24 80	33 20				
1936	24 90	33 90				
1937	27 30	35 40				
1938	29 90	35 40				
1939	32 50	43 00				
1940	39 00	43 00				
1941			44 00	44 00	5 00	
1942			44 00	44 00	5 00	
1943			47 00	47 00	15 50	
1944			47 00	47 00	15 50	
1945			47 00	47 00	45 50	8 00
1945 (Nov)			47 00	47 00	103 00	8 00

Year	Premiums [a] for Quota Deliveries		Total Government Buying Price	
	Producers	Landlords	Producers	Landlords
1933				
1934				
1935				
1936				
1937				
1938				
1939				
1940				
1941			49 00	44 00
1942			49 00	44 00
1943			62 50	47 00
1944	40 00–100 00	15 00–75 00	62 50 [b]	47 00 [b]
1945	40 00–100 00	15 00–75 00	62 50 [b]	47 00 [b]
1945 (Nov)	40 00–100 00	15 00–75 00	150 00 [b]	55 00 [b]

[a] The premium varied within the range and depended upon the percentage of the quota delivered See text for details

[b] Does not include premium for quota delivery

Source Compiled from data furnished by the Ministry of Agriculture and Forestry

crop. This extra premium varied with the percentage of rice quota delivered to the government, and ran as follows:

Percentage of Quota Delivered	*Extra Premiums to Producers (yen per koku)*	*Extra Premiums to Landlords (yen per koku)*
90-100	40	15
100 and over	100	75

Thus a producer received a total of 62.50 yen per koku for all rice delivered up to 90 percent of his quota, 102.50 yen for each koku between 90 and 100 percent of his quota, and 162.50 yen for each koku above 100 percent of his quota. Landlords received less, as indicated in Table 57. These extra premiums were paid on the basis of an overall average by areas rather than to individual farmers. Consequently, individual farmers did not necessarily receive the premiums they deserved and the incentive was weakened. Early in 1945 the production-incentive subsidy to be paid for the 1945 rice crop was set at 45.50 yen per koku but in November, before much of the crop was purchased, the subsidy was raised to 103 yen, bringing the price, excluding quota premiums, to 150 yen per koku. However, this was after the war had ended and a general sharp upward trend of all prices had gotten underway. In contrast to the producers' price, the wholesale price (price paid by distribution agency to selling agency) was fixed at 43 yen per koku in 1941 and was raised only once to 46 yen in November 1943. The retail price to consumers was slightly higher, averaging about 52.50 yen per koku, and was intended to cover costs of distribution less subsidies. The cost of the subsidy amounted to 770 million yen in fiscal 1944 and accounted for a large percentage of the budget of the Ministry of Agriculture and Forestry.

The government purchasing price (including subsidies) for other food staples such as barley, wheat, potatoes, etc., also rose sharply. The price of wheat increased 251 percent between 1941 and 1945, naked barley rose by the same amount, while sweet potato prices rose 210 percent and white potatoes 283 percent. Ceiling prices for such miscellaneous grains as corn, buckwheat and millet, which are normally consumed on farms mainly as feed, were set in 1939 and remained unchanged until 1944. By then these grains were entering the black market as foodstuffs and the ceiling prices were raised to bring them into line with staple grains, but black-market prices merely went higher. The ceiling prices set for perishable foodstuffs were never effective and the nation-wide standard price system for these commodities was abandoned in August of 1944 in favor of ceilings set by local authorities in line with local conditions. This step was not effective, however, in diverting such foodstuffs from the black market.

The black market was not extensive in 1942 but in 1943, as imports fell off, shortages of fertilizer began to be felt and the ration was adulterated with supplementary grains; as these then became scarce and much

harder to obtain, the government changed its method of collection and pressed farmers harder for more. A vicious circle was established which created an extensive black market in 1944 and a dominant one in 1945. As less food appeared in legitimate channels, a greater demand was created on the black market, this, in turn, reducing the quantity of food going into legitimate channels. Once this process set in, as it did in 1943, it could not be broken, especially since production declined and imports fell away.

After 1944 rice and barley were used as mediums of exchange in many rural communities. To obtain tools and clothing, hire labor, etc., the farmer had to pay in food. This created further incentive for farmers to hoard as much of their crop as possible. The black market was most extensive in vegetables, fruits, fish, etc., and less so in rice and other staples. A private research organization, in a study of purchases by factory workers in Tokyo during September-October 1944, found that such consumers purchased 9 percent of their rice, 69 percent of their vegetables, 38 percent of their fish and 7 percent of their seasonings on the black market.[50] After the bombing and fire raids began and normal channels were disrupted, there was a marked increase in "illegal" transactions. Professional black marketeers began to buy up foodstuffs in the country and sell them in the city at fantastic prices.

There is no doubt that the struggle to obtain food, which came to absorb urban inhabitants in 1945, tended to hinder production. Absenteeism increased because of the necessity for day-long trips to the country to obtain food. There was a noticeable decline in workers' efficiency due to inadequate caloric intake, accumulated war fatigue, etc. The decline in the monthly per-capita output of coal of the Mitsubishi Mining Company, as shown in Chart 14, closely parallels the decline in the daily per-capita consumption of staple food by miners. Japanese estimated that a coal miner should receive about 6 go of rice daily, that is, 847.5 grams, which, supplemented with sufficient fish and vegetables, would provide the minimum food requirements for such strenuous work. In providing a worker with this rice, however, it would also be necessary to allot him 3 go or 423.75 grams for each adult member of his household in order that he might not reduce his own ration by sharing it with his family. Before the war it was common for heavy workers in coal mines to consume as much as 8 to 10 go (1,130 to 1,410 grams) of rice daily, along with substantial quantities of fish or meat and vegetables. In 1941 heavy workers in the Mitsubishi Mining Company were consuming about 700 grams of rice daily in addition to the supplementary foods. While the level of the staple was maintained, for the most part, throughout the war, it was the

[50] *Survey of Black Market Purchases by Factory Workers in Tokyo, September-October, 1944*, Institute for Science of Labor, Tokyo, January 1945, p. 7.

decline in the availability of the supplementary foods which affected the workers. According to officials of the company, in 1945 coal miners in Kyushu were able to obtain only 10 to 15 percent of the amounts they had secured in 1940 of such supplementary foods as vegetables, fruits, fish, meat, etc. At the end of the war, these workers were living virtually by the staple ration alone, which amounted to only 700 grams daily. While recognizing the influence of other factors affecting the decline of labor efficiency, such as poorer equipment and inadequate supplies of materials, transportation problems, etc., company officials expressed the belief that the decline in labor efficiency was considerably influenced by the actual decline in food consumption.[51]

To sum up, the deterioration of Japan's food position began in 1943. By the summer of 1945 the situation was critical. Black markets flourished, urban dwellers were not obtaining minimum food requirements. The government in desperation had cut imports of vital materials in favor of foodstuffs, but even this did not suffice as the blockade was pressed tighter.[52] The staple ration was cut, supplementary foods were no longer available on legitimate markets. The caloric intake during 1945 averaged 1,680 calories per day compared to a minimum requirement of 2,165.[53] Japan reached the beginning of the 1946 rice year (November 1, 1945) with a carry-over of only enough rice for four days' consumption (133,000 tons). As a climax the 1945 rice crop proved to be a disastrous failure totaling only 6.4 million metric tons. Had the war continued, there would have been starvation in the urban centers of Japan during the winter of 1945-46.

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[51] *Report on Causes for Decline of Production in Coal Mines*, Mitsubishi Mining Company, Tokyo, January 1946.

[52] Japan requires a *minimum* of 600,000 tons of salt for food per year. The production of salt in Japan in 1945 amounted to no more than 200,000 tons produced during the period from April through September. Seasonally, during the months from October to March, the production of salt in Japan proper is almost impossible. Had the war continued, with imports cut off, there would have been a grave salt deficiency. See *Sembai Kyoku Nempo* (Annual Report of the Monopoly Bureau, Finance Ministry) for 1945. Tokyo, 1946.

[53] A comparison of the caloric intake in Japan, the United Kingdom, the United States and Germany, is as follows:

AVERAGE CALORIES PER CIVILIAN PER DAY

	Japan	*U.K.*	*U.S.*	*Germany*
Pre-War (Japan 1931-35; U.K. 1934-38; U.S. 1935-39; Germany 1937-39; average)	2265	2987	3080	2907
1944	1900	2923	3215	2941
Change from pre-War to 1944 (percent) ...	—17	—2	+4	+1

Sources: Japan, Report of the Medical Division, USSBS; U.K. and U.S., *Food Consumption Levels in the United States, Canada and the United Kingdom*, Combined Food Board, Second Report, Dec. 1944; Germany, Special Paper No. 4, *Food and Agriculture*, USSBS (Europe) Exhibit E.

Clothing

Japan built her textile industry to a peak in the thirties, making it the third largest in the world and then in the war years proceeded to tear it down. Total civilian production of cloth in Japan proper reached its peak in 1937 and thereafter declined sharply until in 1944 production was only 7 percent of the 1937 figure. As is indicated in Table 58, exports, imports and consumption of cloth also reached their peak in 1937. By 1944 exports and imports were both only 2 percent of the 1937 figure, while consumption was 7 percent.

During the late thirties the chief factor in reducing civilian consumption of cloth was the export drive, military requirements being relatively small. The export peak, percentagewise, came in 1936 when 69 percent of total production was exported, although from the standpoint of volume slightly more was exported in 1937. The percentage exported in 1937, however, dropped to 52 in view of greater total production. Al-

TABLE 58

Civilian Production, Imports, Exports and Amount of Textile Cloth Available for Consumption, Japan Proper, 1935-44

(in thousand square yards)

Year	*Total Civilian Production of Cloth*	*Total Imports*	*Total Exports*	*Total Consumption*
1935	5,824,516	1,885,575	3,309,727	4,400,364
1936	4,944,277	2,250,591	3,396,098	3,798,770
1937	6,354,819	2,107,871	3,302,912	5,159,778
1938	5,014,154	1,374,411	2,693,709	3,694,856
1939	4,580,537	1,456,199	2,893,422	3,143,314
1940	3,925,251	971,612	2,139,385	2,757,478
1941	2,519,014	777,314	1,174,526	2,121,802
1942	1,268,709	176,842	232,064	1,213,487
1943	768,199	108,484	265,183	611,500
1944	422,985	35,527	70,770	387,742

Sources: *Japan Yearbook, 1943-1944; Oriental Yearbook, 1943-1948;* Japanese Textile Control Association.

though peak production of wool came in 1935, the export peak in terms of volume in 1936, percentagewise the peak was not reached until 1939 when 28 percent of output was exported. In the case of cotton, production reached a peak in 1937 but the export peak percentagewise came in 1939 when 84 percent was shipped overseas as Japan restricted domestic consumption and pushed exports to obtain exchange. Silk cloth output reached a peak in 1942 but the highest export levels, percentagewise, were reached in 1934-35. In rayon the production peak came in 1938, but in 1935, 67 percent of output was exported, the percentage declining thereafter until it reached only 14 percent in 1942. In contrast to all other cloths, however, exports of synthetic cloth actually rose in volume from 1942 to 1944.

According to the Chief of the Textile Bureau of the Ministry of Commerce and Industry, an annual per-capita consumption of 25 to 28 square

yards of cotton and 3 to 4 square yards of wool cloth is sufficient to provide an adequate, if not ample, wardrobe. In the 1935-38 period, when cloth consumption in Japan reached its peak, the per-capita civilian consumption of cotton cloth ranged from 26 to 30 square yards and from 3.5 to 4 square yards for wool cloth. The decline which set in thereafter was due first to decreased production, secondly to the emphasis on exports, and later to growing military requirements. Following the beginning of the war against China in July 1937, production and imports of textiles began to decline while the demand of the military increased both in absolute and relative terms, but did not cut into civilian supply materially until after the beginning of the Pacific War. The percentage of total cloth production going to the military rose from 0.8 percent in 1937 to 37.8 percent in 1944. In the latter year 235,666,000 square yards went to the military while 387,742,000 square yards were available for civilians.

Without raw materials for their textile machinery and markets for their products, Japanese war leaders decided at an early stage in the conflict that textile machinery—good and bad—must be scrapped to provide metal for munitions, machines for war production, and to make available mill-floor space for expanding war industries. Scrapping orders issued by the government reduced production capacity to about one-quarter of prewar size. It is now known that conversion of the textile industry to munitions production, in Japan, began prior to Pearl Harbor. The 1941 edition of the Kabushiki Kaisha Nenkan (Corporations Yearbook) lists various types of munitions production as some of the activities of the four major textile machinery manufacturers, Howa Kogyo KK., Osaka Kikai Seisakusho KK., Osaka Kiko KK and Toyoda Jido Shokki Seisakusho KK.[54] The reconversion applications of these four companies, filed with SCAP, indicate that they converted to war production as early as 1938. For example, the reconversion application of Howa Kogyo KK., dated January 31, 1946, states, in English:

> . . . under the Prohibition Law against manufacturing Spinning and Weaving Machines issued in 1938, it became impossible for the company to continue the producing [of textile machinery] and was enforced by the Japanese government to turn to manufacturing munitions and continue it till the end of the War.

Four separate amalgamations or scrap drives beginning in the spring of 1941 resulted in a decrease in Japan's cotton spinning and weaving industry of some 8 million spindles and 257,000 looms. Or as the *Oriental Economist* noted:

> . . .with regard to spinning facilities our cotton and staple fiber spinning plants were equipped with 13,782,000 spindles before the China Incident which decreased to 3,071,000 in January 1, 1946—about 22 percent

[54] *Hikiu Shoken Kaisha,* Kyokai edition, pp. 557, 559, 651, and 652.

of what existed prior to the Incident. The remaining 78 percent was lost due to the dismantling of plants. . .for the confiscation of metals and to air raids.[55]

The Ministry of Commerce and Industry reported to SCAP that production capacity on a yen basis in the textile industry was down to 3.2 billion yen compared to a prewar capacity of 9.2 billion yen—a decline of 65 percent.[56] The machinery taken was broken up on the mill premises by the Sangyo Setsubi Eidan (Industrial Equipment Corporation), a government company described in Chapter 2. Small weavers were also involved in the scrapping operation through the Kosei Ginko (Peoples' Rehabilitation Bank) which made cash compensation payments.[57] Compensation by the Sangyo Setsubi Eidan generally took the form of non-negotiable bonds. The scrapping program was based on an organized plan but little attention was paid by the military to the value of any specialized equipment. For example, one observer noted that "in one mill an 18-color textile print machine, one of a dozen in the world, was scrapped while more common 10- and 14-color machines were untouched."[58]

Wherever possible the attempt was made, however, to convert entire plants to war production. The two basic industries to which textile mills were converted were aircraft parts and chemicals. By mid-1943, 41 percent of all textile plants had been shifted to war production while only 35 percent continued to produce textiles. The remainder had either been scrapped or were idle pending a decision as to their disposition. Of the 127 cotton spinning mills shifted to war production, 43 were turning out aircraft parts, 9 had turned to chemicals, and 75 to machinery or other war industries. Of the 29 rayon and staple fiber factories converted, 11 had turned to chemicals, 9 to aircraft parts, and the remainder to machinery or other war industries. The rayon plants which turned to the chemical industry concentrated for the most part on output of synthetic fuel. To cite a few examples of conversions: the Toyo Cotton Spinning Company had 53 plants, 38 for cotton, 4 for rayon and staple fiber, 9 for wool, and one each for silk spinning and wood pulp production. Only 22 were in operation producing textiles. Ten had been fitted for aircraft parts and accessories in collaboration with Nippon Aircraft Company, Chuo Industries, Kawasaki Aircraft. Two had been turned over to Toyo Steel Company, one had been leased to Sumitomo Metal Industries Com-

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[55] *Oriental Economist*, March 26, 1946, pp. 165-66.

[56] See *Summation of Non-Military Activities in Japan and Korea*, SCAP-GHQ, Vol. 3, December 1945, Tokyo, p. 88.

[57] See "Functions and Mission of the Popular Rehabilitation Bank," by Sakaguchi, Yoshihisa, in *Zaisei*, Tokyo, January, 1940.

[58] "The Future of Japanese Textiles," by Nehmer, Stanley, in the *Far Eastern Survey*, August 28, 1946, Vol. XV, No. 17, p. 261. See also "Japan's Textile Industry," by Torrens, James G., in the *Far Eastern Survey*, June 4, 1947.

pany for the manufacture of butanol. Two had been turned over to Toa Chemical Industry Development Company, one to Kodo Alcohol Company, and the remainder were used for the expansion of affiliated companies such as Toyo Synthetic Chemical Industry, Toyo Heavy Industries, Toyo Rubber-Chemical Industry, etc. Of the 15 mills of the Kanegafuchi Spinning Company, 27 were producing textiles, 10 had been put at the disposal of Kanegafuchi Industries, Ltd. of which seven were turning out aircraft parts and three chemicals. The remaining eight plants had been turned over to Mitsui Chemical, Nikka Rubber, Nippon Tire, Sumitomo Communications Equipment Company, Nippon Aircraft Company, etc.[59]

In 1944 the government grew concerned about the shrinking supply of textiles and at a Cabinet conference on March 31, 1944, it decided upon "Outline of measures for extraordinarily increased production of textiles in wartime." It was resolved to operate all remaining plants on a two-shift basis, to permit the employment of women in staple fiber plants (hitherto forbidden), not to reduce capacity further, and to regard remaining plants as essential war industries. Needless to say, in view of the growing steel shortage curtailment was not abandoned entirely although it was slowed somewhat. An examination of each specialized field of textile production in more detail will reveal the extent of curtailment during the war years more explicitly.

The quantity of cotton grown in Japan has been infinitesimal compared with Japanese mill requirements. In the 31 years, 1909-39, production of raw cotton in Japan proper never equaled one percent of consumption. Yet cotton manufacturing had long been the foremost industry of Japan, and as a result raw cotton was Japan's principal import. In the years 1928-38, the value of cotton constituted an average of about 20 percent of the total value of the import trade of Japan proper. The high point was reached in 1934 when cotton constituted 25 percent of the total value of imports.[60] Over these years Japan was second only to the United States as a consumer of cotton and processed about 12.5 percent of the world total mill consumption. Before 1938 cotton constituted, quantitatively, by far the most important fiber for Japanese clothing, household and industrial use. Of the quantity of apparel-type fibers retained for home consumption in Japan, cotton provided 90 percent until the early 1930's, and even through 1937, the peak cotton manufacturing year, constituted 80 percent. But, thereafter, as a result of government restrictions, it diminished rapidly. Actual per-capita consumption of raw cotton appears to have been reduced from 9.5 pounds in 1937 to 6.2 pounds in 1938,

[59] See "Cotton Spinners Change-Overs," *Oriental Economist*, July 1943, pp. 317-19.

[60] For an excellent discussion, see *The Japanese Textile Industry, 1928-1936*, U. S. Dept. of State Division of Research for Far East, OIR Report No. 4529, Washington, August 1, 1947.

to 1.3 pounds in 1939. Warm clothing especially for the poorer classes was made of quilted cotton material consisting of two layers of cotton fabric with a layer of cotton wadding between, and bed coverings were stuffed with cotton. Until 1937, the United States and India supplied 90 percent of the cotton imported into Japan; thereafter the percentage dropped, falling to 51 percent in 1940, as Japan made efforts to free herself from this dependence and as U.S. cotton priced itself out of the market. In 1940-41, for example, Indian cotton was over 40 percent cheaper than American. The percentage of cotton coming from Egypt, and particularly from Brazil and China, rose sharply. Imports of Brazilian cotton into Japan increased to a maximum in 1939 when they constituted 24 percent of Brazil's cotton exports and 13 percent of Japan's cotton imports. Japan laid grandiose plans for cotton production in North China[61] but these failed to materialize although China became almost the sole source of cotton supply after Pearl Harbor. Technical difficulties in utilizing the short harsh cotton of North China without the long-style variety with which to blend it were never overcome. Imports of raw cotton fell from a peak of 2,033 million pounds in 1936 to 651 million pounds in 1941 under deliberate government restriction, principally in an effort to save foreign exchange. Imports dropped to 154 million pounds in the following year and in 1944 totaled only 31 million pounds. In the period from January through August 1945, 23 million pounds were imported.

Despite this complete dependence upon the imported raw material, in the years preceding World War II Japan was among the three most important cotton-textile producing countries of the world. It ranked third in the number of cotton-spinning spindles, second in the amount of cotton consumed, and first as an exporter of cotton cloth. The number of cotton-spinning spindles in Japan increased from 3.8 million in 1920 to a peak of 12.2 million in 1937 (7.2 million in 1930). Of the 1937 total approximately 3.5 million were required to process cotton for domestic consumption. As may be seen in Chart 15, of the 12.2 million installed spindles in 1937 only about 9 million were in operation. This was due to the cartel (Japanese Cotton Spinners Association) action in requiring members to seal a portion of their spindles in order to avoid overproduction and consequent falling prices. The Spinners Association controlled about 97 percent of all spindles, and although the number of spindles more than doubled between 1926 and 1936, the number of companies remained the same. The large mills expanded and the industry was concentrated in the hands of a few companies which moved toward vertical integration. After 1937 a marked decline set in for both installed and operating spindles, the former dropping to 11.4 million in 1941 and the latter, more sharply, to 5.9 million. By the end of the war the number of installed

[61] Detailed plans are given in the *Japan Year Book, 1939-1940*, pp. 472-74.

spindles had been reduced to 2.7 million and operating spindles to 1.0 million, a decline from the 1937 peak of 78 and 89 percent respectively. The causes for this decline may be seen in Table 59. As a result of the wartime enforced amalgamation policy, the number of prewar cotton spinning companies was reduced to 10 by the end of the war (each company operated a number of mills). It is apparent from Table 59 that 64 percent of the 1941 installed capacity was scrapped; only 7 percent of the decline in installed capacity was due to damage by bombing and fire. As a result of this decline in operating spindles, yarn output fell from 1.5 billion pounds in 1937 to 51 million pounds in 1945.

TABLE 59

DECLINE IN COTTON SPINDLES, BY COMPANY, BY CAUSE, JAPAN PROPER, 1941-45

(in thousands of spindles)

Company	*Installed Capacity 1941*	*Reductions During the War*			
		Scrapped	*Transferred Overseas*	*War Damaged*	*Stored*
Toyo Boseki KK.	1,872	1,217	104	91	...
Daiken Sangyo KK.	1,586	1,078	73	4	217
Dai Nippon Boseki KK.	1,414	882	59	54	141
Kanegafuchi Kogyo KK.	1,312	827	53	213	50
Shikishima Boseki KK.	1,166	719	15	153	54
Daiwa Kogyo KK.	1,145	728	52	181	60
Fuji Boseki KK.	996	582	66	2	9
Nisshin Boseki KK.	892	524	72	63	244
Kurashiki Kogyo KK.	845	690	6	62	10
Nitto Boseki KK.	777	507	18	2	29
Total	12,005*	7,754	518	825	814

* This is a total of about 600,000 spindles more than the total reported by the Textile Control Association. It is believed that the discrepancy is due to the inclusion in the company reports of twister spindles.

Source: Adapted from Table V, p. 8, *Report of the Textile Mission to Japan,* Dept. of State Publication No. 2619. Far Eastern Series 13, Washington, 1946.

As a consequence of the wide diversification of ownership of power looms in Japan, it is much more difficult accurately to summarize the impact of the war on the weaving industry. The Japanese Textile Association reported a peak of 393,921 looms in 1941 and a decline thereafter to 136,071 in 1945. The Textile Mission to Japan reported a total of 107,555 operable looms at the beginning of 1946, while the Textile Association listed 122,074 installed looms, of which 33,760 were operating. Of the 87,549 looms which represented the installed capacity of the large cotton spinning companies in 1941, 22,651 remained by the end of 1945, of which 10,555 were operable. Thirty-eight percent of the 1941 installed looms were scrapped while 13 percent were destroyed or damaged by bombing and fire. Independent weavers always held a larger total of power looms than the spinning companies and in prewar years there were thousands of small weaving plants averaging under 10 looms each. A proportion of these looms was very nar-

row, being suitable for the weaving of 18" cloths and under. With restrictions on production resulting from the war, many of these plants disappeared as a result of the scrapping program of the government along with various concentration schemes. But at the end of the war independent weavers reported to SCAP that they numbered 2,500 and owned approximately 68,500 operable wide looms and 28,500 narrow looms. From all the facts at hand, it may be estimated that between 20 and 30 percent of Japan's prewar looms remained at the end of the war.

Output of cotton cloth in Japan fell 98 percent during the period 1937-45, or from 4,826 million square yards to 55 million square yards. The effect on civilian supply in Japan, however, was not quite as great as this percentage decline would indicate, because, as may be seen in Chart 16, 55 percent of the cotton cloth output in 1937 was exported. While exports of cotton manufactures in the thirties never yielded a large net credit for Japan, in most years it nearly always covered the cost of cotton imported from abroad for domestic consumption. Exports of cotton cloth dropped from a peak of 2.7 billion square yards in 1937 to 1 billion in 1941 and then to zero in 1945. Although Japan built up her stocks of cotton cloth from 164 million square yards in 1937 to 854 million square yards by the end of 1941, this was only a four months' supply at the 1937 rate of domestic consumption. There was also a stockpile of 234 million pounds of raw cotton on hand at the end of 1941. During the 1933-37 period an annual average of 3.6 million bales of cotton was consumed in Japan proper, of which about 1.4 million bales went into manufactures retained for final domestic consumption. This would mean an annual requirement for domestic consumption of approximately 700 million pounds and therefore Japan's raw cotton stockpile was good for four months, at the 1933-37 rate of domestic consumption. This, of course, was not maintained. As early as 1938 cotton cloth for home consumption was required by law to contain at least 30 percent staple fiber and thereafter the percentage was raised progressively.

Japan led the world as a producer of rayon (including both rayon yarn and rayon staple fiber) in the three years, 1936-38. The combined production of rayon yarn and staple fiber in Japan reached its peak of 541 million pounds in 1938, or 30 percent of the aggregate rayon output of the world. Prior to Pearl Harbor the industry was concentrated in the hands of 34 companies operating approximately 50 plants, chiefly in Yamaguchi, Shiga, Hiroshima and Okayama Prefectures.[62]

The manufacture of rayon yarn in Japan was begun during World War I and remained small throughout the first decade of its development. By 1928 the output of yarn in Japan totaled 16.5 million pounds, or 5 per-

[62] See *Japan's Rayon and Staple Fiber Industry Makes Great Strides*, by Ono, Seiichi, in *Keizai Joho, Sangyo-Hen*, July 1940.

cent of the world output. From sixth place in that year, Japan rose, before the end of the following decade, to the position of the world's largest rayon-producing and exporting country. In 1937 its production of rayon yarn reached an all-time peak of 336 million pounds, or 28 percent of the total world production.

Since 1937, staple fiber has constituted the major product of the rayon industry, as may be seen in Table 60. Introduced in the early part of the decade, staple fiber became of increasing importance to the Japanese as a substitute and alternative spinning fiber for imported cotton and wool. The production of staple fiber expanded from less than a million pounds in 1933 to a peak of 327 million pounds in 1938, when it constituted 39 percent of the world total. It was both cheaper and faster to make than rayon yarn and the wood pulp which went into its production, even though imported, required less exchange than did wool and cotton imports. Prior to Pearl Harbor Japan had not succeeded in becoming independent of foreign sources for its supply of wood pulp for rayon. It was particularly deficient in the dissolving grades of wood pulp which it imported principally from the United States, Norway, Finland, Sweden and Canada.[63]

TABLE 60

JAPANESE RAYON YARN AND STAPLE FIBER PRODUCTION, 1935-45

(in millions of pounds)

Year	Yarn		Total Yarn	Staple Fiber	Total Rayon
	Viscose	Cuprammonium			
1935	201.0	9.8	210.8	13.6	224.4
1936	261.8	11.3	273.1	45.9	319.0
1937	324.7	11.2	335.9	175.5	511.4
1938	202.9	11.0	213.9	327.2	541.1
1939	229.6	8.9	238.5	301.3	539.8
1940	208.3	7.8	216.1	285.8	501.9
1941	159.4	8.7	168.1	296.6	464.7
1942	89.0	6.4	95.4	174.5	269.9
1943	45.6	4.9	50.5	121.7	172.2
1944	19.2	3.6	22.8	83.3	106.1
1945	4.5	1.1	5.6	21.9	27.5

Source: Textile Mission to Japan.

During the last half of the decade (1930-40), the supply of rayon yarn available for domestic purposes averaged less than 50 percent of production. More than half was either exported as yarn or in rayon fabrics. Staple fiber production, on the other hand, went largely for use within Japan. Over the last half of the decade approximately 75 percent was

[63] While the Japanese preferred the imported pulp for quality it was not absolutely essential. The domestic pulp used during the years 1942-45 lessened the quality of the cloth, but compared to cotton and wool it was a raw material available at home.

consumed domestically.[64] It was not unnatural, therefore, that when curtailment set in, rayon yarn output should have been hit hardest. There was a 98 percent decline in rayon yarn output from its peak in 1937 to 1945, while the decline in staple fiber output from its peak year 1938, to 1945, was 94 percent.

The immediate causes for decline in output after 1937-38 were (a) the imposition of exchange control and the adoption of the rayon-woodpulp "link" system of foreign trade control, which, by cutting down pulp imports, cut rayon production, and (b) the contraction of foreign markets as discriminatory measures against Japan were adopted more widely. The decline after 1941 was due mainly to wartime scrapping of the industry's machines and conversion of its plants to production of chemicals or airplane parts. Of the total registered capacity of the rayon industry of over 1.6 billion pounds in 1939, there remained in January 1946 a total registered capacity of 532 million pounds. In the yarn branch of the industry there was a decline of 73 percent due to scrapping or conversion while war damage accounted for less than one percent. In the staple fiber branch the decline was 61 percent with war damage also accounting for less than one percent. Of course, registered capacity in the rayon industry was a nominal and arbitrary figure based on standard factors for machinery in place and to some extent on machinery that did not exist. This fictitious registration was used to avoid restrictions imposed on rayon companies by the industry's control association. It was found that rayon-yarn productive capacity, based on actual machinery, was approximately 72 percent of registered capacity and staple fiber was 64 percent. This practice was the result of curtailment of output by the Japanese Rayon Producers' Association in order to stabilize the market. Curtailment measures made mandatory the "sealing" of a certain percentage of the spinnerets of each company. In addition, producers were frequently required to withhold a fixed proportion of their output of yarns from the market by depositing surplus stocks in cooperative storage under the jurisdiction of the association. The rate of curtailment in operation rose from 20 percent in 1935 to 80 percent in 1940. This was strong inducement to over-register capacity.[65] Of the 47 plants producing rayon in 1941, 31 were taken out of rayon production by wartime scrapping or conversion.

Production of synthetic cloth, the ultimate end-product of both yarn and staple fiber, reached a peak of 1,565 million square yards in 1938. It was exceeded only by production of cotton cloth in the period 1936 to 1943. From 1943 to the end of the war, silk production was greater than synthetic cloth output due largely to the more rapid decline in synthetic

[64] *Oriental Economist*, "The Rayon and Staple Fiber Industry, 1937-1944," May 25, 1946.

[65] See *Oriental Economist*, May 25, 1946, pp. 339-40.

cloth output. Its production fell 89 percent over the period 1938-44. (See Table 61.) While exports of cotton cloth and silk were principally used to

TABLE 61

PRODUCTION OF SYNTHETIC CLOTH, JAPAN PROPER, 1935-44

(in millions of square yards)

Year	Total Production	Filament Rayon	Spun Rayon
1935	745	731	14
1936	1,044	927	117
1937	1,297	1,034	263
1938	1,565	607	958
1939	1,313	689	624
1940	902	631	271
1941	638	485	153
1942	396	273	123
1943	257	127	130
1944	165	67	98

Source: Japanese Textile Control Association.

obtain exchange in the late thirties, it was synthetic cloth which clothed the Japanese consumer and was shipped to yen-bloc countries to meet their demands. The latter demand was the reason exports of synthetic fiber were maintained at a higher level than that of other cloths in the last three years of the war. While synthetic cloth exports declined 88 percent from 1937, woolen exports fell 96 percent, silk exports 97 percent and cotton cloth exports 99.8 percent, by the end of 1944. According to the Chief of the Textile Bureau of the Ministry of Commerce and Industry, there was much grumbling in Japan during the war years because of the poor quality and short life of the synthetic cloth, but then, as he added, there was much grumbling about many things. Had it not, however, been for the very real strides made in the production of synthetic cloth in the mid-thirties, the Japanese consumer would have had to rely wholly upon an insufficient supply of silk alone.

Prior to 1937 Japan was dependent upon Australia for 94 percent of the wool used by the woolen and worsted industry. Japan in turn exported large quantities of rayon and cotton cloth to Australia and when that country placed severe restrictions on these imports in 1936, the Japanese government ordered purchases of Australian wool reduced by two-thirds. Because it failed to find sufficient wool in South Africa, New Zealand or South America to meet its military demands, Japan was forced to purchase an additional amount of wool on Australia's terms but nevertheless imports of Australian wool dropped 53 percent between 1937 and 1941. Total raw wool imports fell from a peak of 257 million pounds in 1937 to 120 million pounds in 1941 and then, when the war cut off all sources of import except North China and Manchuria, imports fell swiftly, dropping to a mere 4 million pounds in 1944 and to 1.7 million pounds in the eight months January-August 1945. Since Japan produced no wool of any

consequence at home, this drop in imports meant a corresponding cut in yarn and cloth production.

In 1937 the wool industry in Japan was placed under government control. Imports of wool were restricted under the Exchange Control Law and the manufacture of wool goods for domestic civilian use was curtailed in favor of military use and export. After October 1937 licenses were required for the import of wool into Japan. It became apparent in early 1938, however, that the reduction in supplies was adversely affecting the country's export trade in wool fabrics. Therefore the system of linking imports of wool to exports of manufactured woolen goods was adopted. Under this procedure, exporters of wool manufactures were granted import permits for amounts of wool corresponding to the wool content of their exports. In October 1937 the government decreed that from 20 to 30 percent of staple fiber should be used in all woolen and worsted goods for home consumption, made from imported wool. In July 1938 these percentages were increased to from 50 to 80 percent and goods produced with a smaller proportion of substitutes were forbidden to be sold on the home market. This policy of compelling the industry to stretch its stocks of wool by mixing with other fibers was accentuated with the outbreak of the Pacific War. Wool was mixed not only with large quantities of rayon staple but with such other fibers as hard fiber waste, mungo hair, goat hair, mulberry bark, silk, silk waste, and waste recovered from cotton and wool rags. Although such mixture cloths did not compare with all-wool fibers in durability and warmth, they had to serve the civilian population.

The two principal divisions of wool cloth manufacture are the woolen and the worsted. The differentiation between these is based chiefly on the method of treating the wool fibers during the process of manufacture, especially in the preparation of yarns, since the character of the final product is largely set by the time the wool has been worked into the yarn state. In the manufacture of woolen yarn the individual wool fibers must be thoroughly intermingled but their arrangement is of secondary importance. This permits utilization of fibers of all lengths. Woolen yarn is especially suited to the manufacture of soft, heavy fabrics, such as those used in overcoats for both civilian and military use. Worsted yarn is spun from tops. The wool fibers are paralleled and equalized, and the yarn is smooth compared with woolen yarns. Worsted fabrics as a rule are woven much lighter in weight than are woolen. It is this fact that accounted for the large proportion of worsted spindles in the Japanese wool manufacturing industry, as the demand in the home market and for export was chiefly for light-weight fabrics. Production of worsted yarn exceeded woolen until 1939. The peak in production of the former occurred in 1936, while the production of woolen yarn was greatest in 1939. Thereafter the decline was about equal. Total production of woolen and

worsted yarn fell from a peak of 155 million pounds in 1936 to only 14 million pounds in 1945, a decline of 91 percent.

The concentration of the Japanese worsted industry in the hands of a comparatively few companies with integrated operations was similar to the cotton-spinning industry but in contrast to the woolen industry. The latter was characterized by a wide range in the capacity of mills from very large to small units and by a diversification of ownership. Owing to this lack of concentration in the woolen industry and to the location of most woolen mills away from urban target areas, it did not suffer an overall capacity reduction to the same extent as the worsted, cotton or rayon industries. As may be seen in Table 62, the number of woolen cards was reduced by 311 or 40 percent over the period 1939-45. The number of worsted spindles, on the other hand, which had increased from 1,120,000 in 1935 to 1,632,966 in 1939, was reduced by 1,251,990 or 76 percent from 1940 to 1945. Of this reduction in worsted spindles almost two-thirds resulted from scrapping. The weaving capacity of the Japanese woolen and worsted industries was as dispersed as the weaving capacity of the cotton textile industry. In 1935 worsted and woolen looms in the hands of spinners totaled about 9,000, but an additional 21,000 looms were scattered about the country in hundreds of small weaving establishments. Around the city of Nagoya, for example, many farming families were engaged in the weaving of woolen and worsted goods as their secondary line of business. Of the 29,336 looms which Japan had in 1939, 16,279 were scrapped, 2,435 were damaged, and 311 were shipped overseas during the war, a total reduction of 64 percent.

TABLE 62

REDUCTION IN WOOLEN CARDS AND WORSTED SPINDLES, JAPAN PROPER, 1939-45

	Woolen Cards	*Worsted Spindles*
In place, 1939	765	1,632,966
Scrapped	61	777,806
Transferred to other fibers	10	109,080
Shipped overseas	26	85,426
Damaged by war	214	279,678
Total Reductions	311	1,251,990

Source: Japanese Textile Control Association.

The decline in woolen cloth production over the decade from 1936 on may be seen in Table 63. While production fell 98 percent between 1937 and 1945, civilian consumption dropped 97 percent. The military use of wool cloth rose from less than one percent in 1935 to 63 percent of total production in 1944. Exports were at a physical peak of 38 million square yards in 1936 but were highest percentagewise in 1939 when they amounted to 28 percent of total production. During the Pacific War years they dwindled away to nothing. Stocks on hand declined steadily through 1940 and then rose the following year to 26.7 million square yards by the end

of 1941. The Bombing Survey concluded that at the 1936-38 rate of consumption, stocks of finished wool cloth on hand at the end of 1941 were equal to approximately 12 days' requirements. Export requirements, however, were included in the 1936-38 rate of consumption. If these are excluded, it appears that stocks of wool cloth on hand, at the 1936-38 rate of consumption, at the end of 1941, were equal to 42 days' requirements. In addition, stocks of raw wool on hand at the end of 1941 amounted to 30 million pounds, slightly less than one-third of average annual imports of raw wool over the four years, 1938-41.

TABLE 63

PRODUCTION AND USE OF WOOLEN CLOTH, JAPAN PROPER, 1936-45

(in millions of square yards)

Year	Total[a] Production	Military Use	Exports	Civilian[b] Consumption	Stocks[c] on Hand
1936	286.8	2.2	38.1	252.3	44.3
1937	259.5	10.6	36.0	211.0	46.1
1938	272.0	29.3	25.1	222.2	41.4
1939	104.7	22.8	29.6	68.2	25.4
1940	77.5	19.7	17.9	43.9	21.3
1941	83.0	20.5	12.2	44.9	26.7
1942	66.0	26.9	4.5	47.8	13.4
1943	71.8	28.7	2.1	42.0	12.3
1944	54.3	34.9	1.5	18.0	12.5
1945[d] ...	5.0	3.8	.0	6.5	7.1

[a] Includes production in government plants as well as production in private plants for military use.

[b] Excludes exports.

[c] End of the year.

[d] Jan.-August.

Sources: Textile Bureau, Ministry of Commerce and Industry and Textile Control Association.

Silk was the one textile whose raw material was wholly available in Japan proper and did not have to be imported. It might have been expected, therefore, that its production would have been maintained throughout the war. Such, however, was not the case. Due to the increasingly tight food situation, it became necessary to convert mulberry acreage to potato and soybean production. Mulberry acreage fell 60 percent between 1940 and 1945 as is shown in the following table:

MULBERRY ACREAGE AND COCOON PRODUCTION, 1940-45

Year	Mulberry Area (in cho)[a]	Area Converted to Foodstuffs Production (in cho)	Cocoon Production (in 1000 kan)[b]
1940	533,918	.....	81,546
1941	494,449	39,469	69,848
1942	412,624	81,825	55,851
1943	363,961	48,663	52,938
1944	264,359	99,602	40,312
1945	214,217	50,142[c]	23,703

[a] 1 cho = 2.45 acres.

[b] 1 kan = 8.27 lbs.

[c] to August 1945.

Source: Agricultural Administration Bureau, Ministry of Agriculture and Forestry.

During the course of the war 319,701 cho or 783,267 acres were converted from mulberry to foodstuffs. The greatest conversions occurred in 1944 as the food situation became more desperate, but had the war continued an even larger conversion would have occurred in 1945. Some 50,000 cho were converted to soybean production in June of 1945 and in mid-August an additional conversion of 150,000 cho was ordered. Had this been carried out, it would have cut mulberry acreage to virtually nothing. In its memorandum to prefectural governors, the Agricultural Ministry stated:

> In view of the present circumstances it is essential at any cost to plan for the strengthening of self-sufficiency in foodstuffs. . . .in view of the need to secure additional areas for the planting of grains and the tremendous importance of having a large area at planting time, it is permissible, if necessary, to dispose of the traditional crops and plant sweet potatoes quickly in order to encourage temporary planting. . . .Since the increase of foodstuffs is vital, it will be permissible to dispose of fruit trees. Basic policy for disposing of mulberry trees is by the "Kabusage" method. However, since self-sufficiency of foodstuffs is absolutely essential, they may be disposed of altogether and areas completely cleared.[66]

Cocoon production fell more sharply than mulberry acreage, declining by 72 percent over the 1940-45 period, while raw silk output dropped most sharply of all, falling 87 percent over the same period. Part of the explanation is found in the government's policy of scrapping equipment. Prewar and end-of-war capacity in the raw silk industry may be seen in the following table:

CAPACITY IN THE RAW SILK INDUSTRY, 1939-45

	Multi-Thread Basins	*Ordinary Basins*	*Total Basins*
1939 Capacity	87,038	63,807	150,845
Scrapped	71,374	55,261	126,635
War Damaged	964	1,446	2,410
Total Reduction	72,338	56,707	129.045
End-of-war Capacity ...	14.700	7,100	21,800

Source: Raw Silk Bureau, Ministry of Commerce and Industry.

Reduction of basins was 85 percent of 1939 capacity and as is apparent from the table, almost all was due to enforced scrapping. War damage accounted for only 2 percent of the total reduction. Raw silk production fell from 94.0 million pounds in 1940 to 12.3 million pounds in 1945. The trend may be seen in Chart 17.[67] Domestic consumption of raw silk,

[66] Memorandum from Chief of the Agricultural Administration Bureau of Ministry of Agriculture of Prefectural Governors, *Concerning a Plan for Collective Planting of Fall and Winter Crops in 1945*, Tokyo, August 16, 1945, p. 3.

[67] Imports shown in Chart 17 are of a class of raw silk called "tussah," obtained from the cocoons of wild (i.e., undomesticated) silkworms, which is used for rough, uneven-textured materials such as pongee. Imports of tussah raw silk, chiefly from Korea, Kwantung and Manchuria, averaged 2½ million pounds annually in 1932-37.

however, did not fall proportionately since exports accounted for 41 percent of 1940 production (they had averaged 67 percent over the period 1934-38) but fell to negligible proportions after 1942. Furthermore, all of the raw silk classed as "domestically consumed" did not really go to the Japanese consumer prior to 1940, since a considerable portion went into silk fabrics which were exported. The total consumption of raw silk in the manufacture of fabrics for export is estimated to have averaged 14 million pounds annually in 1934-38, or about 40 percent of the total volume of raw silk retained within Japan. Such diversion of raw silk, however, was virtually eliminated after 1941. During the war, the Japanese textile industry consumed proportionately large amounts of silk, particularly in mixtures with rayon staple fiber and wool. The availability of raw silk formerly exported, of waste or substandard silk, and the shortage of other raw materials were responsible for this policy. Industrial workers, for example, were furnished with suiting serges made of silk, rayon and one-ninth wool. Not only was silk mixed extensively with other fibers in the production of cloth, but as cloth it was used more widely than ever before in Japanese clothing. Prior to the China War, silk had been a luxury item in Japan, but the decreasing availability of cotton and wool after 1937 led to greater use of silk. For example, silk underwear was not produced in Japan except for export prior to 1939 but during the war years production actually increased and the whole output was consumed domestically.[68]

Unfortunately, there are no statistics available indicating the proportion of raw silk produced which was used in the production of mixed cloths.[69] It is known that silk cloth production reached a peak in 1941 of 494,752,000 square yards, declining by 1945 to 51,732,000. The following rough calculation may provide a clue to the degree of the diversion. Total domestic consumption of raw silk in 1939 amounted to 43 million pounds. This produced 461 million square yards of silk cloth or a ratio of approximately 1 pound to 10 square yards. In 1945 production of raw silk was 16 million pounds. Cloth output was 51 million square yards. The ratio was thus roughly 1 pound for 3 square yards. It may be assumed therefore that

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[68] The number of points required to purchase silk cloth, after the rationing system was adopted in February 1942, was just one-fourth of that necessary to buy an equivalent amount of cotton or woolen cloth.

[69] In July 1940 the government had ordered the compulsory mixing of from 20 to 30 percent (by weight) of raw silk with staple fiber, rayon, and cotton in the manufacture of yarns and fabrics intended for domestic use or for export to yen-bloc countries. The government allotted 10,000 bales of silk per month to the Cotton Spinners' Federation and the Staple Fiber and Wool Industry Federations. Because the utilization of silk as a blending medium required some readaptation of existing equipment, however, the government found it could not immediately enforce the measure, and compliance was placed on a voluntary basis.

the difference between 3 square yards and 10 square yards was going into the output of mixed fabrics, or, in other words, that 3/10 of the output of raw silk was going to silk fabrics while 7/10 was going into mixed fabrics, as compared with 1939. The output of raw silk in 1945 was 13 percent of the 1940 level.

Exports of silk cloth, which had constituted 29 percent of total silk cloth production in 1936, declined to 5 percent in 1941 and then vanished in 1945. The output of silk cloth in Japan dropped 90 percent over the period 1941-45. On a comparative basis, however, as was to be expected of the textile whose raw material was wholly available at home, output of silk was maintained at a better rate than either of the three cloths previously discussed. If 1937 production for all four textiles is used as a base and set at 100, the relative figure for 1945 output was 10 for silk, 3 for rayon, 2 for cotton and 2 for wool. The *Oriental Economist* index of industrial production, which was reestablished after the war, and calculated back to April 1945, indicates that total textile output stood at 6.7 in April 1945, (1931-33 = 100) and then fell to 2.8 in August 1945.[70]

Control of the production and distribution of textiles was as complicated as any phase of the Japanese economy. While control had been underway since 1937,[71] and measure had followed measure, the *Oriental Economist* noted in 1943 that:

Because of the existence of so many distribution control organs, control has been extremely complicated and a fairly large amount of fees have been involved as fiber manufactures passed from producer to retailer. At

[70] *Oriental Economist*, March 22, 1947, p. 221.

[71] Control over silk production and prices, however, had a much longer history. Government purchasing operations to support the market were carried out by the Imperial Silk Syndicate, popularly known as the Teisan, in 1914-15, in 1920, in 1926-27 and in 1930. The Raw Silk Price Stabilization Law became effective in April 1937. In January 1940 the Raw Silk Distribution Control Act was passed, designed to ration raw silk domestically in order to force the release of a compulsory fixed volume for export. The high prices of silk in 1939 had impeded exports and resulted in loss of much needed foreign exchange. Under the Act only certain organizations of silk traders, designated by the government, were empowered to buy or sell silk for domestic use. Deliveries of raw silk to domestic manufacturers and processors could be made by these selected distributing agents only in exchange for allotment tickets. These tickets were apportioned to each manufacturer and processor for quantities deemed necessary for his requirements. The Reserve Fund System was put into effect on July 1, 1940. This was intended to check speculation by (1) prohibiting hedge selling in liquidation trading, (2) maintaining reasonable selling prices for export, and (3) controlling price differentials between export silk and silk for domestic consumption. On May 7, 1941, the Raw Silk Industry Control Law was enacted. This had for its purpose the complete and inclusive unification of all sericultural, silk reeling, and silk distributing activities of Japan and the elimination of the middleman. Centralization of control over all phases of the silk industry was vested in a semi-public organization known as the Japan Raw Silk Company, capitalized at 80 million yen, half of which was subscribed by the government.

the same time the supply of fibers has grown shorter. Under these circumstances individual and separate controls over different branches of the fiber industry have contributed but little to the general production.[72]

At that time four control associations exercised supervision over cotton, rayon, silk, and wool and hemp. In addition, there were two overall bodies, the Fiber Manufacturers' Control Council, which dealt with the government, and the Fiber Industry Control Council, which served as liaison between the four control associations and the subsidiary distribution control organs. There were 57 subsidiary distribution control companies with federations of commercial associations attached to them. This proved even too complex for the Japanese and in October 1943 the four control associations and the two liaison bodies were consolidated into one Textile Control Association while the 57 companies were merged into 19. On the government side control over silk was exercised by the Ministry of Agriculture and Forestry; over rayon, cotton and wool by the Ministry of Commerce and Industry. A combined Textile Control Board allotted raw materials to spinners and weavers and set distribution quotas for textile clothing manufacture. Distribution went down the line to prefectural control companies which were the sole distributing agencies for their respective prefectures and which were composed of local wholesale and retail dealers and department stores. Working clothes were distributed at places of employment and students' clothing at schools in exchange for ration tickets. Other items were sold generally to consumers through local department and retail stores on a point-rationing basis.

The Textile Manufactures Distribution and Consumption Control Regulation was promulgated on January 20, 1942, based on the provisions of the National General Mobilization Law, and clothing rationing under a point system got under way on February 1, 1942. At that time each urban resident received a 100-point ration book and each rural resident an 80-point book. This allowance was intended to cover a period of one year, ending February 1943. At the end of the first year a survey indicated that about a quarter of the points allowed for clothing had been unused and on the basis of this survey the individual point allotment was reduced 25 percent. In June 1943 national standard models for clothing were established and in August the overall number of varieties was cut 60 percent in order to simplify output. It was apparent by January 1944, when a new ration was considered, that textile supplies did not permit another general ration at the 1943 level and after delay for some time the government finally announced a general 50-point ration for persons under 30 years of age and 40 points for those 30 years and over. This was the last general clothing ration distributed. However, throughout the war special allowances were issued to pregnant women, brides, repatriated and

[72] *Oriental Economist*, December 1943, p. 577.

demobilized persons and air-raid victims. The structure of the clothing point-rationing system is shown in Table 64.

TABLE 64

JAPANESE CLOTHING RATIONING POINT SYSTEM, 1942-45

1. Regular Individual Allowance—Ration Points

Date of Issuance	*Urban Residents*	*Rural Residents*	*Age 30 and Over*	*Under 30 Years of Age*
Feb. 1, 1942	100	80	..	..
Jan. 18, 1943	75	60	..	..
April 1, 1944	...	..	40	50

2. Special Allowances—Ration Points

Date of Issuance	*Pregnant Women*	*Brides-to-be (maximum)*	*Repatriated & Demobilized Persons (max.)*	*Air-Raid Victims*
Feb. 1, 1942	100	500	200	.....
Jan. 18, 1943	100	500	200	.....
April 1, 1944 ...	100	500	200	.....
1945	100	...	200	50-250

Source: Textile Bureau, Ministry of Commerce and Industry.

Japanese authorities estimated that an average family of five, including two adults, two children and one infant, required about 400 points a year for a minimum wardrobe. During 1942 each five-member family received 500 points, from February 1943 to April 1944 it received 375, thereafter it received 220. Thus, although the average family of five required about 1,600 points from February 1942 to the end of 1945, it received only 1,095. Table 65 will afford some idea of what might have been purchased over the four-year period with the available points, assuming the family had the money and that the goods were available on the market.[73]

Even had the full allotted ration been available, it would not have been adequate. However, because of the decline in textile production and the losses due to war,[74] there was not enough clothing available to meet

[73] The United Kingdom clothing ration was reduced from the first year's level of 66 coupons per person to a basic rate of 48 coupons per annum. This parallels the initial reduction in Japan. There was, however, in Britain, a supplement of 10 coupons for children and manual workers. This ration was maintained through 1944 but the 24 coupons released in February 1945 were required to last for seven months instead of six, so that the basic ration for that period was 41 coupons. A man's suit required 26 coupons. Thus, after the first year of clothing rationing, the purchase of a suit in England required 26/48 or a little more than one-half of the annual ration. In Japan it required 63/75 or roughly 7/8. In Britain in 1944 it required 63/40 or 1½ times the ration in Japan; in 1945 it required 24/41 or approximately 3/5 of the ration. In 1945 in Japan it could not be obtained except possibly on the black market at extra-legal prices.

[74] Air attacks, it is estimated, directly destroyed 2 billion square yards of cloth, 458 million of which were in various mills, 275 million in warehouses, and 1.3 billion in homes. See *Japanese Wartime Standard of Living*, USSBS, Washington, January 1947, p. 39, based on a special report by the Textile Control Association for GHQ, Tokyo, January 1946.

point demands for it. Even the volume of clothing sold on the black market, according to all available testimony, was very small. The greatest volume of transactions developed in 1945 when urban residents, whose need for food was more pressing than their demand for clothing, were forced to

TABLE 65

POINT VALUES OF SELECTED ITEMS OF CLOTHING AND HOUSEHOLD USE, JAPAN, 1943

Items	*Point Value*	*Items*	*Point Value*
Workman's coat	43	Socks, pair	3
Man's suit (western style) .	63	Work dress, 2-piece	60
Woman's blouse and skirt .	44	Child's blouse & skirt	22
Woman's dress	38	Child's overcoat or cape ..	22
Kimono (rayon and silk) .	60	Quilt or bedroll	30
Woman's work suit	60	Single blanket	23
Long-sleeved undershirt ..	15	Double blanket	50
Bath towel	13	3-ounce thread	1

Source: Ministry of Commerce and Industry.

barter clothing and clothing coupons for food. Particularly hard hit were those who were bombed out. The extra points allotted to them could find little on the legitimate market. Although the government set aside 11 items of clothing to be used in emergency, the stocks were extremely small considering the needs and came out of the declining general volume of production. These stocks turned over about three times during the war and at the beginning of 1945 were down to one-half of the initial volume.

The inadequacy of the general supply of clothing may be seen in Table 66. While the figures are open to some question,[75] they are probably roughly indicative of what was distributed in 1944 and the first half of 1945. It would appear that per-capita cloth consumption in 1944 was 3 square yards while the maximum for 1945, had the war continued, would have been no more than two-fifths of a square yard per capita. Distribution of socks (tabi) and stockings combined provided only one pair per capita in 1944.[76] There were only enough work dresses and kimonos distributed to provide one for every sixth woman. One pair of men's pants was available for only one out of every 13 men in the civilian population. Obviously, even prior to the incendiary air raids which began in March 1945, the supply of clothing available to the Japanese civilian population

[75] For example, while 433,598 dozen hats are listed as being distributed in 1944, the All-Japan Hat and Cap Control Association reported production for that year of only 390,000 dozen. Of course it is possible that reserve stocks were drawn upon to make up the difference. The 42 million "pieces" of "cloth goods" listed is pleasantly vague. Yearly, small weaving establishments all over Japan turn out narrow-width "obi" cloth. Lengths and yardage differ according to the predilections of the individual weaver. For purpose of computation in the text, it was assumed that each "piece" was at least one square yard.

[76] In 1944 British women bought 6.5 pairs of stockings each. See *The Impact of the War on Civilian Consumption in the United Kingdom, the United States and Canada, op. cit.*, p. 38.

TABLE 66

CLOTHING DISTRIBUTION IN JAPAN PROPER, 1944 AND 1ST HALF 1945

(in thousands)

Item	Unit	1944	1945	
			1st Quarter	2nd Quarter
Cotton Cloth	sq. yd.	42,649	6,117	1,665
Staple Fiber Cloth	sq. yd.	29,010	6,595	1,519
Silk Cloth	sq. yd.	21,923	2,685	948
Rayon Cloth	sq. yd.	12,501	1,365	516
Woolen & Worsted Cloth	sq. yd.	4,290	304	96
Cloth Goods	piece	42,010	3,761	1,287
Blankets	each	265	430	110
Bedding	set	818	117	165
Elementary School Uniforms	each	5,705	373	125
Secondary School Uniforms	each	1,326	123	45
Mens' Pants	each	2,669	215	126
Kimonos	each	2,749	1,778	827
Working Dresses	each	3,128	1,585	1,386
Undershirts	doz.	375	218	72
Tabi (socks)	pair	56,819	9,160	13,548
Stockings	doz. pair	1,814	452	158
Gloves	doz. pair	2,234	717	529
Hats	doz.	494	51	18
Hand Knitting Yarn	lbs.	1,272	221	241
Sewing Thread	lbs.	4,274	997	794

Source: Textile Bureau, Ministry of Commerce and Industry.

was entirely inadequate, and in view of the fact that 2,500,000 dwelling units, or 20 percent of the nation's households, were destroyed or damaged by the raids with resultant loss of apparel, the effect of the war on the clothing situation is obvious.[77]

SHELTER

The impact of the air attack was nowhere so effective as in the destruction of dwelling units in the 66 towns attacked. Approximately 50 percent of the housing facilities of these major cities and towns were destroyed, but even more eloquent than statistics of dwelling units destroyed are the figures showing the decrease in population of the six major cities of Japan. Four million residents left the city of Tokyo alone during the last year of the war, 80 percent during the five months beginning March 1945. So vast an economic disruption had not been witnessed in Japan since the earthquake of 1923. Approximately 746,000 dwelling units were destroyed in Tokyo alone as a result of air raids.[78] If we assume six inhabitants to

[77] Prices rose sharply during the last year of the war. Even the official index reflected this increase. The clothing sub-section of the "consumer price index for wage earners in Tokyo" of the Cabinet Bureau of Statistics rose from 100 in July 1937 to 278 in January 1944, then increased to 386 by December 1944, and finally jumped to 542 by May 1945.

[78] From a tabulation in *Documents Submitted to the Supreme Commander for Allied Forces,"* by the Japanese Mission to Negotiate the Surrender, Manila, August 19, 1945, Vol. I, pp. 4-9.

a dwelling unit (the figure for all of Japan in August 1945 was 6.4 and the ratio was always higher in the urban areas), this means that over four million people were rendered homeless in one city alone. And the pattern was similar in the other 66 towns and cities. Table 67 indicates

TABLE 67

POPULATION CHANGES FOR SIX LARGEST CITIES IN JAPAN, 1940-46

City & Prefecture	*Census*	*Thousands of Persons*	*Change from Preceding Census (in percent)*
Tokyo, ...	1940 [a]	6,779	
Tokyo	1945 [b]	2,777	−59.0
	1946 [c]	3,442	+23.9
Osaka, ...	1940	3,252	
Osaka	1945	1,103	−66.1
	1946	1,294	+17.3
Kyoto, ...	1940	1,090	
Kyoto	1945	866	−20.6
	1946	915	+ 5.7
Nagoya, ...	1940	1,328	
Aichi	1945	598	−55.0
	1946	719	+20.2
Yokohama, ...	1940	968	
Kanagawa	1945	625	−35.4
	1946	707	+13.1
Kobe, ...	1940	967	
Hyogo	1945	379	−60.8
	1946	443	+16.9

[a] As of Oct. 1, 1940.

[b] Nov. 1, 1945.

[c] April 26, 1946.

Source: *Summation of Non-Military Activities in Japan*, GHQ-SCAP. Vol. 8, May 1946, p. 231.

the decline in population in the six major cities. One had only to see the rubble and burnt ruins covering two-thirds of Tokyo, Osaka, Nagoya, etc., to realize how great was the destruction of the urban pattern and how severe the disruption of economic activities which normally centered in the cities. In all, 2,502,000 dwelling units were destroyed by air attack while an additional 614,000 were torn down by the Japanese themselves in 1944 and 1945 to clear firebreaks in the more congested residential and industrial districts and along the mainline railway tracks of Tokyo, Osaka, Kobe, Nagoya and Yokohama. In addition, during 1944 and 1945, 563,000 dwelling units were destroyed by fire (apart from that caused by air raid), earthquake and flood. So much lumber was cut for industrial and military requirements during the years 1939-44 that watersheds throughout Japan were denuded, and as a consequence the frequency and severity of floods increased, particularly in 1945, which was a year of excessive rainfall and bad storms. The total loss of dwelling units, therefore, in 1944 and 1945 amounted to 3,679,000, or 24 percent of the 14,974,000 dwelling units available at the peak in 1942. Thus over the last year and a half of the war, approximately 22 million Japanese or 30 percent of the

civilian population were routed out of their established homes, principally in urban areas, and had to seek temporary shelter with friends or relatives in the countryside or live in miserable, unsanitary shanties amidst the rubble and debris of the burnt-down cities.[79] The census taken on February 22, 1944, showed 30.3 million urban inhabitants and 42.0 million rural residents. The census of November 1, 1945, indicated 19.5 million urban inhabitants and 52.5 million rural dwellers. The overall housing figures are presented in Table 68 but such statistics merely suggest rather than tell the whole story. They do not picture the loss of time and the confusion caused by workers who formerly lived close to their place of employment attempting to reach it from a new location much more distant. With shops burnt down and the pattern of distribution disturbed, the male members of the family had to take time off from work to go long distances in search of food or clothing.

Compared with Germany, where 15 percent of the dwelling units were wholly lost as a result of the air attack during the course of the war,[80] Japan's loss of 24 percent of her available housing was greater and probably more serious in its repercussions; for while the reduction in German

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[79] The Urban Areas Division of USSBS noted:

"A table of measurable damage cannot fully reflect the impact of the raids on the people. The number of people rendered homeless presented an almost insurmountable problem. National and local organizations which had been set up to care for the victims were largely ineffectual because of the magnitude of the disaster. The vast majority of bombed-out residents were, as a result, thrust upon their own resources either to improvise shelter on or near the site of their former homes or to move elsewhere. The pre-raid evacuation program succeeded in moving a small part of the population out of the cities but post-raid evacuation was curtailed by reduced transportation facilities. Most people left the city on foot carrying with them the remnants of their possessions. The destruction of food stocks and distribution centers in the cities, complicated by the unchartered movements of evacuees, seriously aggravated an already critical food situation. The breakdown of the official rationing system and curtailment of factory food rations caused by destruction of plants forced refugees and remaining residents more and more to the black markets, not only for food but for all goods." *The Effects of Air Attack on Japanese Urban Economy*, Summary Report, Urban Areas Division, USSBS, Washington. March 1947, p. 7.

[80] See *The German Bomb Damage Statistics*, Special Paper No. 6, USSBS, European Theater. The total casualties from the air raids in Germany were estimated at 375,000 dead and 625,000 wounded, of which about 87 percent were civilians. In Japan, civilian dead from air raids were set at 299,360 and injured 432,872. The Japanese figures are from the Home Ministry and there is reason to believe that they represent the minimum estimates, particularly in the case of the dead, since it was customary to report as dead only those who were identified.

TABLE 68

CHANGES IN NUMBER OF DWELLING UNITS, JAPAN PROPER, 1936-45

(in thousands)

Year	No. of Dwelling Units [a]	Estimated Normal Attrition [b]	Destroyed by Fire, Flood and Earthquake [c]	Demolished in Connection with Air Raid Protection Activities	Destroyed by Air Attacks [d]	Estimated Construction of Dwelling Units [e]
1936	13,640	136	15	...	....	...
1937	13,853	139	14	...	....	366
1938	13,941	100	16	...	....	204
1939	14,135	50	16	...	....	260
1940	14,424	b	24	...	....	313
1941	14,729	b	23	...	....	326
1942	14,974	b	13	...	....	258
1943	14,905	b	110	...	....	80
1944	14,673	b	103	171	8	50
1945 [f]	11,291	b	460	443	2,494	15

[a] A nation-wide census of housing is taken every ten years by the National government; the last was that of April 1937. In other years data on the number of dwelling units are collected in December by the village, town and city governments for the Finance Ministry to serve as a basis for tax allotments. Figures for 1945 have been estimated.

[b] Estimated on the basis of known attrition rates. It is assumed that during the war buildings which normally would have been considered obsolete and demolished were patched up and lived in, hence the number of dwelling units retired from service would be negligible.

[c] Figures furnished by Welfare Ministry.

[d] Figures furnished by Welfare and Home Ministries.

[e] Estimated for years 1937-43 from changes in number of dwelling units adjusted for normal and abnormal attrition. Estimated for 1944-45 on basis of figures furnished by the Housing Corporation and index of lumber used for construction purposes. Inasmuch as some of the increase in dwelling units may have resulted from subdividing existing buildings, the construction figures would be overstated to that extent.

[f] January-August.

Source: Home, Welfare, and Finance Ministries.

housing was spread over a three-year period, the bulk of the Japanese loss occurred within some seven months, and unlike the brick, stone, and concrete dwelling units of Germany, which, though damaged by successive air attacks, were often only partially destroyed, and could still be lived in, the wood and paper houses of Japan were completely consumed by fire, leaving nothing habitable in their wake. Neither country had any appreciable amount of excess dwelling space when the war started,[81] and neither was able to replace more than a minute fraction of its losses during the period of the raids. In all, the number of dwelling units constructed in Japan to rehouse air-raid victims did not exceed 15,000 or 0.5 percent of the number of dwelling units destroyed.

The Housing Corporation (Jutaku Eidan), a national policy corporation, had been organized in 1941, capitalized at 100,000,000 yen, princi-

[81] See "Shortage of Dwellings Assuming Serious Proportions," in *Toyo Keizai Shimpo*, December 7, 1940, p. 11.

pally to build workers' dwellings close to newly established war plants. It had scarcely gotten under way when the attack on Pearl Harbor occurred. In the following years it built 91,791 units but in 1945, just when it was needed most, its activities tapered off due to the lumber shortage.[82] As is shown in Table 68, 1941 was the peak year for housing construction. Thereafter residential construction fell 96 percent. Allocation of lumber for residential construction declined from a peak of 9.7 million koku in 1941 to 0.6 million in 1945. Residential building had been under control ever since 1937 when the construction of steel and concrete or brick structure had to be approved by the prefectural governors. In November 1939 construction of wooden houses came under similar control.[83] However, the most effective control was the inability to obtain building materials except at black-market prices. Other than the Housing Corporation's construction of a decreasing number of workers' barracks, there was no residential construction of any consequence after 1942. By August of 1945 the Housing Bureau of the Welfare Ministry estimated that there were 6.4 persons per dwelling unit for the country as a whole and 10.7 in the 66 urban areas subjected to air attack.[84]

Miscellaneous Civilian Supplies

Compared to the very real problems which the Japanese civilian faced in 1944-45, because of the reduced availability of food, clothing and shelter, the decline in the supply of other less important items of civilian use and consumption was inconvenient and annoying but hardly crucial, with the possible exception of medical supplies. The pattern was roughly similar from item to item: decline in supply, military consumption of a larger and larger portion of dwindling output, civilian use of substitutes, if available, if not, merely doing without the item.

Match production fell from a peak of 526,701 match tons[85] in 1935 to 99,016 in 1945, a decline of 82 percent. Of the 68 major prewar producers, 34 survived the war. Fourteen of the largest plants were destroyed by fire

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[82] During the first eight months of 1945 the Housing Corporation constructed only 10,000 units, compared to 24,000 over the same period in the previous year. See Interrogation of Kitaoka, Director of Housing Corporation, Tokyo, November 2, 1945.

[83] For an account of the development of control in this field, see "Control Orders on Building Construction," *Asahi Nenkan* for 1942, Tokyo, 1943, p. 174.

[84] The number of persons per dwelling unit in Great Britain decreased from 3.75 in 1939 to 3.5 in 1944. Civilians per occupied dwelling unit in the U.S., excluding farmhouses and farm families, fell from 3.75 in 1938 to 3.30 in 1944. Washington, D. C., had 4.09 persons per occupied dwelling unit in 1944. The number of occupied dwelling units rose from 12.4 million in Great Britain in 1938 to 12.5 million in 1944. The comparable figures for the U.S. are 26.4 million and 30.6 million. See *The Impact of the War on Civilian Consumption*, *op. cit.*, p. 42.

[85] According to the Match Control Co., a match ton is 600 small boxes of matches.

incident to bombing raids while 20 others abandoned production. Electric light bulb output fell from 167 million units in 1940-41 to only 4 million in 1944-45, a decline of 98 percent. Candle production dropped from a peak of 43 million pounds in 1940 to one million pounds in 1945. Consumption of electric power for lighting purposes declined slightly from 2.8 billion kwh. in 1941, or 9.2 percent of total electric energy consumption, to 2.1 billion kwh. in 1944, or 7.2 percent of total consumption. Charcoal, firewood and rentan (a mixture of charcoal, coal, and sawdust) are the three main types of fuel used in Japanese households. The amount of hard coal consumed for domestic purposes is negligible compared with other fuels, largely because the average Japanese home is heated by movable braziers (Hibachi) and central heating is practically unknown. The volume of charcoal consumed fell from 2 billion kilograms in 1940 to 0.7 billion kilograms in 1945. Rentan consumption fell 65 percent over the period 1940-44 while coal consumed for civilian heating purposes (including office buildings and hospitals, etc.) dropped 80 percent. As both the supply of fuel and the means of delivering it fell, urban residents had to make time-consuming trips out to the countryside to obtain firewood and charcoal. Lack of sufficient heat contributed, along with undernourishment and inadequate clothing, to the marked increase in respiratory diseases that occurred toward the end of the war and helped lower the vitality and efficiency of the general populace.

According to the Managing Director of the Pharmaceutical Control Association, the consumption of drugs by the civilian population fell from 20 million yen in 1941 to 6 million yen in 1944, a decline of 70 percent, while military consumption rose from 20 percent of total output in 1941 to 50 percent in 1944. During the war 30 percent of the 790-odd pharmaceutical factories were destroyed or damaged by air raids and fires, but the large plants of such leading firms as Takeda, Shionogi, Fujisawa, and Daiichi remained intact. The main difficulty was the loss of foreign supplies of drugs and the deterioration in the quality of those produced at home as control of drug quality was relaxed to permit production of more drugs from a diminishing supply of raw materials. Comparison of planned allotment with actual production of a selected group of standard drugs reveals a failure to meet production schedules for every item.[86] Since the military took what it needed of the total available, the civilian sector bore the brunt of the curtailment. Imported drugs, such as boric acid, were all impossible to obtain. A severe shortage of vaccines and serums developed which increased susceptibility to disease. For example, although the planned civilian allotment of diphtheria antitoxin for the years 1942-44 totaled 17,300 litres, actual production amounted to only

[86] See Appendix Table NN, *Japanese Wartime Standard of Living*, USSBS, *op. cit.*, p. 123.

5,700 litres, of which the military took 1.700 litres. Civilian and military requirements for tetanus antitoxin were estimated to be 172,400 litres for the period 1942-44; the amount actually distributed, however, was only 4,600 litres, all of which was taken by the military. There did not appear to be any shortage of doctors. Of the estimated 100,000 physicians in Japan (including those in the armed forces), 40 to 50 percent were serving the civilian population at a ratio of 1 to 1,300, a ratio which Japanese medical officials considered adequate if not ample. On the other hand, due to their inability to obtain dyes and stains for slides, many of the histological laboratories ceased functioning and analytical work virtually came to a halt.[87]

The glass industry is an excellent example of conversion from civilian to military use. Production of optical glass increased over 500 percent from 1938 through 1944 but in the latter year less than 4 percent was for civilian use. Domestic consumption of window glass dropped 98 percent over the period 1940-45, while glassware production in 1945 was the lowest in 20 years and only 4 percent of 1937 output. Fiber glass, on the other hand, which was used for separators for storage batteries, for electrical insulation, etc., rose 900 percent over the period 1940-45.

Footwear provides a case study of forced consumer use of inferior substitutes. The Japanese do not prefer the clumsy wooden clogs (geta). Those who could afford them used rubber-sole canvas shoes, or even more so, if their income permitted, foreign-style leather shoes. Government policy fostered the continued use of geta to reduce consumption of leather and rubber and thereby reserve such supplies for the military. In the United States the average prewar annual per-capita consumption of leather footwear was about three pairs; in Japan it was about one-seventh pair per capita. Geographic and agricultural conditions in Japan have not been conducive to the raising of livestock; the restricted area, the high value of land, and the large population to be supported made it more necessary to carry on intensive cultivation of food crops. Under normal conditions, therefore, the leather industry was dependent on foreign sources of supply for 70 to 80 percent of the hides and skins it consumed. Furthermore, Japan produced only small quantities of tanning materials and extracts used in making leather and was largely dependent upon imports to meet requirements. Official control over the distribution of tanning materials and extracts was provided for by Ministry of Commerce and Industry Ordinance No. 60 promulgated in Kampo on June 23, 1941. Since 1941, the gradual elimination of a number of medium- and small-scale tanning plants, which was begun in 1938, was drastically increased

[87] For a complete account of Japanese medical activities during the war, see *The Effects of Bombing on Health and Medical Services in Japan*, Medical Division, USSBS (Pacific), Washington, 1946.

under official auspices. Through amalgamation of factories, and the formation of blocs of tanners, the number of tanneries in Japan proper, which stood at 700 in 1938, was reduced to 52 by 1945 with 8 large concerns and their affiliates dominating the leather industry.[88]

Production of hides and leather was at a peak in 1939 and declined thereafter because of the drop in imports.[89] The military share of total output rose from 30 percent in 1937 to 90 percent in 1944. While civilian consumption declined 93 percent from its 1938 peak, military consumption fell 65 percent from its 1939 peak, compared with 1944 consumption. Furthermore, the quantities of leather released by the military upon cessation of hostilities would indicate that it had been able to maintain an ample stockpile all during the war.

With respect to rubber, Japan was, of course, wholly dependent upon imports. These reached an initial peak in 1937 of 70,500 tons, dropped to 32,700 in 1940, and then, with the Japanese seizure of the southern areas, rose again to 83,800 tons in 1943, after which the impact of the blockade brought them down sharply. Domestic consumption of crude rubber for civilian purposes dropped steadily from 1937 on, however, undergoing an 88 percent decline, while military consumption rose steadily, increasing 900 percent between 1937 and 1944. The percentage of military use to total consumption rose from 5 percent in 1937 to 61 percent in 1944.[90]

The growth in the production and use of clogs may be seen in Table 69. Of relatively simple construction and requiring only wood and a bit of cloth or cord for their manufacture, the government sponsored their adoption after 1937 as standard "patriotic" footwear. People gradually switched to clogs either because they could not afford rubberized canvas or leather shoes, or because they wished to save the ones they had for cold and rainy days, using clogs in good weather. Leather shoes became a black-market item as early as 1943 and their price rose steadily until only the wealthy could afford a new pair. On the whole, however, if clogs are considered adequate as footwear, the Japanese encountered no great

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[88] See Interrogation of Tanaka, Secretary, and Nakagawa, Vice-President, of Hide and Leather Control Association, Tokyo, October 24, 1945.

[89] Although air raids damaged 25 percent of the productive capacity of the 52 tanning plants in Japan proper, they had no effect on the output of hides and leather because the decline in imports due to the blockade had cut supplies far below productive capacity. There was three times as much productive capacity left after the air raids as there were hides to be tanned.

[90] The comparisons are based on figures supplied by the Japanese Rubber Control Association. Since the statistics supplied by this organization to USSBS differed from those subsequently supplied to SCAP, their reliability is open to considerable question. The latter set supplied SCAP has been used here. See *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Tokyo, Vol. 8, May 1946, p. 117.

shortage in this phase of civilian supply. By the end of the war almost everyone was wearing clogs.

TABLE 69

FOOTWEAR PRODUCED FOR CIVILIAN CONSUMPTION, JAPAN PROPER, 1937-45

(in thousand pair)

Year	Geta	Rubberized Footwear[a]	Leather	Total
1937	60,700	64,700	2,500	127,900
1938	64,900	55,400	3,200	123,500
1939	113,400	59,300	2,100	174,800
1940	142,700	57,342	1,200	201,242
1941	194,400	50,806	1,600	246,806
1942	183,500	56,362	2,700	242,562
1943	156,200	44,272	1,500	201,972
1944	118,700	19,882	400	138,982
1945[b]	45,300	6,600	0	51,900

[a] Includes rubber-soled canvas shoes, rubber shoes and boots, and rubberized socks.

[b] January-August.

Sources: For wooden clogs and leather shoes, Consumer Goods Bureau, Ministry of Commerce and Industry; for rubberized footwear, Rubber Control Association.

As a larger and larger proportion of rubber imports were used in the expanding aircraft industry, less became available for civilian purposes. There was a 70 percent decline in output of automobile tires between 1942-44, a 67 percent decline in output of auto tubes from 1941 through 1944, a 70 percent and 66 percent decline in supply of bicycle tires and tubes respectively. While the decline in output of new vehicles and bicycles, and especially fuel supply, was even more precipitous, the tire shortage did add to the immobilization of local transportation, which, as has been shown earlier, became a real problem in 1944-45, and to that extent made life that much more difficult for the civilian.

Paper ordinarily has a larger variety of uses in Japan than in occidental countries. In addition to its conventional uses, it is employed in the Japanese home for sliding doors, screens, translucent panels, and as umbrellas, fans, lanterns, etc. In 1939, one-third of Japan's paper and rayon pulp came from foreign countries, another third was produced in Sakhalin, Korea, and Formosa, while the remaining third was produced principally in Hokkaido. As shipping grew tighter, pulp imports from abroad were eliminated entirely and those from nearseas areas were reduced sharply. As a result, paper production in 1944 was only 35 percent of its 1940 peak. The share consumed by the military rose from 6 percent in 1940 to 36 percent in 1944. The number of newspapers in Japan proper was reduced from slightly over 5,000 to 75. Size was reduced to four pages and circulation cut 25 percent. Other civilian uses, such as wrapping, writing, screens, and toilet paper, fell 77 percent between 1942 and 1944.[91]

[91] Air attack damaged or destroyed 42 of the 205 paper mills. The 42 mills destroyed accounted for 23 percent of the total productive capacity of the industry. But since the industry as a whole was operating at less than half of capacity due to the

Household furnishings and utensils are less essential to the Japanese than to the Occidental because of the greater simplicity of the average Japanese home. Since the Japanese normally sit on the floor (on straw mats called tatami) and sleep on the floor in bedrolls and quilts, there is much less furniture both required and used than in a western-style house. Beds, chairs, refrigerators, stoves, bathtubs, radio consoles, etc., are not to be found. Consequently the decline in house furnishings and utensils was more of an inconvenience than a hardship. For those few commonly used items for which statistics were available, large declines were registered, but this was of no great consequence. The Japanese civilian was too miserable for a variety of other major reasons to be concerned about such minor matters. Getting food was of more importance than finding a dish on which to place it.

While any attempt to measure civilian supply in value terms is fraught with great difficulty, because so many transactions went on unrecorded and because official prices meant so little in the last year and a half of the war, several indicators are available. A novel approach was that of the *Oriental Economist,* which after the war attempted to translate value terms into physical volume. Using the yen value of department store sales reported during the war, it constructed a sales index. This was then divided by an index of retail prices as a means of deflating to obtain a volume index of consumer purchases in department stores. The volume index, it felt, was indicative of the trend for all items except food. The results of the *Economist's* calculation are presented in Table 70. It found that by the beginning of 1945 sales were about one-third of the 1941 level while by mid-summer 1945 they had declined to one-fifth of the 1941 level.

TABLE 70

VOLUME OF DEPARTMENT STORE SALES, JAPAN PROPER, 1941-45

Year	*Value of Sales Index*	*Tokyo Retail Price Index**	*Volume Index*
1941	100	100	100
1942	86	104	83
1943	85	113	76
1944	65	128	50
1945—Jan.	52	147	36
Aug.	36	175	20

* Originally calculated by the Tokyo Chamber of Commerce and Industry and recalculated by the *Oriental Economist* on a 1941 base.

Source: *Oriental Economist,* February 1, 1947, p. 78.

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blockade which cut off supplies of pulp and coal, the air attack was not responsible for decline in output. Had the Japanese wished to maintain production, or had the means to do so, they could have shifted production from damaged plants to unused capacity in undamaged plants.

A more inclusive approach, though one which only carries through 1944, was the deflated series on consumer expenditures presented in Table 6. It will be recalled that in arriving at this series a price index had been used which took into consideration the trend of prices on the black market, and that the series had been deflated to a base in 1940 yen. On this basis consumers' outlays for goods and services declined from 26.7 to 18.8 billions of 1940 yen from 1940 to 1944—a decline of 30 percent. In the case of Germany, the decline in consumers' expenditures over the same period was only 22 percent.

In Table 71 an effort has been made to present on a per-capita basis the changes in the annual purchases of all consumer goods and services in four of the major combatant countries. It is believed that this affords a reasonable basis for comparison of the impact of the war on the civilian sector of the economy in each of the countries. It is apparent that the Japanese civilian was hit harder by the war than his counterpart even in Germany and Great Britain. In Great Britain and the United States, the major share of the change in consumer goods and services came prior to 1941. There was remarkable stability of consuming power in the U.S. and the U.K. from 1941 through 1944. In Japan and Germany, on the other hand, the decline during the immediate war years was severe. Had comparable data been available for the last partial year of war, 1945, the decline would have been much more precipitous, more so in Japan than in Germany, because Germany, by 1945, had already absorbed the major share of its punishment from air attack, while Japan had yet to reap her war harvest. It was the Japanese civilian, with the lowest relative consuming power, and the least reserve to fall back on, who was most severely punished by the impact of the war.

TABLE 71

ALL CONSUMER GOODS AND SERVICES ANNUAL PER-CAPITA PURCHASES

(valued at prewar prices)

Year	*United States (at 1939 U.S. Prices)*	*United Kingdom (at 1938 U.K. Prices)*	*Germany (at 1939 German Prices)*	*Japan (at 1940 Japanese Prices)*
Prewar (U.K. and Germany 1938; U.S. 1939; Japan 1940)	$ 508	£ 87.9	*RM.* 945	*Yen* 374
1941	568	74.4	910	362
1942	558	74.1	817	330
1943	576	71.7	801	309
1944	589	73.9	724	258
	Percent	*Percent*	*Percent*	*Percent*
Change from prewar to 1944	+16	−16	−24	−31
Change from 1941 to 1944	+ 4	− 1	−21	−29

Sources: U.S. and U.K., *The Impact of the War on Civilian Consumption in the United Kingdom, the United States and Canada, op. cit.*, p. 23; Germany, calculated from Special Paper No. 1. *The Gross National Product of Germany, 1936-1944*, USSBS (Europe), p. 6; Japan, calculated from Table 6.

CHAPTER SEVEN

THE ECONOMY UNDER OCCUPATION

> *You will not assume any responsibility for the economic rehabilitation of Japan or the strengthening of the Japanese economy. You will make it clear to the Japanese people that you assume no obligation to maintain any particular standard of living in Japan.*—BASIC INITIAL POST-SURRENDER DIRECTIVE TO SUPREME COMMANDER FOR THE ALLIED POWERS FOR THE OCCUPATION AND CONTROL OF JAPAN, November 8, 1945.

The war economy, which had been starved, pounded and beaten virtually to its knees by mid-summer of 1945, came to a standstill upon surrender. There was no longer a purpose to ninety percent of end-product output. Oriented wholly for war, facing a completely uncertain future, with no incentive or authority for reconversion to peace-time purposes, silent war plants, desolate of workers, remained only so much economic debris, part to be salvaged for reparations, part to be slowly turned to meet reconstruction needs, and part to rot unused and unprotected from the elements.

The Occupation, preoccupied with very pressing problems of demilitarization and security, was confronted with an economy in collapse. The heritage of war for any defeated country is usually a period of economic chaos and national misery and Japan was not to be an exception. To the basic difficulties which followed in the wake of war, the confusion and lack of authority in the immediate surrender period added others which only intensified the crisis and made the road back longer. For example, the mounting tempo of note issue in the last year of the war, the growing resort by commercial banks to central bank credit, the vastly heavier governmental expenditures, as was indicated in Chapter 2, combined to build up an inflationary pressure, which, uncorked with the decline of authority upon surrender, was fed by very great withdrawals of deposits in the weeks immediately following August 15, 1945, and by uncontrolled government expenditures. Those who could dipped heavily into the government till while there was still time and while the taking was good. Government disbursing officers paid out all the funds on hand, the military paid discharge allowances and pensions, years in advance.[1] Immediately after the announce-

[1] Ouchi, Hyoye, *Financial and Monetary Situation in Post-War Japan.* International Secretariat, Institute of Pacific Relations, New York, September 1947, p. 4.

ment of surrender, the government paid out 9.9 million yen earmarked as extraordinary military budget funds, a sum greater than any monthly military expenditure throughout the war years. In the following month, September 1945, an additional 24 billion yen was disbursed in this fashion. By the time SCAP found out what was happening and put an end to the practice, prices had risen 295 per cent.

The very serious undermaintenance of the coal mines, the inadequate allocations of steel, shoring timbers, cement, etc. had led, as we have seen in Chapter 3, to a marked drop in coal output even prior to the end of the war. When the impressed Korean and Chinese miners, and even many disgruntled Japanese miners, left the coal fields immediately after surrender, the void in the mining labor force caused a further sharp drop in output. The wartime policy of scrapping equipment in and drawing labor from consumer goods industries—cotton textiles, for example—led, as we have seen, to a growing shortage of essential consumer supplies. Immediately upon surrender military hoards and government-held stocks were appropriated by retiring officers and officials, sold to contractors, and channeled into the black market,[2] whereas they might have been rationed via normal channels to help alleviate the severe shortages. While the war period was marked by the growing strangulation of Japanese industry due to growing inability to obtain essential raw materials from abroad, surrender brought with it complete and official cessation of the influx of any essential foreign supplies for a considerable period until regulations and procedures could be devised to permit the reopening of even a trickle of the needed trade.

Thus it is apparent that many of the basic economic difficulties which confronted the Occupation during its first three years had their origin in wartime developments and were greatly aggravated by immediate post-surrender events. This was true in such matters as inflation, insufficient coal production, shortage of consumer goods, lack of essential foreign industrial raw materials, etc. The solution of these war-born and surrender-swollen problems was not helped by SCAP's original policy of non-responsibility in the economic sphere and was further impeded by the dearth of technically competent and qualified personnel in GHQ.[3]

Generals are not economists, and after concentrating for four years on the most effective way of tearing down Japan, once that goal had been achieved there were too many related problems of security and demilitarization to allow any great concentration of time or effort to be devoted to methods of rebuilding Japan. Indeed, the original Presidential Policy Statement on Japan made abundantly clear that the responsibility for economic

[2] See, for example, *Summation of Non-Military Activities in Japan,* SCAP-GHQ. No. 30, Tokyo, March 1948, p. 35.

[3] See, for example, *Notes on the Economic Aspects of the Allied Occupation of Japan,* by John R. Stewart, International Secretariat, Institute of Pacific Relations, New York, April 1947, p. 4.

reconstruction was to be left primarily in the hands of the Japanese people and their government.[4] The attitude was that it was up to them to repair the economic damage they had suffered as a result of a war they had started. A Japanese government was left in power largely for this purpose.[5]

Developing economic circumstances, however, and an incredibly incompetent performance by the Japanese government forced a complete reversal in Japan of SCAP's original position of non-responsibility in the economic sphere. In addition, a directive of the Far Eastern Commission, issued on January 23, 1947, declared that "the peaceful needs of the Japanese people should be defined as being substantially the standard of living prevailing in Japan during the period of 1930-34." Since the economy at the time was operating far below this level, responsibility for meeting the goal rested upon the Allied Occupation authorities. Originally the target date for the achievement of this objective was 1950, but when it soon became apparent that this was unobtainable, the date was advanced to 1952. There was considerable skepticism in many quarters that even this could be achieved. With GHQ acceptance of its role in the economic field, directive followed directive until General MacArthur was using Allied troops to enforce collection of both Japanese rice and taxes.

Paralleling this reversal of SCAP's role in Japanese economic life came a wide turnabout in the U.S. view of the post-war punishment to be imposed upon Japan. The immediate post-surrender attitude, that the magnitude of the crime of Pearl Harbor was so great that severe penalties should be imposed, gave way to the theory that punishment of the magnitude of a mere misdemeanor would be sufficient, since Japan was not really to be feared any longer but rather, being too weak, had to be restored to economic health so that she might cease to be a drain upon the resources of the American taxpayer. This reversal may best be seen and traced in terms of reparations proposals for Japan.

The Reparations Problem

The first reparations proposal was that of Edwin W. Pauley. The Pauley report, written in the months immediately following surrender, placed its emphasis on the elimination of Japanese war potential and the need for destroying the top-heavy and overbalanced capital goods-heavy industry structure which the militarists and their business allies had erected.

[4] The Statement, made public on September 22, 1945, declares in part: "The policies of Japan have brought down upon the people great economic destruction and confronted them with the prospect of economic difficulty and suffering. The plight of Japan is the direct outcome of its own behavior, and the Allies will not undertake the burden of repairing the damage." Part IV, Section 3.

[5] For a clear statement of this point see *The Results of the Allied Occupation of Japan: An Interim Report*, by Edwin M. Martin, American Institute of Pacific Relations, New York, 1947, p. 55.

Pauley argued for wholesale plant removals that Japan might no longer be able to control the economic life of neighboring countries by acting as the key industrial consumer of their raw materials. It was the view of his mission that militaristic Japanese economic planning had deliberately retarded the normal industrial development of neighboring areas in Asia, exploiting their raw materials while retaining key manufacturing processes in the home islands of Japan, so as to ensure control. While this advantage lay in Japanese hands, neighboring peoples were unable to resist aggressive Japanese economic penetration. Pauley's proposed transfer of surplus Japanese industrial potential to Japan's neighbors looked to their establishment on an equal footing with Japan, to their ability to resist Japanese economic control and forestall any attempt at renewed Japanese military aggression. In essence Pauley urged that the Allied Powers

> . . . should take no action to assist Japan in maintaining a standard of living higher than that of neighboring Asiatic countries injured by Japanese aggression, insofar as such assistance will divert food or other material aid from these other countries, or will require the retention in Japan of industrial capacity, the removal of which is required on grounds of security. Under this principle, a broad view should be taken of the economy, and especially of the varying degree of industrialization of Eastern Asia as a whole. The overall aim should be both to raise and to even up the level of industrialization. This aim can be served by considered allocation, to different countries, of industrial equipment exacted from Japan as reparations. Reconstruction is an urgent need of all the countries against which Japan committed aggression. Reconstruction is also needed in Japan. In the overall comparison of needs Japan should have the last priority.[6]

In addition to the removal of equipment in all primary war facilities such as arsenal, aircraft plants, etc., the Pauley Mission recommended, in the field of iron and steel, removal of approximately 5,000,000 metric tons of blast furnace capacity, nearly 3,000,000 tons of electric furnace capacity, over 6,000,000 tons of open hearth capacity and 6,000,000 tons of rolling mill capacity. It proposed that Japan's machine-tool inventory be reduced to 175,000 machine tools by the transfer of 600,000 in reparations. A maximum annual capacity of 10,000 new machine tools was to be permitted. The removal of the entire aluminum and magnesium industry was recommended. It was proposed that Japan's shipping be limited to an overall gross tonnage of 1,500,000 including wooden ships, with no vessel to exceed 5,000 gross tons or 12 knots. Three-fourths of the shipbuilding facilities were to be removed. Pauley envisaged reparations as being paid solely in the form of existing capital equipment, including ships, and warned against four kinds of reparations—"labor reparations, recurring reparations, reparations out of stocks and materials on hand, and the taking of stocks and bonds of commercial enterprises in Japan."

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[6] *Report on Japanese Reparations to the President of the United States*, Washington, November 1945 to April 1946, pp. 6-7.

The eleven-nation Far Eastern Commission was unable to come to any final agreement on a reparations settlement, largely because of Russian intransigeance in insisting that plant and equipment removals from Manchuria and Sakhalin must be regarded merely as "war trophies" of the Red Army, and not as reparations for the Soviet Union.[7] In an effort to meet the pleas of certain other Far Eastern Nations, the United States, in April 1947, used its power to act in Japan in matters regarded as urgent, without the action of the Far Eastern Commission. It instructed SCAP to make available 30 percent of the industrial facilities declared surplus to Japan's needs in the Far Eastern Commission's Interim Reparations Decisions of 1946.[7] China was to receive 15 percent, the Philippine Republic 5 percent, Netherlands for the Netherlands East Indies 5 percent, and Britain for Malaya and Burma, 5 percent. By August 1948, under this "Advance Transfer Program," 16,736 of the 19,000 machine tools, designated by SCAP, from 17 Japanese government-owned Army and Navy Arsenals, had been handed over to the claimant nations. China had obtained more than half of the total while the Philippines had received the second largest allotment. In addition some 3,198 pieces of laboratory equipment had been divided among the four countries. Thus, after three years of occupation, aside from occupation costs provided for in annual Japanese budgets, this handful of tools constituted the sole reparations exacted from Japan proper. The United States had neither asked for nor received any reparations from Japan and, in fact, in order to effect a basic settlement, had offered to give up part of its share to other claimant nations.[8]

While the reparations settlement remained deadlocked in the Far Eastern Commission, a growing reaction to what were termed the "harsh and unrealistic" proposals of the Pauley Mission developed. It was argued that industrial plants and equipment removed from Japan would prove of little or no value to the recipients, and that the de-industrialization of Japan would leave a void in the Far Eastern economy that would react unfavor-

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[7] Beginning in May 1946, the Far Eastern Commission issued a series of "Interim Reparations Removal Directives" which provided for removals of clearly surplus equipment to claimants "determined on a broad political basis, taking into due account the scope of material and human destruction and damage suffered by each claimant country as a result of the preparation and execution of Japanese aggression, and taking also into due account each country's contribution to the cause of the defeat of Japan, including the extent and duration of its resistance to Japanese aggression." Decision of May 8, 1947. See *Activities of the Far Eastern Commission*, Report by the Secretary-General, Washington, D.C., 1947, p. 80.

On October 30, 1947, as a result of an FEC directive, SCAP ordered the destruction of all industrial machinery in Japan whether owned privately or by the government, designed for the single purpose of creating war equipment

[8] For an excellent statement of the Chinese position on reparations see *The Treaty with Japan: A Chinese View*, by Chang Hsin-hai (Dean of Kwang Hua University), in *Foreign Affairs*, April 1948, pp. 505-14.

ably upon all countries, not only upon Japan. But most basic to the American scene was the argument that reparations removals from Japan would be paid for by the American taxpayer, since the Pauley reparations proposals would not permit Japan to become self-supporting, and the deficient Japanese economy would remain a long-standing burden upon the resources of the United States. Later this argument was directed not only against reparations removals but against basic U.S. economic reform policy in Japan on the ground that the reforms were disrupting business organization and hindering the recovery of industrial production, thereby prolonging Japan's dependence on American generosity to the detriment of the U.S. taxpayer.[9]

Apart from the discussions in U.S. government bureaus and committees, the first public announcement of this new view was the statement on the economy of Japan submitted by the United States Representative on the Far Eastern Commission. After reviewing the military and political accomplishments of the occupation, General McCoy declared:

> However, the establishment of a self-supporting economy in Japan, without which the achievements of the occupation cannot be consolidated, has not yet been accomplished. Japanese industry and commerce are not yet sufficient to sustain the Japanese economy; there is not yet final Allied determination of the reparations which Japan will be required to pay; and Japan is not yet in a position to participate fully in world trade and to contribute its part to the rehabilitation of world economy. Economic chaos in Japan has been prevented only at the expense of the American people who have financed the importation of vital food and other materials required to prevent widespread disease and unrest.
>
> It is the view of the United States Government that if the fundamental objectives of the occupation are to be achieved, and if there are to be established the conditions necessary to enable Japan to make its proper contribution to the economic rehabilitation of world economy and to take its place in the community of nations, a much greater effort must be made to bring about the attainment of a self-supporting Japan with a reasonable standard of living. To this end, my Government believes that the Japanese Government and people, the Far Eastern Commission and its member states, and the Supreme Commander, recognizing the conditions which now require that more emphasis be placed on such a program, should take all possible and necessary steps, consistent with the basic policies of the occupation, to bring about the early revival of the Japanese economy on a peaceful, self-supporting basis.[10]

Shortly after this statement was made, Secretary of the Army Royall released the "Report on Industrial Reparations Survey of Japan," prepared by Overseas Consultants, Inc., a group of leading American engineers re-

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[9] For a Japanese approach, see "Japan Views Her Reparations," by Ohkita, Saburo, in *Contemporary Japan*, Tokyo, Vol. XVI, Nos. 1-3, January-March 1947, pp. 11-26; also, "From Pauley Plan to Strike Plan," by Kobayashi, Yoshimasa, in *Kaizo*, June 1948.

[10] FEC 292, Washington, D. C., January 21, 1948, p. 1.

tained by the Army to make an independent five-months' study in Japan of the Japanese industrial potential. Concurrently the U.S. Department of State made available the "Report on Japanese Reparations," by Edwin W. Pauley, a study which theretofore had been classified. The debate over the proper level of Japanese reparations, if any, was thus publicly launched.

The Overseas Consultants' report (Section B) concerned itself with the adequacies of retained capacities (after removals) for achieving a self-sustaining civilian economy. The ostensible purpose for which the survey was undertaken was to determine which plants might best be removed under the industry level for Japan prescribed in a document prepared by the State-War-Navy Coordinating Committee and known as SWNCC 236/43. This directive called for 990 million (1939) yen worth of productive facilities to be designated for reparations, exclusive of primary war facilities about which there was no dispute. The Consultants lowered this to a mere 172 million (1939) yen, exclusive of primary war facilities, giving as their premise that "in our opinion, a strong industrial Japan would be less dangerous to the peace and prosperity of the Far East than a continuance of the present state of instability and economic maladjustment in this vast and populous region."

They also stated categorically that:

> We realize that other Far Eastern countries are in need of industrial equipment, and the ultimate decision with respect to reparations should be based on a balancing of needs to obtain optimum benefits for the region as a whole. It is our opinion that this can be achieved most surely by leaving Japan free to reconstruct and use as quickly as possible the bulk of her industrial capacity.

The report concluded:

> Not only does Japan need more, rather than less, productive capacity than she now has if she is to have any chance of becoming self-supporting, but the removal of productive facilities (except primary war facilities) which can be effectively used in Japan would hurt world production; would reduce the likelihood of her becoming self-supporting, and in any case increase the time required to accomplish this objective; would be expensive to the American taxpayer; and, in our opinion, would not be to the best interests of the claimant nations. In view of the foregoing we recommend against the removal of productive facilities (except primary war facilities) which can be effectively used in Japan.[11]

The controversy over the reparations issue was thus well under way when Major-General Draper, Under-Secretary of the Army, set out for Japan, accompanied by a group of American businessmen, including Percy H. Johnston, Chairman of the Chemical Bank and Trust Co., and Paul G. Hoffman, subsequently named Administrator for the European Recovery Program. Since General Draper had been largely credited with responsi-

[11] *Report on Industrial Reparations Survey of Japan to the United States of America*, Overseas Consultants, Inc., New York, February 1948, pp. 223-24.

bility for the decision to restore German industry and to call a halt to decartelization, the probable results of his mission were not unanticipated. Japanese businessmen could hardly suppress their hope. As one press report declared: "Many Japanese say the present American thinking links democracy firmly to private enterprise while the American policy in Japan is seemingly the American policy of ten years ago, when government leaders were definitely against business."

Revival of the capital market was anticipated and stock prices rose materially. Japanese officials were reported as feeling that resumption of debt service (on prewar foreign debt) must be arranged at the earliest possible date because of the importance of its connection with the importation of new foreign capital for recovery. Speculation centered on the probable end of the purge of business leaders and the cessation of the breakup of the Zaibatsu. The Japanese attitude on labor stiffened and the Governor of the Bank of Japan announced in favor of wage control. Generally, Japanese writers predicted a "softening" of the United States attitude and openly stated that the United States would now build up Japan as a Far Eastern "bulwark."

The most authoritative expression of the views and proposals of the Draper Mission, which spent three weeks in Japan and Korea considering the future of both economies, was the Report of the Johnston Committee.[12] Apparently the Army sought to disassociate General Draper from the work of the mission, and to create the impression that the report was the work of a group of independent businessmen, when in reality it was another, though perhaps the most important and the most persuasive, attempt in the Army's campaign to set a new lenient "recovery" program for Japan and reverse the previously accepted "reform-punishment" concept.[13]

The Committee announced that "it agrees with General MacArthur and the Department of the Army that industrial recovery of Japan on a peaceful basis is necessary to bring about a self-supporting economy; that this program has now properly become a primary objective of the occupation; and that the American Government in the national interest should support a reasonable recovery program." Noting that the relief costs of keeping the Japanese people alive and of preventing disease and unrest were running at an annual rate of $400,000,000, the Committee urged that the program which the Department of the Army had recently presented to Congress, to provide Japan with an essential minimum of raw materials, be supported by the American people. Admitting that it was a new departure in United States policy toward Japan, the Committee argued that it was a commonsense ap-

[12] *Report on the Economic Position and Prospects of Japan and Korea and the Measures Required to Improve Them*, Washington, D.C., April 26, 1948.

[13] For a Japanese commentary see "On Reading the Draper Report," *Tokyo Shimbun*, May 20, 1948; "The Draper Report," *Jiji*, May 20, 1948; and "Japan's Economic Recovery and Far Eastern Countries," in *Nihon Keizai*, May 20, 1948.

proach. Some branches of Japanese industry could be making goods that other countries needed if these industries had the raw materials; but Japan cannot pay for them, the argument ran. The United States could finance them; Japanese industry could convert them into finished goods; by selling part of these goods abroad it could get the dollars to pay for the raw materials; the rest of the product would remain in Japan where it is badly needed.

Or to state the argument in slightly different fashion, a difficult circle of circumstances prevails in the Japanese productive economy. Insufficient essential raw materials result in insufficient production; insufficient production results in insufficient foreign exchange to pay for the necessary raw materials. Until this circle is broken, Japan's economy will remain prostrate and dependent upon a food dole such as the United States is presently supplying. The best way to break this circle is to supply sufficient dollar exchange to enable Japan to purchase the initial foreign raw materials.

Since increasing production is the one sure method of producing industrial recovery, it follows that almost all of the plant Japan has must be retained and utilized. The Johnston Committee stated bluntly:

> Plants which are needed in bringing about the recovery of Japan should be retained and only excess capacity removed. Otherwise the United States, which is now extending relief to Japan, would in reality be paying the reparations bill. In our opinion, the capacity that can be spared without affecting Japan's useful peacetime productivity is not great.[14]

Indeed, the Committee's recommendations on reparations place them at a level lower than the recommendations of the Overseas Consultants, Inc., which, it will be recalled, in turn sharply reduced the Pauley recommendations. The contrast may be seen as follows:

RECOMMENDED REMOVALS FOR REPARATIONS
(in thousands of 1939 yen)

	Pauley	*Overseas Consultants*	*Johnston Committee*
Industry Total	990,033	172,269	102,247
Primary War Facilities	1,475,887	1,475,887	560,000
Grand Total	2,465,920	1,648,156	662,247

Just how a group of businessmen, without a staff of engineers, in a three-week survey which included travel time to and from the Far East, and a diversionary trip to Korea, could conclude that primary war facilities available for reparations were only forty percent of that favored by a group of engineers who had spent five months studying the question is not made clear in the report of the Committee.

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[14] The Japanese themselves had earlier undertaken a campaign to put across much the same idea. See *The Basic Problems of Japan's Economic Reconstruction*, Special Research Committee, Foreign Ministry, Tokyo, March 1946, revised September 1946. Also, *Living Standard and the Future Economy of Japan*, Research Bureau, Foreign Ministry, Tokyo. December 25, 1946.

A speedy settlement of the reparations question was urged since the threat of removals was hindering production, so the Committee held, and woven in with this notion was the view that since the process of deconcentration was also retarding output, it too should be reconsidered. On this score the Committee recommended that:

The period of uncertainty caused by this economic reform should be made short and the area of uncertainty lessened as rapidly as possible. The possible disturbing effects should be allayed by care not to hurt production, and by limiting reorganization to the minimum necessary to insure reasonable competition. This we understand is the intention of the occupation authorities and is further assured by their establishment of an American review board to see that deconcentration plans do not adversely affect production and the broad program to achieve economic recovery. Care must also be taken that breaking up of the Zaibatsu monopolies does not lead to the growth of governmental monopolies.

This marked a wide departure from the recommendations of the Edwards Mission on Japanese Combines (1946), but the announcement in Tokyo on May 1, 1948, by SCAP, that 194 of the 325 companies designated for study under the Economic Deconcentration law would not be required to undergo structural reorganization, indicates an active implementation of the Johnston Committee's recommendation. As one correspondent stated: "When Washington decided that Japan must be strengthened economically to remove the load from the backs of American taxpayers, it became evident that the proposed fragmentation of large-scale enterprise would have to be softened."

Thus, though three years of occupation have brought no decisive solution on the reparations problem, they have seen a basic change in the U.S. attitudes and probably the high-water mark of a basic economic reform, the destruction of the great commercial, financial and industrial monopolies in Japan. The role of the Zaibatsu during the war period has already been examined.[15] Upon surrender it was found that the reparations problem could not be considered independently of the Zaibatsu. The Pauley report stated:

Reparations are related to Zaibatsu because in considering the available undestroyed and undamaged physical plants, which are reparable in kind, many, if not most of them, are owned by the Zaibatsu; which leads logically and necessarily to a consideration of the effect of such takings upon the Zaibatsu; which in turn leads to a consideration of the relationship of the Zaibatsu to the entire Japanese economic life, because of the large per-

[15] See Chapter 2, pp. 101-103. For a Japanese account see *Nihon Sangyo Fukko-Eno Michi* (Road to the Rehabilitation of Japanese Industry), by Hoashi, Kei, the Shinso Shuppansha, Tokyo, 1947, 251 pp. The author earned more than a year's imprisonment for his outspoken criticism of the military-bureaucratic wartime control of Japan's economy.

centage of control which lies in the Zaibatsu in every field, both internally and externally.[16]

Dissolution of the Zaibatsu

Pauley's condemnation of the Zaibatsu was unequivocal and is cited here to indicate more fully the climate of official American opinion in the year following the surrender.

> Japan's Zaibatsu (literally, "financial clique") are the comparatively small group of persons, closely integrated both as families and in their corporate organizations, who throughout the modern history of Japan have controlled not only finance, industry and commerce, but also the government. They are the greatest war potential of Japan. It was they who made possible all Japan's conquests and aggressions. . . . Not only were the Zaibatsu as responsible for Japan's militarism as the militarists themselves, but they profited immensely by it. Even now, in defeat, they have actually strengthened their monopoly position. The industrial facilities owned or controlled by them stand relatively undamaged from the war, compared with thousands and thousands of small businesses which have been wiped out. The 'little men' are not only ruined, but heavily indebted to the Zaibatsu. Unless the Zaibatsu are broken up, the Japanese have little prospect of ever being able to govern themselves as free men. As long as the Zaibatsu survive, Japan will be their Japan.[17]

This view became substantially that of the United States Government and an early directive by the Joint Chiefs of Staff to General MacArthur ordered the breakup of excessive concentrations of economic power in Japan. The democratization of Japanese economic life involved a long series of steps and a considerable number of new laws and enforcing organizations. The process began in halting, cautious fashion in late 1945, gathering momentum in 1946 and 1947. By mid-1948 the machinery was working smoothly, but the new orientation of U.S. policy indicated earlier cast some doubt that the process would be carried through to effective completion. SCAP has, however, defended the program vigorously on several occasions, and in his New Year Message to the Japanese People declared:

> Economically, allied policy has required the breaking up of that system which in the past has permitted the major part of the commerce and industry and natural resources of your country to be owned and controlled by a minority of feudal families and exploited for their exclusive benefit. The world has probably never seen a counterpart to so abnormal an economic system. It permitted exploitation of the many for the sole benefit of the few. The integration of these few with government was complete and their influence upon government policies inordinate, and set the course which ultimately led to war and destruction.[18]

After preliminary discussions the first major concrete step in deconcentration was the Japanese Government proposal of November 4, 1945, to

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[16] *Report on Japanese Reparations, op. cit.*, Document 1-f, p. 10.

[17] *Ibid.* Program, pp. 39-40; see also references 7a and 7b.

[18] *Contemporary Japan*, Vol. XVII, Nos. 1-3, January-March 1948, Tokyo, p. 97.

SCAP, of a program for the dissolution of the "big four" Zaibatsu holding company empires. Very briefly, the proposal, which was accepted by SCAP in a directive two days later,[19] provided for the formation of a Holding Company Liquidation Commission, to which the "big four" holding companies would turn over all their securities. The Zaibatsu officers and directors would resign. The Holding Company Commission would either dissolve or itself run the holding companies. Upon final liquidation of the transferred securities, the original owners would receive non-negotiable, non-transferrable Japanese Government bonds having a maturity of not less than ten years. The face value of the bonds given in redemption of the receipts would not be in excess of the net proceeds derived in liquidation of the securities and property transferred by the holding companies. Previously a SCAP directive had restricted the sale or transfer of the securities of fifteen Zaibatsu holding companies and of their affiliates or subsidiaries, without SCAP approval. Nor could these securities be used as collateral to obtain loans without SCAP approval. Because of uncertainty as to what constituted a subsidiary or affiliate, a directive on December 8, 1945, established a "Schedule of Restricted Concerns" which listed by name the 326 companies to which the ban on capital transactions applied. Another directive of the same date prescribed "Regulations Affecting Restricted Concerns," limiting them to routine operations and forbidding them to issue additional stocks or bonds, to declare dividends, or to dispose of any funds or assets without SCAP approval. Officers' salaries were not to exceed the level of June 1945 and officers were not to be given bonuses, gifts or retirement pay. In subsequent months other companies were added to the restricted list; by August 1946 it had grown to 42 holding companies and 1,121 subsidiaries; by June 1947, to 67 holding companies and 3,658 subsidiaries. A year later there were 83 designated holding companies with approximately 4,500 subsidiaries.

A second major step in the economic leveling process was the Japanese Government proposal of November 16, 1945, to levy a new tax "designed to eliminate and recapture all profits, corporate and individual, made during, in connection with and as a result of the war." It additionally proposed to assess a universal capital levy, on a graduated scale. A SCAP directive[20] a few days later approved this proposal and went further and ordered the Japanese Government not to pay any indemnities for war damage, or war conversion, or war supplies and materials, pending legislation on the subject. It also prohibited the Japanese Government from making any subsidy payments, tax allotments, paying off war-assumed guarantees of bank loans, selling assets or issuing bonds, or borrowing without specific SCAP approval.

[19] SCAPIN 244, November 6, 1945.

[20] AG 121.7 (November 24, 1945) ESS-Fl, entitled *Elimination of War Profits and Reorganization of National Finances*, SCAPIN 337.

This directive was ultimately implemented in 1946 by two measures, the War Indemnity Special Measures Law,[21] which levied a tax equal to the claim an individual or corporation had against the government after a small allowed exemption, and the Capital Levy Law, which imposed a graduated tax upon real and intangible property of individuals valued in excess of 100,000 yen.[22] The former measure was estimated to have saved the government payment of some 90 billion yen (80.9 billion yen of claims arising from war-damage insurance, contract termination, indemnities for government-ordered plant expansions, depreciation and obsolescence guarantics, etc., plus 24.8 billion yen of claims from private banks for industrial loans in default, all of which had been guaranteed by the government, minus 15 billion yen representing claims honored under the allowance exemption which ranged from 10,000 to 50,000 yen per claim).[23] The yield of the capital levy was estimated at 43.5 billion yen and fell most heavily upon the top 5 percent of the Japanese population, the rates of the levy ranging from 10 percent on the first 10,000 yen of taxable wealth (after an exemption of 100,000 yen) to 90 percent on the excess above 15 million yen. Provision was made for payment in kind. Inflation, as we shall see later, materially reduced the levy's real revenue, since the yen depreciated rapidly in the year between tax valuation and payment.

The cancellation, via taxation, of the war indemnities impaired the capital structure of many corporations and made it impossible for them either to repay bank loans or find sufficient working capital. This was particularly true in the heavy industries and in the larger financial institutions which had granted large war loans. In anticipation of this, the government passed several measures in 1946, including Emergency Law for the Accounts of Companies, Emergency Law for the Accounts of Financial Institutions, the Enterprise Reconstruction and Reorganization Law, and the Financial Institutions' Reorganization and Readjustment Law, designed to facilitate financial readjustment resulting from the indemnities tax. In the case of corporations, losses were to be borne by stockholders up to 90 percent of capital, with creditors sharing the burden where losses exceeded 90 percent of capital, while in the case of financial institutions depositors had to absorb losses in excess of 90 percent of the capital. All reorganization plans had to be approved by the government.[24]

[21] Law No. 38, October 18, 1946, *Official Gazette*, No. 167, October 19, 1946.

[22] Law No. 52. November 11, 1946. *Official Gazette*, No. 187. November 12, 1946.

[23] For a discussion see "Problem of War Indemnities." *Nippon Times*, Tokyo, July 22, 1946. p. 4; "Cancellation of War Indemnities Demanded," *Yomiuri Shimbun*, Tokyo, March 22, 1946; and "Postwar Taxation in Japan," by Henry Shavell, in *Journal of Political Economy*, University of Chicago, April 1948, pp. 135-36.

[24] For a more detailed discussion see "The Reconstruction of Japanese Enterprises," by Tsuya, S., in Monthly Circular, Mitsubishi Economic Research Institute (reestablished in June 1947), No. 212/213, July-August 1947, Tokyo, pp. 19-24.

A Holding Company Liquidation Commission (Mochikabu Kaisha Seiri Iinkai) was established in 1946 to handle the deconcentration procedures and its powers have been steadily augmented.[25] The first five holding companies designated for dissolution under the Commission were Mitsui, Mitsubishi, Sumitomo, Yasuda and Fuji Industrial. At stockholders' meetings held on September 30, 1946, the Mitsui, Mitsubishi, and Yasuda holding companies voted to dissolve under the terms of the Commercial Code of Japan and submitted liquidation plans. The physical transfer of the securities of all five holding companies was made in October, amounting to over 1.2 billion yen. The Commission was to arrange for the sale of securities and other assets by various methods including special arrangements with the workers of the subsidiary companies, sealed bids in the open market, and direct negotiations with individuals. Limitations were placed on the amount of securities any company could acquire. After meeting creditors' claims and the costs of dissolution, the net proceeds were to be turned over to the stockholders of the holding companies in the form of ten-year non-negotiable bonds. By mid-1948 the HCLC had taken over securities valued at 7.8 billion yen.[26]

A number of additional directives were issued during 1946 designed to make more complete the Zaibatsu liquidation program. One directive required the Japanese government to make certain that no "windfall or gain" would accrue to the Zaibatsu as a result of an increase in the market price or value of the bonds given to them. Members of listed Zaibatsu families, or their appointees, were prohibited from holding positions of responsibility in any restricted company. The Japanese government was directed to eliminate inter-corporate security holdings of restricted concerns, prohibit multiple directorships or contractual, service, or patent arrangements among restricted companies in restraint of competition or trade. The efforts of certain Zaibatsu to evade the effects of dissolution by obtaining control of non-restricted companies were blocked by prohibiting any restricted concern or its subsidiary from acquiring an interest in or participating in the management of a non-restricted concern. In mid-1946 ten more, lesser Zaibatsu families were brought under HCLC control, while, later in the year, 56 persons of ten Zaibatsu families were designated by SCAP and had to turn over

[25] Imperial Ordinance No. 233 as amended by Imperial Ordinance No. 567, November 25, 1946. *Official Gazette*, No. 197, November 25, 1946. Imperial Ordinance No. 591, December 3, 1946, *Official Gazette*, No. 205, December 4, 1946, and the Law Concerning the Revision of a Portion of the Holding Company Liquidation Ordinance, December 9, 1947. An excellent study is *The Cancellation of War Indemnities*, Economic and Scientific Section, Research and Statistics Division, SCAP-GHQ, Tokyo, December 15, 1946.

[26] For a discussion of procedures, pricing, priorities in the disposition of shares, see "Basic Policy for the Disposition of Transferred Securities," Minutes of the 22nd Meeting of the Holding Company Liquidation Commission, Tokyo, May 20, 1948.

their personal security holdings (previously only security holdings of Zaibatsu corporations had been transferred) amounting to about 1.2 billion yen.

The third major step in breaking up the cartels and monopolies came in August 1946, when SCAP directed the Japanese government to dissolve all control associations in ninety days. Previously there had been a debate as to whether this was feasible; a few had been abolished earlier.[27] While they were recognized as instruments for cartel control of industry, there had also been reluctance to disrupt allocation control in the face of a mounting inflation and a severe shortage of goods. With the establishment of the Economic Stabilization Board in August 1946, it was decided that it, as the central economic control body (and thus in a sense heir to the Munitions Ministry), should take over the allocation and control association functions. In due course it began to issue "Quarterly Coal Distribution Plans," "Quarterly Financial Accommodation Plans," and "Quarterly Allocation Program for Key Products," which looked and were very much like the wartime material mobilization and financial accommodation plans. Just as the control associations had found it necessary to organize distribution companies to carry out the allocation program, so the Economic Stabilization Board, following the now familiar pattern, organized a series of "public corporations," the Shipping Corporation, the Petroleum Distribution Corporation, the Solid Fuel Distribution Corporation, the Industrial Reconstruction Corporation, the Foreign Trade Corporation, the Price Adjustment Corporation, the Special Procurement Board and the Fertilizer Distribution Corporation.[28] Four additional Kodans, for liquor, feed, groceries and oilstuffs, were established in December 1947. To provide for the orderly liquidation of some 1,200 control associations and their subordinate control and distribution companies, a Closed Institutions Liquidation Commission was established. Thus the wartime control system with its vestiges of cartel domination was abolished, but the substitute allocation system had a very familiar appearance.

The fourth major step in the program for achieving economic democracy was the application of the purge program to the economic field starting with the issuance on January 4, 1947, of a series of appropriate ordinances. The economic purge was applied on a compulsory basis to "key officials" in

[27] The Iron and Steel Control Association in February 1946, the Koeki Eidan in March 1946, the three rubber control associations in April, the lumber control association in June, etc. Even after August, the Temporary Demand and Supply Adjustment Act gave some control associations a longer lease on life until the Economic Stabilization Board was in an effective position to assume their functions. Some control associations continued to exist well into 1948, under this law, because the staffing of the Economic Stabilization Board was a long, slow process.

[28] For a detailed description of the functions of each of these corporations, see Monthly Circular No. 211, Mitsubishi Economic Research Institute, Tokyo, June 1947, pp. 28-29.

some 250 designated major companies.' Key officials were defined as "chairman, vice-chairman, president, vice-president, director, standing auditor, and any other official regardless of his title, who, in fact, exercises the authority or influence or receives compensation commensurate with that of any of the officials listed above. . . ." All those removed were barred from "any position in the public service," and forfeit any rights they may have to public or private pensions, annuities or similar benefits. By mid-1947 some 2,200 persons, all outstanding wartime business leaders, had been purged under this program. They raised a strong protest in Japan and even found support in the United States among business leaders, but SCAP issued an official statement which quoted pertinent instructions given him in his basic directive from the Joint Chiefs of Staff and defended the program vigorously, even though it might conflict with other occupation objectives such as the revival of the Japanese economy.[29]

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[29] The official statement of January 31, 1947, reads in part:

"The Supreme Commander was directed early in the occupation to 'prohibit the retention in or selection for positions of important responsibility or influence in industry, finance, commerce or agriculture of all persons who have been active exponents of militant nationalism or aggression, and of any who do not direct future Japanese economic effort solely toward peaceful ends.' In the absence of evidence to the contrary, he was directed to 'assume that any persons who have held key positions of high responsibility since 1937 in industry, finance, commerce and agriculture have been active exponents of militant nationalism and aggression and to remove and exclude them from positions of important responsibility or influence. . . .'

". . . I have aggressively furthered this objective, not alone because to do so is in compliance with the basic directive by which my course of action as Supreme Commander is bound, but because any other course would be to ignore those very causes which led the world into war, and by so doing to invite the recurrence of future war.

"It was these very persons, born and bred as feudalistic overlords, who held the lives and destiny of the majority of Japan's people in virtual slavery, and who, working in closest affiliation with its military, geared the country with both the tools and the will to wage aggressive war. This, to the end that a large part of the earth's surfaces and inhabitants might be brought under the same economic bondage they had so long maintained over a majority of the Japanese people—and that Japan might weld from conquered nations and peoples of the world a vast totalitarian Empire, designed further to enrich them. These are the persons who, under the purge, are to be removed from influencing the course of Japan's future economy. . . .

". . . even if . . . this cleansing of the economy of Japan of undesirable influence is destined seriously to handicap industrial revival for lack of essential leadership—or even if such revival is wholly impossible without the guidance of those several thousands of persons involved who directly contributed to leading the world into a war taking a toll of millions of human lives and effecting the destruction of hundreds of billions in material resources—then, in that event, the interests of these hundreds of millions of peoples who want and seek peace leave no alternative than that Japan must bear and sustain the consequences, even at the expense of a new economy geared down to the capabilities remaining." Quoted in Martin, *The Results of the Allied Occupation of Japan: An Interim Report, op. cit.*, pp. 34-35.

The fifth major step was the passage on April 12, 1947, of an Anti-Trust Law (Law Relating to Prohibition of Private Monopoly and Methods of Preserving Fair Trade).[30] The measure defines and prohibits "unreasonable restraints of trade," "unfair methods of competition," "excessive concentration of power over enterprises," "undue restrictions of production, sale, price or technology through combinations and agreements." Mergers, interlocking directorates, interlocking stockholdings, etc. are prohibited. A Fair Trade Commission is established to enforce the measure, which is modeled much along the lines of the American Clayton Anti-Trust Act and the Federal Trade Commission. During its first year of activity (July 1947-July 1948) this Fair Trade Commission has proceeded with vigor to enforce its statute. A number of trade associations have been cited and ordered to discontinue non-competitive practices. The Teikoku and 27 other banks were cited for conspiring to fix interest rates. A group of motion picture companies and theaters were restricted from monopolistic practices. Approximately 4,500 companies have submitted stock-disposal plans under Cabinet Order No. 43, which required companies owning stocks of other organizations to report to the Commission their stockholdings and proposed disposition plans. The Commission called the attention of the government to several statutes, a number of whose provisions were in conflict with the anti-trust law, and these provisions were repealed. A number of anti-price-fixing decrees were issued and several holding companies were ordered to dissolve. However, it must be remembered that enforcing competition is wholly alien to Japanese government and business practice. In the past, cartel arrangements and various restrictive practices have not only been tolerated, but, as we have seen, sanctioned by government measures. It remains, therefore, to be seen, whether the Commission's early vigor survives the end of the occupation.[31]

In mid-1947, the Securities Coordinating Liquidation Committee (Shoken Shori Chosei Kyogi Kai) was established, because of the conflict among, and the difficulties experienced by, the various government agencies attempting to dispose of securities turned over to them.[32] The Commission was to coordinate the security disposal work of the Holding Company Liquidation Commission, the Closed Institutions Liquidation Commission, the Bank of Japan, liquidating agency for closed financial institutions, and

[30] Law No. 54, April 12, 1947, *Official Gazette*, No. 309, April 14, 1947.

[31] For a further discussion from a Japanese point of view see *Nippon Keizai No Saiken* (Reconstruction of Japanese Economy), by Takahashi, Kamekichi, the Nippon Keizai Kenkyujo, Tokyo, 1947, p. 96 *et seq.*

[32] Law No. 8, January 17, 1947, *Official Gazette*, No. 239, January 18, 1947. The necessary ordinance establishing the Committee was not issued until June 18, 1947. See also "Aims and Methods of Securities Disposal," *Asahi Shimbun*, Tokyo, October 14, 1947, and "Disposal of Zaibatsu Stocks," *Oriental Economist*, Tokyo, June 28, 1947.

the Ministry of Finance, liquidating agency for capital levy tax collections paid in securities, etc. Since it was the very wealthy who were being separated from their securities, and since there was little security-owning tradition among the other economic levels in Japan, considerable difficulty was encountered in liquidating the holdings of the various agencies. The Security Coordinating Liquidation Committee was therefore charged with popularizing the notion of security ownership and explaining the benefits of wide distribution of corporate ownership.[33] By the end of 1947, however, only 2 percent of the total amount of securities actually held by various government security holding agencies had been sold. By June 1948 it was estimated that the SCLC held some 22 billion yen of shares for disposal for all government agencies, or a little less than half of the 45 billion yen of corporate shares outstanding. Since it had, as of August 24, disposed of 24,471,645 shares valued at 2,123,004,942 yen, shares disposed of amounted to only 10 percent of those still on hand.[34] Of the shares sold, 19 percent went to company employees, 72 percent were sold by auction to the public, and 9 percent were sold privately by negotiation. In April 1948 a Securities and Exchange Commission was established under the Ministry of Finance. Modeled after the American act, the law provides for compulsory disclosure of corporate information when securities are to be offered publicly, sets penalties for misinformation or misrepresentation, and requires the registration of security dealers, underwriters or brokers. It defines matters referring to the control of trading, limits extension of credit, short sales, wash sales and stabilization activity and prescribes severe penalties for manipulation of security prices.[35]

The final basic step in the deconcentration and anti-monopoly program was taken in December 1947, with the passage of two far-reaching measures, Elimination of Excessive Concentration of Economic Power Law,[36] and the Law for Termination of Zaibatsu Family Control. The former gives

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[33] This it proceeded to carry out by such means as release of a film entitled "Democratization of Industry," and radio programs entitled "Savings and Stocks." "Popularization of Stocks," etc. See *Summation* No. 25, October 1947, p. 242.

[34] See "Democratization of Stock Transactions," *Seiji*, Tokyo, June 30, 1948.

[35] See *Summation* No. 31, April 1948, p. 253.

[36] In her excellent article, "Trust Busting in Japan," in the *Harvard Business Review*, July 1948, Eleanor M. Hadley declares:

"Under six months of SCAP pressure this bill passed the Japanese Diet December 10, 1947. In effect it represented the result of two years of torturous work involving SCAP and Washington, on the one hand, and Japanese politicians schooled in subterfuge, on the other. . . . The pattern of these battles is always the same. First an attempt is made to prevent the antimonopoly legislation from getting on the books; secondly, if legislation cannot be avoided, effort is made to emasculate as far as possible its various provisions; thirdly, and as a last resort, comes sabotage of enforcement." pp. 425 and 431.

the Holding Company Liquidation Commission authority to designate excessive economic concentrations and to reorganize such combines into independent companies to insure a reasonable degree of competition and freedom of enterprise. An excessive concentration of economic power is defined as any enterprise which by reason of its size in any line or the cumulative power of its position in many lines restricts competition or impairs the opportunity for others to engage in business independently. Enterprises of monopolistic character "shall include any enterprise which shall have resulted from merger of independent enterprises or which shall have resulted from excessive expansion of activities during the period between July 1, 1937, and September 1, 1945, in relation to its previously existing position in the field of activity." No enterprise shall be permitted to operate in "unrelated fields of activity," or control companies in such fields. The Holding Company Liquidation Commission was to designate excessive concentrations of economic power existing on the effective date of the statute, and hold hearings prior to issuing final orders for reorganization. The enforcement of final orders issued by the HCLC was to be responsibility of the Fair Trade Commission. The law did not apply to government companies, non-profit organizations or labor unions.

In February 1948 the Commission issued a statement of standards approved for designating enterprises as excessive concentrations of economic power,[37] and so designated 325 companies, including Nippon Seitetsu, Nippon Gomu, Kanegafuchi Boseki, Teikoku Sekiyu, Hitachi Seisakusho, Tokyo Shibaura Denki, Mitsubishi Jukogyo, Kawasaki Jukogyo, Mitsui Seiki, Riken Kogyo, Oji Seishi, Toyo Rayon, Toyo Menka, Nippon Hassoden, etc. The list reads like a who's who of Japanese business. In April the companies filed required information and some submitted dissolution plans. In May it was announced that 194 of the 325 companies designated would not be required to undergo structural reorganization. Whether this was due to a legitimate finding that the companies were not "excessive concentrations of economic power," or whether it was due to the influence of the Draper-Johnston Mission, it is impossible to say. On July 1, 1948, the Holding Company Liquidation Commission removed 31 more names from the list of firms designated, reducing the number of companies facing deconcentration to 100.[38] In August it was decided to cancel the application of this measure to banks.[39]

The Law for the Elimination of Zaibatsu Family Control provided in essence that any Zaibatsu family member holding any official position in any Zaibatsu-designated company or subsidiary or affiliate had to retire

[37] For details see *Summation* No. 29, February 1948, p. 247.

[38] See *Yomiuri Shimbun*, Tokyo, July 2, 1948.

[39] See *Oriental Economist*, August 21, 1948, p. 681.

within thirty days and excluded them from positions in such companies for ten years.

In March 1948 a Board of Smaller Enterprises was established within the Ministry of Commerce and Industry. In its first article the law setting up the Board states:

> Smaller enterprise is essential to a sound and prosperous Japanese economy. It is considered that small, efficient, independent enterprises will serve as a bulwark against concentrations of economic power and provide opportunity for the industrious to follow the legitimate callings of their choice.

Thus the basic steps have been taken and the overall pattern of the program to democratize Japanese business is clear.[40] The Zaibatsu were first separated from ownership, control or position in their industrial empire. The companies were then subjected to a pulverization process and finally rules of fair play in business were laid down and a permanent organization established to enforce competitive practices. The directives and statutes have all been placed on the record but the actual implementation process is only in the very early stages. The whole orientation is completely contrary to what the Japanese customarily followed, and therefore if enforcement or policing of the program lags, no real gains will have been achieved. That the program involves a complete face-lifting for Japanese business, and that it is hurting financially, there is no doubt. The removal of a cancerous growth must result in some pain.

Labor Reform

In contrast to the policy toward business concentrations, the basic reforms in the field of labor looked to the emergence of a strong union movement and to the achievement of substantial material advantages for labor.[41] While the pattern was drawn almost wholly from American practice and does not quite fit the Japanese scene, a series of benevolent measures in three years of the occupation have sponsored an unprecedented development of the Japanese labor movement.

Under SCAP pressure, the wartime labor-front organizations voluntarily dissolved on September 30, 1945. A few days later there followed SCAP's directive on "Removal of Restrictions on Political, Civil and Religious Liberties," resulting in the abrogation of laws and ordinances restricting for labor and other groups freedom of speech, of the press, and of organization. The police were purged, the notorious "thought police" were quickly abolished, and repeated instructions were issued to the police to refrain from

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[40] For a useful review, see *Major Post-Surrender Legislation Affecting the Zaibatsu*. Far Eastern Commission, MI-064/1. Washington, D.C., January 19, 1948, downgraded to unclassified February 2, 1948.

[41] For an extended discussion of labor organization under the Occupation, see the forthcoming study by Miriam Farley, *Labor in Japan*, Institute of Pacific Relations, New York, 1949.

interference in labor affairs, except to deal with criminal acts. To eliminate police control of labor administration completely, all labor functions were transferred from the Home to the Welfare Ministry. Later both Ministries were abolished and a new Labor Ministry organized in September 1947.[42] The release of political prisoners on October 18, 1945, liberated a number of old-time labor leaders. A directive of November 28, 1945, forbade discrimination in private or public employment with respect to wages, hours or working conditions because of nationality, creed or social status.

The first milestone, however, in the revival of labor, was the Trade Union Law of December 1945, modeled after the U.S. National Labor Relations Act of 1935. Though passed by the Diet on December 21, it did not become effective until March 1, 1946. The law guarantees the right to organize and to bargain collectively and recognizes the right to strike; laws and regulations infringing on the activities of labor unions are made invalid, and employers are forbidden to discharge workers for union activities. The law also contains detailed provisions requiring unions to register with the authorities. A system of Labor Relations Committees on both a national and prefectural level was established for the handling of disputes arising under the law. Under the terms of this and subsequent statutes, unionization of a spontaneous sort grew rapidly. While in February 1946, 675 unions with a total membership of 496,000 had registered with the Welfare Ministry, by July 1948 there were 33,940 unions with 6,636,710 members. When it is recalled that at no time in the pre-war period had union membership in Japan exceeded half a million, the extent of the gain becomes apparent.

Since the non-farm labor force, in the last census, was estimated to be 13.4 million (compared to 18.7 million in 1940, the decline being due to flight from urban centers and subsequent government restrictions on returning), it is apparent that 48 percent of the non-farm labor force was unionized. Of the 6.6 million unionized workers, over 2 million were government employees. The Government Railway Workers' Union (Kokutetsu) had 600,000 members, the Japan Teachers' Union (government employed) (Nikkyo) had 500,000 members, the Communication Workers' Union (Zentei) had 350,000, etc. All the government unions joined together in the Zenkanko

[42] See "Labor Ministry Opens," *Oriental Economist*, September 20, 1947, p. 758. Of the Ministry's five bureaus, three were transferred from the Welfare Ministry. The Labor Administration Bureau is concerned with labor unions, labor relations and labor education. The Labor Standards Bureau enforces the labor standards and workmen's insurance laws. The Employment Security Bureau is responsible for operation of public employment offices, development of unemployment relief policies, prevention of undesirable recruitment practices, and administration of unemployment compensation. A newly created Women's and Minors' Bureau administers the protective legislation applying to women and children. Finally the new Labor Research and Statistics Bureau is the fact-finding agency.

(Zen Kankosho Shokuin Rodo Kumiai Renraku Kyogikai), the liaison council of national and local government workers' unions.

In August 1946 various independent unions came together and, according to their political leanings, formed two national organizations, the General Federation of Japanese Trade Unions (Nippon Rodo Kumiai Sodomei) and the more left National Congress of Industrial Unions. As of December 31, 1947, the Sodomei claimed 1,119,203 members, the Sanbetsu, 1,186,965.[43]

While workers had welcomed the Trade Union Law, labor opposed the next major piece of labor legislation, the Labor Relations Adjustment Law, passed on September 20, 1946. Growing labor activity, particularly the use of the "production control" technique, whereby workers did not strike but seized control of the management of a plant and ran it according to their own theories,[44] seemed to necessitate more effective machinery for the settlement of labor disputes. The law provides machinery for conciliation, mediation or arbitration, as the parties may select, under the auspices of the Labor Relations Committees. There is no compulsory arbitration. The part of the Act to which labor objected was that which imposed restrictions on the right to strike. Policemen, firemen and prison guards were not permitted to form unions and were prohibited from striking. General government employees, likewise, were prohibited from striking, although they have the right to organize. Transportation, mail, telephone and telegraph, water supply, gas and electricity, and medical, sanitation and public health were designated as public utilities. Public utility workers had to appeal for mediation to the Labor Relations Committees, and could not strike for thirty days after presentation of the appeal. In addition, the act gave the Government the power to extend the scope of public utilities by designating as a public utility any enterprise whose suspension would disturb the public economy or the people's daily livelihood. It was to this power particularly that labor objected.

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[43] See *Survey of Labor Unions and Federations*, Ministry of Labor, Bureau of Labor Statistics and Research, December 31, 1947, Tokyo. In October 1946 a third national federation, the All-Japan Council of Labor Unions, was organized with the objective of absorbing all unions not affiliated either with Sodomei or Sanbetsu, and has been claimed as the third major federation. It has been inactive, and investigation by the Japanese Labor Ministry has disclosed that it does not maintain any headquarters. Some activity is carried on in its name at infrequent intervals by a few unions in the Osaka area.

[44] This movement reached its peak in 1946. While the Japanese Supreme Court declared it illegal in March 1947, there were still sporadic instances of the practice during the first half of 1948. Generally, after 1946 the formation of labor-management councils in a large number of enterprises gave labor its desired voice in the affairs of the companies. See *Production Control by Labor*, Publications Analysis No. 40, May 15, 1946, Analysis and Research Division, Civil Information and Education Section, SCAP-GHQ, Tokyo, and "Court Suspends Production Control," *Nihon Keizai*, Tokyo, April 21, 1948.

When government workers, dissatisfied with their 3,791-yen per month standard wage, threatened in July 1948 to strike in early August, General MacArthur sent a letter to Premier Ashida, whose Cabinet was tottering because of the labor offensive, declaring that:

> No person holding a position by appointment or employment in the public service of Japan, or in any instrumentality thereof, should resort to a strike or engage in delaying or other dispute tactics which tend to impair the efficiency of government operations.

Whereupon the Cabinet, declaring the MacArthur letter "a directive overriding all Japanese law," proceeded to promulgate an ordinance denying government workers not only the right to strike but also the right of collective bargaining. It was the latter feature which precipitated the resignation of the top officials in SCAP's labor division. It also made it impossible for the Central Labor Relations Committee to continue its efforts to settle the wage dispute between the Government and its employees. All problems pertaining to government and public employees were thereafter to be handled purely as a civil service rather than a labor matter.

The Labor Relations Committees are the basic machinery for the settlement of labor disputes in Japan. On a national level there is the Central Labor Relations Committee (in Tokyo) and the Maritime Labor Relations Committee. In addition, each prefecture has a committee. The Central Committee is composed of 21 members, seven representing labor, seven representing the public, and seven representing employers. The public members are chosen by the 14 other members. All members serve for one year.[45]

Another major gain in the field of labor was the establishment of protective labor standards. Protective labor legislation, which had been suspended during the war, was reinstated. On March 13, 1946, the Ministry of Health and Welfare completed the restoration of pre-war labor standards by issuing an ordinance effective April 1, 1946, repealing all wartime "exception regulations" affecting work in the mines. The restoration of pre-war standards was not thought to be sufficient, however, and a new Labor Standards Law became effective September 1, 1947.[46] A basic eight-hour day, 48-hour week is required. A 25 percent premium for overtime and night work is mandatory. When the workday exceeds six hours, a 45-minute lunch or rest period must be provided. Feudalistic labor practices and forced labor are prohibited. Wages must be paid directly to workers in full and in cash. Minimum wages are to be set for each industry by a labor-management

[45] For further details see "Economic Laws (3)—Labor Relations Adjustment," *Oriental Economist*, November 16, 1946, pp. 762-64.

[46] *Official Gazette*, English Edition, No. 303, April 1947. See also "Labor Standards Law Now in Complete Force," *Mainichi*, November 1, 1947; and "Outline of Labor Standards Law," *Asahi Shimbun*, March 6, 1947. A revised Seaman's Law, raising protective standards for seamen to a level at least as high as standards prescribed by the ILO in 1936, was passed by the Diet on March 27, 1947.

committee. Employment contracts for more than one year are prohibited. Wages, working hours and other details must be clearly set forth in such contracts. Equal pay for equal work is prescribed. Prohibition of juvenile labor under fifteen, with certain exceptions, and protective standards for women and young workers are provided. Thirty days' notice or thirty days' pay must be given in case of discharge. If properly enforced the statute will work a real gain for labor.[47] Simultaneously, a Workmen's Compensation Insurance Law was passed, containing provisions similar to those found in the United States.[48]

An Employment Security Bill was approved by the Diet on September 30, 1947, to become effective on December 1, 1947. It replaced the Employment Exchange Law of 1938 and provided for a system of free public employment exchanges, for government-sponsored vocational guidance and vocational training in connection with the exchanges, and for the prohibition or control of various types of non-government recruiting and labor-supply activities. The Employment Security Bureau of the new Labor Ministry immediately started a training school for prefectural and local officials in such matters as interviewing, referral, vocational training and labor-market analysis. Under the terms of the Employment Security Law, the Ministry of Labor on February 7, 1948, issued an ordinance aimed at outlawing feudalistic labor bosses. The ordinance defines an operator of an illegal labor-supply project as " any person or agency who supplies workers to another, whether or not a contract is known to exist, unless that person: (1) takes full financial and legal responsibility as an entrepreneur for completion of the particular project; (2) performs on-the-job supervision of the laborers; (3) assumes full legal obligation as an employer with respect to workers; and (4) provides necessary machinery, equipment (excluding simple tools), materials or necessary planning and techniques. Labor contractors unable to meet these requirements are prohibited from contracting for hiring of labor. Obviously this ordinance, even more than other labor measures, depends for its meaning wholly upon the degree of enforcement.[49]

Again modeled along American practice, Unemployment Allowance and Unemployment Insurance Laws were enacted on November 21, 1947, designed to cut the ground from under the prevailing paternalistic relationship between Japanese employer and worker, by making the worker look to the

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[47] Full enforcement did not get under way until May 1, 1948. See "Complete Enforcement of Labor Standards Law Effective May 1," *Nihon Keizai*, April 30, 1948; and "Labor Standards Law Creates Unexpected Troubles," *Tokyo Shimbun*, April 25, 1948.

[48] See *Summation* No 18, March 1947, pp. 169-74, for further details. Also, "The Labor Standards Law and the Position of Women," *Miyako Shimbun*, Kyoto, August 21, 1947; "Standard Labor Law." *Oriental Economist*, April 19, 1947, pp. 300-01; also "Scientific Observation of Labor Standards Law," by Imai, Katsumi, in *Kagaku To Gijutsu*, December 1947.

[49] See *Summation* No. 29, February 1948, p. 183.

State rather than to the employer for support. It had been customary for employers to retain workers on the job even though they were not needed, or to discharge them with separation allowances, resulting either in inefficient utilization of manpower, or a financial burden which has become increasingly heavy with the progress of inflation. The Unemployment Allowance Law was an interim measure financed entirely by the government, to operate for six months until May 1, 1948, when sufficient funds were expected to have been accumulated under the Unemployment Insurance Law to allow it to come into operation. Administration is through the local public employment security offices under the Employment Security Bureau of the Ministry of Labor. Coverage includes all concerns employing five or more workers engaged in manufacturing, transportation, communications, commerce, trade, finance, etc. Major exclusions are workers in agriculture, construction and forestry. Government, which provides equivalent benefits from other sources, is also excluded. Employees not under the compulsory provisions may apply for voluntary coverage, and if more than half of the workers involved elect to be covered, the employers are required to obtain coverage. Unemployment insurance benefits, paid on a weekly basis, are 60 percent of the workers' wages for workers whose wages fall within specified levels; between 61 and 80 percent for workers whose wages fall below; and between 40 and 59 for wages above the set level. Maximum duration for the unemployment insurance benefit is six months; for the allowance it was four months. Waiting period is one week for the insurance; it was one month for the allowance. The entire cost of the unemployment allowance was borne by the government. The cost of the insurance is borne jointly by the government, employers and employees. The government pays the cost of administration and one-third of the cost of the benefits, while covered employers and insured workers each pay a monthly premium fixed temporarily at the rate of 1.1 percent of the wages. There are the usual disqualifications and appeals machinery.[50]

Obviously much has been done to make amends to labor for its nine wartime years of suppression. Whether these gains will survive the occupation depends, of course, upon which economic group dominates the government later. That the American pattern of a labor movement apart from political parties is difficult for the Japanese to understand has already become apparent, and it is probable that the English labor-party pattern would have been a better fit. The labor scene shifts rapidly, however, legislation can be changed with ease,[51] and it is probable that when the occupation ends, labor

[50] For further details and evaluation by U.S. experts, see "Report of the Social Security Mission to Japan," Department of the Army, Washington, D.C., July 25, 1948, 164 pp.

[51] Changes have already been proposed. See "Proposed Revisions of Labor Laws Outlined," *Mainichi*, Tokyo, March 10, 1948; "Labor Minister Discloses Government Policy on Labor Law Revision," *Nihon Keizai*, February 6, 1948, and "Labor Law Revision Problem," *Yukan Kyoto*, Kyoto, March 24, 1948.

and management in Japan, after an initial period of hostility, will find a common level.

LAND REFORM

The Japanese homeland is smaller than California in area and only sixteen percent of it is suitable for cultivation. Yet almost half of Japan's eighty million (1948) people till the soil in an unsuccessful attempt to feed the nation. The consequence is one of the most basic maladjustments in the economy. "Too many people on too little land" and "many people on little land" have been catch-phrase characterizations. Since the average farm is so small (2.4 acres compared to 3 acres for China, 10 for Great Britain, 47 for the United States and 80 for Canada),[52] historically it has been difficult to eke out a living and in the many periods of adversity more and more of the land came into the possession of landlords. Lack of employment opportunities elsewhere kept the farmer on the land as a tenant. In 1946, 70 percent of the farming population depended in some degree upon rented land. The intense competition for land by the excessive number of farmers raised the price of land to a high figure and forced tenants to accept landlord terms, however extortionate. In 1938 an acre of good paddy field cost 2,620 yen (US$748), and upland 1,680 yen (US$479). By way of contrast, in the United States an acre of good Iowa farm land cost about $80 in 1938, while in more densely settled states, such as New York and New Jersey, it brought up to $130. The landlord in Japan required payment of rent in rice. Whereas in 1940 the average yield of rice was 8.36 *koku* per acre, the average rent was 4.28 *koku* per acre. Thus the tenant paid somewhat more than 50 percent of the yield to the landlord.

In prosperous times the yen value of the rice which remained in the hands of the tenant was sufficient only to enable him to eke out the barest existence. In times of adversity, the combination of low prices and the small amount of rice left to the tenant, due both to the large percentage taken by the landlord and the small area cultivated by the tenant, threw the tenant into debt to the landlord, and rarely was he able to extricate himself. Thus tenancy verged on bondage. The resulting agrarian discontent was closely intertwined with militarist expansion plans.

It was to this problem that one of the facets of SCAP energy was turned. A directive of December 9, 1945, called for the destruction of the "economic bondage which has enslaved the Japanese farmer for centuries of feudal oppression" and ordered the Japanese government "to take measures to insure that those who till the soil of Japan shall have more opportunity to enjoy the fruits of their labor."[53] Specifically, the Japanese government was required to submit to SCAP by March 15, 1946, a program for rural

[52] Japan has the smallest cultivated land per capita of any Far Eastern country. In acres, Japan has .21, China 1.26, India .77, Korea .47, the Philippines .61, etc.

[53] AG 602.6 (December 9, 1945) CIE "Rural Land Reform."

reform.[54] The plan submitted proved to be unsatisfactory and it was not until July that an acceptable bill was introduced in the Diet. After continued pressure from SCAP officials it finally became a law on October 21, 1946.[55]

The program may be considered in four categories. The first defines the land subject to transfer. The second fixes the price of the land and conditions of payment. The third is the administration of the land reform, and the fourth is concerned with the revision of tenancy practices.

Absentee landlords must sell all of their land to the government. Noncultivating resident landlords may retain one *cho* (2.45 acres), on the average, of tenant-cultivated land in Honshu, Kyushu and Shikoku, and four *cho* in Hokkaido. Anything above this amount must be sold to the government. The retention of one *cho* was permitted in order not to affect hundreds of thousands of little "landlords." Of more than two million persons owning less than five *tan* (10 *tan* = 1 *cho*), slightly more than one-third are "landlords" who rent out one or two *tan* (1 *tan* = .245 acres). Farmers who cultivate their own land are not allowed to own more than three *cho* in Honshu, Kyushu and Shikoku, or more than 12 *cho* in Hokkaido. Land in excess of three *cho* is to be purchased by the government unless the owner-cultivator can cultivate the excess land without use of hired labor, or if subdivision of his holdings, in the opinion of the Land Commission, would reduce its productivity. The three-*cho* limit has been criticized on the ground that it perpetuates the small farm in Japan and thereby limits the farmer to a mere subsistence livelihood. A larger farm would provide a more reasonable living, it is argued. In 1946, however, farms of three *cho* or more in Japan numbered 127,823, or 2.3 percent of the total of 5,697,948 farms, and of these 110,000 were in Hokkaido, where the limit is 12 *cho*, not 3. Thus there were in Japan in 1946 only about 18,000 farms affected by the three-*cho* limit and many of these were exempt under the two exceptions mentioned earlier.[56]

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[54] There were a number of preliminary steps and one wholly inadequate law was actually passed on December 29, 1945. It was not considered as complying with the SCAP directive and was therefore disregarded. For details see *Nippon Sangyo Keizai*, December 7, 1945, and *Tokyo Shimbun*, December 17, 1945. Two excellent accounts in English are "The Promise of Agricultural Reform in Japan," by W. M. Gilmartin and W. I. Ladejinsky, *Foreign Affairs*, January 1948, and "Land Reform in Japan," by Andrew J. Grad, in *Pacific Affairs*, June 1948.

[55] Actually there were two measures: Special Measure for the Establishment of Owner-Farmers (Jisakuno Josetsu Tokubetsu Nochi Hoan) and Revision of the 1938 Agricultural Land Adjustment Law (Nochi Chosei Ho Kaisei Horitsuon). See "Comments on the Land Reform Bill," *Tokyo Shimbun*, July 11, 1946. Also *Yomiuri Shimbun*, July 10, 1946 and *Asahi Shimbun*, July 8, 1946. Text may be found in *Official Gazette*, No. 168, October 21, 1946.

[56] Grad notes: "In the U.S. the average size of farms in 1940 was 63 acres (including fallow land). If the average size of Japanese farms were 63 acres, there would be enough

It has been estimated that the total amount of land to be purchased by the government, under these circumstances, is slightly more than two million *cho*, leaving 600,000 *cho* which will continue to be leased under the "one *cho* exemption."[57] Such purchases are to be completed by December 31, 1948. The original 1945 law had allowed five years for completion of purchases but SCAP insisted that the program be completed in a shorter period (two years) so that the reform might be accomplished under the occupation rather than left to an uncertain fate under a post-treaty Japanese government.

The law provided that the government was to purchase the land and resell it to the tenant. There was to be no direct landlord-tenant negotiation because in the past this had always been too one-sided an affair, with the landlord enforcing his will. Tenants are to pay the government 757 yen per *tan* of paddy and 446 yen per *tan* of upland fields, while the landlords receive 978 and 577 yen respectively, the difference being paid by the government as a subsidy. The government subsidy is payable on only the first three *cho* of any one person's land. Due to the inflation, government purchases of land in 1947 and 1948 were tantamount to confiscation. It may be recalled that under the General Mobilization Law, the government, in September 1939, had frozen the prices of various commodities, including land, at the level prevailing on September 18, 1939. This was the only legal price for land and while unofficial (black market) transactions in land had been carried on at far higher levels, the government could hardly do other than recognize its own enactment. Thus the government price to the landlord was that legally fixed back in 1939. As a result, the landlord now receives for his land only seven percent of the value of the crop grown on it in one season.[58] Even this may be wiped out in view of the growing inflation and the fact that the government pays for the land not in cash but in bonds.[59]

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land for only 235,000 farms, not for 5,697,948 (the 1946 total). What would be done with the millions of owner-cultivators thus deprived of their land? For this and other reasons it is doubtful that Japanese agricultural policy will favor the establishment of large farms in the fore-seeable future." "Land Reform in Japan," *op. cit.*, p. 127.

[57] *Japanese Land Reform Program*, Rural Land Division, Ministry of Agriculture and Forestry, Tokyo, July 17, 1947, p. 3.

[58] The average yield of one *tan* of paddy is 2.2 *koku* of rice. During the first half of 1948 the price of rice per *koku* was officially 1,750 yen, 8,000 yen on the village black market, and up to 20,000 yen in the urban black market. On the average, a farmer surrenders one *koku* of rice per *tan* to the government at the official price of 1,750 yen. If he sells the remaining 1.2 *koku* at the village black-market price, receiving 9,600 yen for it, his total receipts from 2.2 *koku* of rice would total 11,350 yen. In selling this same *tan* of paddy the big landlord receives only 757 yen, or 7 percent of the value of the crop taken from it. Before the war, the value of land ranged from 800 to 1,000 percent of the value of the crop.

[59] The valuation of land on the basis of the 1939 freeze, however, worked in favor of the landlord, in the case of the capital levy. With property assessed at 1939 valuations the proceeds of the sale of a few personal articles in the black market would pay the tax.

The tenant farmer engaged in cultivating this land has first option to purchase it. Since the reform was debated for some six months before the final laws were adopted, many landlords evicted their tenants in order to recover their land either to cultivate or to sell it. The law took cognizance of this, however, and provided that ownership of land should be taken as of November 23, 1945, the date on which Japanese newspapers had first reported the Cabinet's decision to institute land reform. Thus the former tenant was protected even if the landlord had regained his land. A tenant purchasing land from the government may pay the whole amount or only part. The remainder or the whole may be paid in annual installments over a period of 30 years at an interest rate of 3.2 percent. Current high prices have enabled many tenants to pay off in one or two annual installments. On the other hand, some, convinced that inflation is going to get worse, have refrained from paying since, as currency depreciates and the price of rice rises, it will require less and less rice to purchase the land.[60] Contrariwise, in the event of a serious drop in prices, provision is made in the law for the government to permit adjustment of payments so that they will never exceed an amount which, when added to taxes and other financial obligations of land ownership, is equal to one-third of the cash value of the annual crop. In addition, when circumstances so warrant, the government may either reduce or altogether exempt the annual installments. The law forbids sales by the tenants of land acquired under the program except through the agency of, and on terms stipulated by, the government.

The administration of the land reform program is in the hands of a series of commissions. There are three levels. The Local Land Commissions, composed of five tenants, three landlords, two owner-cultivators elected by the groups they represent, and three "learned and experienced" persons, designate the actual plots in each village which are to be purchased and decide who is then legally entitled to buy the land from the government. The Prefectural Land Commissions, which hear appeals from and may overrule Local Land Commissions, are composed of ten tenants, six landlords and four owner-cultivators, elected by their respective representatives on the local commissions, and from five to ten persons appointed "by the competent Minister from among learned and experienced persons." The Governor of the Prefecture is the Chairman. The Central Land Commission, the policy-making body, is composed of 22 members, eight tenants, eight landlords, two representatives of national farm associations and four university professors. The tenant and landlord members are elected by their respec-

[60] See "Farm Land Reform Program," *Kita Nippon Shimbun* (Toyama), April 9, 1947.

tive groups in the Prefectural Commissions. The Chairman of the Central Commission is the Minister of Commerce and Agriculture.[61]

The Local Commissions were elected late in 1946, the Prefectural Commissions by February 1947 and the first land purchase was made on March 31, 1947. At first the program was severely criticized[62] because steady purchases were not accompanied by an equal volume of sales to tenants. The official explanation for this was that distribution was slowed by the necessity for consolidating scattered plots to make a workable economic unit of land. It was stated that in order to accomplish maximum consolidation without disturbing cultivation, since the food supply was desperately needed, acquisition was the first order of business with resale to come later after consolidation. While it is true that the cultivated land of Japan is divided into millions of little plots, with each farmer cultivating a number of scattered holdings, it is also true that landlord stalling tactics slowed resales for a time. While some landlord resistance was to be expected, by and large it was far less than anticipated.[63] By July 1948, the Ministry of Agriculture and Forestry announced, 1,750,000 *cho* had been purchased and 1,222,000 *cho resold to tenants. Two additional purchases were scheduled for* October 2 and December 2 to complete the acquisition phase but land would continue to be sold regularly until it was entirely liquidated.

Even when the reform is completed it is anticipated that some 600,000 *cho*, or roughly 10 percent of the cultivated area of Japan, will still be farmed by tenants. The conditions of tenancy are now regulated, however, by the Agricultural Land Adjustment Law. Payment of rent in kind is forbidden. Rents may not exceed 25 percent of the value of the crop of paddy land or 15 percent of the value of the produce of dry fields. The old practice of mere verbal agreements terminable at short notice is outlawed. Leases must be in writing for a fixed term. Remuneration must be paid for immovable improvements in the event that the lease is not renewed. Thus an attempt is being made to improve the conditions of tenancy at the same time that the majority of the tenants are being re-established as peasant proprietors. Admirable as this reform is, if its benefits outlast the occupation, the basic problem of Japanese agriculture—"too many people on too little land"—remains. Japan in the years immediately ahead is faced with the problem of rural unemployment. Incomes will still be limited by the small size of individual farms. Farmers will continue to depend on part-

[61] See "Reforming Our Farmland," by Mizutani, Chozaburo, in *Contemporary Japan*, Tokyo, January-April 1946. Vol. XV, Nos. 1-4, pp. 87-99, and his "Readjusting Our Farmland Reform," in the same journal, January-March 1947, Vol. XVI, Nos. 1-3, pp. 1-10.

[62] See, for example, "Farmland Reform Lags," *Oriental Economist*, May 31, 1947. Also "Sale of Released Farmland Slow," in *Seiji*, April 24, 1948.

[63] This was the conclusion of W. I. Ladejinsky, after a tour through Niigata Prefecture, Japan's rice bowl and reportedly most feudalistic section.

time employment in other industries. Furthermore, one group of experts believes that the reform will not result in increased production. The effect of the agrarian reform on the food supply of Japan would be vastly different were reform to mean additional acreage under cultivation. This is not possible, and a significantly greater agricultural output cannot be expected as a result of agrarian reform.[64]

The Trend of the Economy

In the three years under the occupation two basic but divergent trends have been paramount. A hare-and-tortoise race has been in progress between a mounting inflation on one hand and a slow revival of industrial activity on the other. The two are, of course, in effect tied together. Inflation has retarded industrial recovery while the dearth of output in the face of mounting monetary claims to goods has only accentuated the price spiral.[65]

While most of the Far East has been subjected to this postwar economic dislocation, the evident and foreseeable impact in Japan might have been contained and mitigated by a wise and effective exercise of basic economic controls over prices, wages, government expenditures, bank credit, supplies, etc. The very great and absolute centralization of authority in the Occupation of Japan and its sponsorship of a series of admirable basic reforms might have led one to expect equal aptitude in the field of economic stabilization. But the early reluctance of SCAP to intervene in this area, and the incompetence of successive Japanese cabinets, produced an administrative fumbling which, if anything, accentuated the dislocations and impaired recovery efforts provided in other fields by factors such as food and raw material imports. That the tortoise will win in the long run is quite clear, in that controls have been effective to the extent of preventing a runaway inflation, such as in China; nevertheless, the race is being unduly and unnecessarily prolonged.

Inflation

Although statisticians attached to Allied Headquarters (SCAP) measure consumer prices by means of an index having August 1946-March 1947 as a base, thereby outwardly minimizing price increases, other indices are available which point up the trend in more realistic fashion. The Tokyo Chamber of Commerce and Industry survey of legal retail prices in Tokyo, with 1930 as 100, stood at 13,009 in July 1948. In the three years between the end of July 1945 and July 1948 the index had risen 12,705 points. The

[64] *Outlook for Japanese Agriculture*, Preliminary Study No. 25, Natural Resources Section, SCAP-GHQ, Tokyo, May 6, 1948. p. 8.

[65] The *Tokyo Times* stated: "However, the opinion has gained ground within the government that the scheme to check inflation by means of increasing production should be changed into one for increasing production by means of checking inflation." July 9, 1948.

Chamber's index of free and black-market prices in Tokyo, having November 1945 as a base, stood at 638 at the end of July 1948. The Bank of Japan survey of Tokyo wholesale prices (1933 = 100) rose from 584 in 1945 to 14,049 in July 1948. Its survey of Tokyo free- and black-market prices (September 1945 = 100) rose to 785 by the end of July 1948. Its index of black-market prices of producers' goods (August 1947 = 100) reached 481 in July 1948. Other indices could be cited. The trend is clear.[66]

The causes of the inflation, though numerous, are equally apparent. For eight years there has been a very severe shortage of consumer goods. For three years industrial production has been wholly inadequate, imports of industrial raw materials insufficient, price control inefficient, wage control lacking. Finally, government expenditures have consistently exceeded revenues, resulting in a sharp increase in Bank of Japan notes in circulation. This has resulted in a sharp increase in the money supply as may be seen in Table 72.

TABLE 72

TOTAL MONEY SUPPLY—JAPAN, DECEMBER 1945-MARCH 1948

(in million yen)

Date	*Currency* [a]	*Total Adjusted Deposits* [b]	*Total Money Supply*	*Percent Increase*
Dec. 1945	55	217	272	..
Mar. 1946	23 *	286	309	14
Mar. 1947	115	275	390	26
Mar. 1948	220	426	646	67

* After currency conversion.

[a] Note issue of Bank of Japan.

[b] Total adjusted deposits of all banks in Japan, Bank of Japan, Deposit Bureau of Ministry of Finance, agricultural associations, credit cooperatives and mutual loan companies.

Source: *Kinyu Tokei Geppo* (Financial Statistics Monthly), Bank of Japan, Tokyo, July 1948.

The spiral which gripped Japan during the first three years of the occupation was characterized by a complex of interwoven reactions of prices, wages, fiscal policy, credit extension, etc. Stated in theoretic terms, spiraling prices, due to an inadequate supply of raw materials and consumer goods, excess purchasing power, etc. tend to make the cost of living outrun the wage level at any given time. The resultant pressure for higher wages, made possible by the new strength of the unions, the real economic basis for their demands, and the weakness and disorganization of management caused a higher wage level than the one upon which the government based its calculation in the prior fixing of official prices. The impact of the higher wages may be traced in two channels.

The increase in industrial costs in the face of fixed official prices forced a firm either to divert its output in whole or in part to the black market in

[66] See also *Fluctuation of Commodity Prices, Wages and Cost of Living During 1947*, compiled by Research Section, Office of the Director-General, Economic Stabilization Board, Tokyo, February 22, 1948, especially p. 10.

order to realize a profit, or, if it sold in legitimate markets at official prices, to incur a deficit which could only be made good by a government subsidy or by a deficit-covering bank loan to replenish depleted working capital. Since the commercial banks, from early 1947 on, were limited in lending scope and also have been reluctant to grant deficit-covering loans, the burden has fallen largely on the government's Reconstruction Finance Bank, which was created to finance capital equipment replacement or expansion, but because of the pressure to grant working capital loans, has become a prime vehicle of inflation. The Bank's capital as a consequence has been constantly enlarged and its borrowings from the Bank of Japan have also increased materially. Its debentures have been absorbed largely by the Bank of Japan and, thus, in effect, government-created funds have been funneled via the Reconstruction Finance Bank to finance industrial deficits. While the fiction of a loan is maintained, the bulk of loans have not been repaid. Thus in order to maintain the illusion of effectively-pegged official prices, the government has been, either by direct subsidy, or indirectly via Reconstruction Finance Bank loans, paying that part of a firm's final selling price which it has not obtained from the public. This procedure has now been formalized in budget provision for both price subsidies and Reconstruction Finance Bank funds, but since the government calculation is always based on meeting the known deficit between costs and official prices at the time of budget making and since subsequent mounting costs always mean a larger-than-calculated deficit, the budget is always unbalanced.

The second channel, through which the pressure for higher wages, resultant from higher costs of living, has brought further inflation is the direct impact on the budget by reason of the large number of government employees and their income requirements. Not once during the three years of the occupation has the government calculation of its wage bill, upon which both its budget estimate and its price level determination are based, held fast. Concessions to legitimate economic demands for higher wages have in each year unbalanced the budget, requiring large supplementary appropriations. Unaccompanied by offsetting tax levies the supplementary budgets have been financed by the sale of bonds principally to the Bank of Japan thereby further increasing and monetizing the government debt. The level of taxes has constantly lagged behind the volume of expenditures and the Japanese government for the past three years has been creating and putting into circulation far more money than it has been withdrawing.[67]

This theoretic analysis can be clothed in economic fact. The Japanese government's unbroken line of budget deficits since 1931 has not been disturbed in the post-war period. The deliberate perpetuation of this policy

[67] See *Nihon Zaisei Ron: Kosai Hen*, by Ouchi, Hyoye, Tokyo, Kaizosha, 1947, especially Chapter 3. and *Mimpo Kaisei to Kinyu Gyojin*, by Inoue, Katsuma, Tokyo, Kunitachi Shoin, 1948.

in the early period of the occupation by Tanzan Ishibashi, Finance Minister in the first Yoshida government,[68] helped to fasten a complex of economic and political circumstances upon subsequent cabinets, making a reversal of policy both economically difficult and politically dangerous. The budget deficit for the fiscal year ending March 31, 1946, has been estimated at 76 billion yen, while the increase in note issue during the fiscal year totaled 44 billion yen.[69] In the following fiscal year the cash deficit totaled 65 billion yen while the note issue rose 92 billion yen. For the fiscal year ending March 31, 1948, the deficit was approximately 102 billion yen[70] while the note issue increased 103 billion yen. Formulation of the 1948-49 budget was delayed until July (1948), some three months after the beginning of the fiscal year to which it applied, during which time a deficit of 20 billion yen was incurred. As finally passed, the budget provided for expenditures of 414 billion yen in the general accounts and over one trillion yen in the special accounts, bringing the total to approximately 1.5 trillion, the largest and probably the least balanced budget in Japanese history. Reaction of the Japanese press was almost unanimously disapproving, mainly on the ground that the budget was not really balanced and that the government was just paying lip service to sound finance while failing to live up to any of its precepts.[71] A study of the budget and the various Japanese commentaries on it lead to the conclusion that the deficit for the present (1948-49) fiscal year will approximate 166 billion yen.

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[68] Ishibashi's view, in essence, is contained in the following quotation: "The advance of commodity prices is caused more by the decrease of commodities than by the expansion of currency. Therefore relief must be sought more in the increase of goods than in curtailing the amount of currency, and for that reason an expansion policy becomes more necessary than retrenchment." "Danger of Retrenchment Policy," in *Zaisei, Tokyo, December 1945.*

[69] Note issue calculated to the beginning of March 1946, since currency conversion occurred on March 2-9, 1946.

[70] Includes a stated deficit of 67 billion yen and a concealed deficit of 35 billion yen resulting from obligations incurred upon which payment was postponed. The *New York Times* of April 13, 1948, declared: "Occupation authorities estimate that the Finance Ministry has delayed a settlement of perhaps 35,000,000,000 yen on its outstanding accounts." The *Oriental Economist* declares: "The exact amount in arrears has never been announced. Some conjectures place it at 30 billion, others at 50 billion yen." July 10, 1948, Tokyo, p. 556.

[71] See "Sound Finance Not Likely," *Nihon Keizai*, Tokyo, July 5, 1948; "Collapse of Government Economic Program Predicted," *Dai Ichi*, Tokyo, June 28, 1948; "1948 Budget Analyzed," *Tokyo Minpo*, June 25, 1948; "Doubtful Points of Revised Budget," *Mainichi*, Tokyo, June 25, 1948. The *Oriental Economist* declared: "Moreover it is already clear that the main budget alone will not suffice for this fiscal year, principally because the labor and personnel costs as used in making the original estimates were set too low . . . we should not be far off in saying that expenditures will far exceed revenues. . . . In the Special Accounts, deficits aggregating 72,800 million yen are already foreseen." Also, *Economic Outlook*, Tokyo, August 7, 1948, p. 640.

The intimate relationship between Japanese government deficits and central bank credit expansion may be seen from the following demonstration:

TOTAL GOVERNMENT BUDGET DEFICITS

April 1, 1946-March 31, 1947	65 billion yen
April 1, 1947-March 31, 1948	102 billion yen
April 1, 1948-June 30, 1948	20 billion yen
TOTAL	187 billion yen

BANK OF JAPAN [72]—"ASSETS"—"INVESTMENTS IN NATIONAL GOVERNMENT"

(In billion yen)

As of	*Total*		*Securities*	*Advances*	*RFB Bonds*
March 31, 1946	13.3	=	3.0	10.3	...
June 30, 1948	200.9	=	77.8	71.6	51.5
Net Increase	187.6	=	74.8	61.3	51.5

The 187 billion yen total government deficit over the two and a quarter year period was exactly reflected in a parallel increase in the assets of the Bank of Japan. Thus, of the 207 billion yen increase in the note issue over this period, the government fiscal policy was responsible for 90 percent. Over the three years of the occupation (August 1945-August 1948) note issue rose 211 billion yen or 703 percent.[73] The trend of the national debt approximates the growth of the note issue and the government deficit. Debt rose 64 billion yen in the fiscal year ending March 31, 1947, compared to the 65 billion yen deficit. In the fiscal year ending March 31, 1948, the debt increased 95 billion yen against the deficit of 102 billion yen. Over the three years of the occupation the national debt rose 227 billion yen, or 130 percent.

The adequacy of the Japanese tax system, in spite of recent attempted reform, has been the subject of debate. In 1945-46 tax revenues were 16 percent of budget appropriations, in 1946-47 only 11 percent, in 1947-48 24 percent, while the budget for 1948-49 indicates a ratio of 22 percent.[74] Generally speaking, the Japanese have held that the tax burden is excessive. The Taxation Adviser to the occupation has publicly held [75] that the impact is equitable, whereas economists in SCAP's Research and Statistics Division have held that the Japanese are being taxed too lightly.

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[72] Source is *Kinyu Tokei Geppo* (Financial Statistics Monthly), Bank of Japan, Tokyo, August 1948.

[73] Without adjustment for currency conversion of March 1946 which temporarily reduced note issue from 62 billion to 15 billion yen. By November 1, 1948, the note issue had risen to more than 280 billion yen.

[74] See "1948 Budget," in *Oriental Economist*, July 31, 1948, pp. 619-22. Tax revenues do not include profits from government monopolies or income from state enterprises.

[75] See "Taxation Reform in Occupied Japan," by Henry Shavell, in *National Tax Journal*, Vol. 1, No. 2, June 1948.

The Japanese contention is generally based on an analysis of the burden on the lower income groups, and where it is limited to this, appears to be valid. Where, however, the contention extends to the overall volume of taxes in relation to national income, it is quite clear that SCAP's economists are correct. In its second official White Paper on Economic Conditions in Japan, the Japanese Economic Stabilization Board[76] highlights the "growing inequity in the incidence of the income tax." Pointing out that inflation has distorted the composition of the national income, it indicates that in the prewar period earned income averaged 40 percent and entrepreneurial income about 30 percent of total national income. Over the 1947-48 fiscal year, however, it estimates that the former was reduced to less than 30 percent while entrepreneurial income has risen to more than 60 percent. In the collection of taxes, however, the amount of taxes on earned income, collected at the source (withheld), represented 131 percent of the goal for the fiscal year ending March 31, 1948, whereas the amount paid on entrepreneurial incomes, based on self assessment by the taxpayer, was only 78 percent of the estimated goal, which was, itself, held to be underestimated. Thus taxes have been collected most efficiently from those least able to pay. A further indication of this inequity is the fact that it has been necessary to raise the minimum exemptions of the income tax on several occasions, because the progress of inflation has thrown low income groups into nominally upper income brackets.[77] For example, during the first half of 1948 the tax rate on an annual income of 50,000 yen was 50 percent. Yet this represented a monthly income of only about 4,000 yen before taxes, and in view of the fact that required family expenditures in June 1948 reached a level of 7,758 yen per month, of which 63 percent went for food, it is apparent that the tax rate was burdensome.[78] An additional regressive measure has been introduced into the tax system with the establishment of the transactions tax, or nationwide sales tax, now levied at the rate of one percent, but likely to be increased as the government is forced to raise additional revenue. Increases in tax and profit margins on government liquor and tobacco monopolies have also hit low income groups proportionately more severely. On the other hand, the tax on owners of real property has been allowed virtually to dry up since assessment upon the basis of 1938-39 valuations is wholly out of line with present inflated land values. The yield of this tax in the fiscal year ending March 31, 1948, was negligible.

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[76] See *Summation of Non-Military Activities in Japan*, Vol. 32, May 1948 Tokyo, p. 64.

[77] See "The Income Tax Problem," *Asahi Shimbun*, Tokyo, January 27, 1948; also "Drastic Revision of Tax System," *Nihon Keizai*, Tokyo, December 11, 1946; "Reform of Tax System Needed" *Yomiuri Shimbun*, Tokyo, April 9, 1948.

[78] *Japanese Economic Statistics*, Research and Programs Division, SCAP-GHQ, Bulletin No. 23, Tokyo, July 1948, p. 66.

That, on an overall basis, the Japanese tax yield is neither commensurate with overall ability to pay nor with the need of withdrawing surplus funds from the narikin is clear from several facts. For the 1947-48 fiscal year, the Finance Ministry, in making the tax forecast calculations, underestimated the level of national income payments to the public by two-thirds. As a result the income taxes collected during fiscal 1947-48 absorbed only 9 percent of actual national income payments, instead of the announced 16 percent. In the case of wages and salaries, the income estimate on which the budget tax figures were calculated was less than half of the final total for the year, while the net income of business proprietors, the largest single component of the national income, was estimated at only one-quarter of the actual total for the year. The inadequacies of a tax based upon such erroneous calculations are apparent.

SCAP's Taxation Adviser estimated that all taxes (including profits of government monopolies) in Japan in fiscal 1947-48 amounted to 20.3 percent of the estimated national income, while the Japanese government has announced that all taxes in fiscal 1948-49 will amount to 17 percent of estimated national income.[79] In the United States, in 1947, all taxes were 24.7 percent of gross national product.[80] Obviously, the United States with high production and a relative abundance of goods was taxing its population more heavily than was Japan. In a country where production was so low (50 percent of the 1930-34 level as of mid-1948) and the monetary means of payment had so far outrun the supply of goods, sound fiscal policy would dictate a much more severe tax program especially upon the relatively untouched "new yen" millionaires, black-market operators, farmers, contractors, labor bosses, etc., all of whom have benefited enormously from the inflation. It would seem that the productivity of the Japanese tax system is considerably less than is necessary for balancing the budget and is not in line with the economy's overall capacity to pay.[81]

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[79] See "Budget Is Imperfectly Compiled," in *Chuka Kokusai*, Osaka, July 5, 1948. In all probability the estimate of national income (1.9 billion yen) for fiscal 1948-49 will again turn out to be much too low.

[80] Taxes were $57.4 billion, gross national product $231.6 billion. It should be noted that U.S. national income was $30 billion lower ($202.5 billion) than U.S. gross national product. Since the valid comparison is taxes to gross national product and not to national income, the comparison made above is more favorable to Japan than would be the case if a Japanese gross national product figure were available and the ratio used in comparison with the U.S. figure had been Japanese taxes to Japanese gross national product.

[81] The *Oriental Economist* declares: "There is no denying that taxation in Japan is not particularly heavy. Inclusive of national and local taxes, the tax burden amounts to 28 percent of the national income in the United States and 35 percent in England while the ratio stands at only 22 percent in Japan. . . . Apparently, the Japanese are not fully self-conscious of the circumstances under which Japan is struggling to extricate

Although a series of SCAP directives ordered the establishment of various controls for economic stabilization, effective measures were not taken until the currency conversion program went into effect in February-March 1946. Among others, SCAPIN 47 of September 22, 1945, entitled "Establishment of Economic, Industrial and Commercial Controls," required the Japanese government to control wages and prices, establish consumer rationing, etc. SCAPIN 359 of November 26, 1945, entitled "Control on Issue of New Currency," provided that the Japanese government might not print or issue currency without SCAP's consent. SCAPIN 635 of January 21, 1946, entitled "Reduction of Government Borrowing and Expenditure," enunciated broad fiscal principles for the Japanese government to follow to avoid the inflationary effect of credit expansion. It directed that government expenditures be reduced to an essential minimum, that deficits be financed to the fullest extent possible from current savings, that recourse to the Bank of Japan for financing government deficits be made only "in last resort."

During the period that these directives were being promulgated, note issue of the Bank of Japan rose from 30 to 60 billion yen while prices rose 295 percent. The currency conversion plan and accompanying proposals, envisaged a coordinated attack upon the inflationary factors. A currency conversion was to be carried out, deposits were to be frozen, war indemnities were to be taxed 100 percent, a capital levy was to be imposed, and an economic stabilization board was to be set up by the Japanese government, simultaneously, to administer allocation and other controls looking to the preservation of the gains which the aforementioned deflationary measures would bring about.[82]

Ordinance No. 84 of 1946, "Deposit of Bank of Japan Notes," of February 17, 1946, provided that Bank of Japan notes were to cease to be legal tender, except for purposes of deposit in financial institutions. Deposits were frozen. Withdrawals permitted were only: (1) 300 yen per month for head of family, plus 100 yen for each member for living expenses; (2) payment of wages up to 500 yen per month; (3) necessary business expenses and 5,000 yen lump sum withdrawal for "reconstruction." In addition there were exceptions provided for wedding or funeral expenses, medical or hospital bills, war victims, repatriates, etc. Later, the 500 yen wage limit was increased by the Japanese government to 700 yen, then to 1,200 yen, and subsequently was lifted entirely. With respect to the conversion it was provided that all Bank of Japan notes in denominations of 10 yen and larger were to be deposited between March 2-7, 1946, in financial institutions which

herself from post-war plight. Hence the present high rate of tax evasion." August 14, 1948, p. 660. See also "Trillions of Yen in Blackmarket Profits," *Tokyo Shimbun*, June 17, 1948.

[82] For a more extended discussion see *An Economic Program for Japan*, by Frank M. Tamagna, Tokyo, May 3, 1946, 111 pp., typewritten. In Mr. Tamagna's files, Research Division, Board of Governors, Federal Reserve System, Washington, D.C.

were directed to redeposit them in the Bank of Japan by March 9, 1946. Each person was allowed to exchange 100 yen of old notes for an equivalent amount of new ones.

Since the mechanics and details were left to the Japanese government, they were, in customary fashion, badly bungled.[83] Furthermore, advance news of the conversion leaked and a number of Japanese converted their holdings into five-yen notes. As a result another ordinance had to be issued, requiring holders of five-yen notes to deposit them. It was planned to stamp each person's ration card once he had converted his 100 yen but in areas where this was not carried out it was possible to go to a number of banks and convert 100 yen at each bank. Since two weeks were allowed to elapse between public notice and required conversion, a buying spree developed.[84] During the last few days, when stores were either refusing to sell goods or had raised prices to fantastic levels, people stood on street corners trying to sell their yen to passersby for almost any tangible commodity. While prices fell after the conversion, which reduced the currency from 62 to 15 billion yen and free bank deposits from 128 billion to 13 billion, the decrease was only about half as much as the increase during the interim weeks.

The currency conversion had no lasting influence. By September 1946, some six months later, the volume of new note issue was at 64 billion yen, surpassing the preconversion peak. Lack of adequate controls was largely responsible. The capital levy, which was to have accompanied the conversion, was not enacted until late in 1946. With payments spread out over the following two years, the burden and effectiveness were greatly diminished as sharply rising prices and valuation on the basis of the old 1939 price freeze made required payments small in relation to the real value of assets. For example, it was possible to sell a few household articles in the black market in 1947 and realize sufficient funds to pay the capital levy on five cho of land.[85] The Economic Stabilization Board was not established until August

[83] For example, after the conversion ordinances had been printed and distributed, it was discovered that the Bank of Japan would be unable to produce sufficient new notes to meet the demand and SCAP officials had no choice but to approve the use of "stamps" to be affixed to old notes. Imperial Ordinance 90 of February 19, 1946, provided that old notes with the stamp attached would be considered the same as new notes and thus be legal tender. The stamps were easy to counterfeit, and at first all were identical so one could validate a 100 yen note by removing a stamp from a 10 yen note. This was corrected later. Due to the shortage of new bank notes, stamped notes continued to circulate until November 20, 1946, when holders were required to exchange them for new-type notes.

[84] The successful conversion in Belgium was announced on Saturday noon, as in Japan, but became effective on Monday, not two weeks later as in Japan. See "The Lesson of Belgium," *Oriental Economist*, March 23, 1946, p. 176.

[85] See "What has Become of the Property Tax," Chapter 8 of *Financial and Monetary Situation in Postwar Japan*, by Ouchi, Hyoye, Nihon Taiheiyo Mondai Chosakai, Tokyo, 1948, pp. 35-36.

1946 and initial organizational problems prevented its effective operation, particularly in the allocation field until 1947. The 100 percent tax on wartime indemnities did not become effective until December 14, 1946, by which time very many claims had already been paid by the government. Basically, however, the continued deficit financing by the government and the resultant wage-price spiral vitiated the effect of the currency conversion and deposit-freezing program of early 1946.

After the currency reform, a system of official commodity prices for the postwar period was established and, based on living costs under these prices, a monthly wage of 500 yen was set for government employees, in whose case wage stabilization was attempted. With management disorganized, however, and labor free to assert itself for the first time in ten years, demands for increased wages by non-government workers, to meet the soaring cost of living, were presented and granted. Over the ensuing year wages of private employees rose steadily under the twin pressures of mounting living costs and increased unionization.[86] Prices began to rise sharply once again from November 1946 on and by April 1947 had increased by 59 percent. In July 1947 the government was forced to recognize the facts and to set a new wage level and a new series of maximum official commodity prices. The basic monthly pay of government employees was fixed at 1,800 yen. Price ceilings were set by multiplying by 65 the price averages for the period 1934 to 1936; recommended wages were to be approximately 30 times the pay level in the base period. The reason for setting the pay level at 30 times, as contrasted with 65 times for commodity prices, was officially explained by the Economic Stabilization Board as follows: "The average per capita output of an industrial worker today is at one half or one third of the average for the period selected as the standard. It is therefore consistent that commodity prices should be raised at double the rate of increase in pay."

At the time the 1,800 yen monthly pay standard for government employees was set, the Bureau of Statistics survey of workers' average wages indicated a figure of 1,847 yen, or 47 yen in excess of the government's figure. By October 1947 this had risen to 2,470 yen, whereupon the government workers demanded an increase, citing a Workers' Household Budget Survey of the Tokyo Metropolitan Government which showed actual house-

[86] From time to time SCAP prodded the Japanese government to take more firm anti-inflationary measures. In a letter to Premier Yoshida, on March 22, 1947, General MacArthur reiterated that the September 1945 directive made the Japanese government responsible for maintaining a firm control over wages and prices. Indicating that these controls had not been effectively applied, General MacArthur declared: "It is imperative that the Japanese government carry out this responsibility to the Japanese people. . . . Unless determined measures are undertaken at once by the Japanese government, the inflationary condition of the economy together with its attendant maldistribution of food and other necessities, will become increasingly serious."

hold expenditures (of an average household of 4.4 persons) at 6,113 yen in October 1947. The tempo of inflation mounted rapidly during the last half of 1947 due to the failure to collect taxes. Note issue rose 83 billion yen during the last six months of the year, the increase in December alone being 41 billion yen. Of the 135 billion yen total of estimated budget tax revenue for the fiscal year 1947-48, only 34 percent was collected during the first nine months of the fiscal year. While, as a result, an intensified tax collection drive was undertaken during the last quarter (January-March 1948), involving the direct intervention of the U.S. military government forces, the sharp increase in collections during this quarter only brought the note issue down by 3.8 billion yen, in contrast to an increase of over 100 billion yen during the first three-quarters of the year, the period of great laxness in tax collections. Thus a permanent inflationary boost had occurred as a result of tax policy. By the spring of 1948, when the government finally granted all government workers a 2,920 yen standard monthly wage, after a threatened strike of government employees had been averted only by the intervention of SCAP, workers and management in the electric power industry agreed on a 5,358 yen per month standard wage, the All-Japan Express Company raised wages to 4,854 yen per month, and coal operators offered miners, who were demanding more, 5,785 yen per month.[87]

Consequently, pressure by government workers continued and in the budget-wage-price settlement of June-July 1948, standard monthly wages were set at 3,791 yen. This was based on a government estimate that the May industrial wage would be 3,500 (when statistics were gathered and tabulated), increasing to 3,700 by the end of June 1948. In fact, however, the actual May figure proved to be 3,667 and therefore the new wage standard, again as in the previous year, was inaccurate at the outset. In the price revision which accompanied both the wage and budget formulations, the government planned to raise official prices by 70 percent or to a level 110 times the base, 1934-36, period. In fact most prices were doubled, as Table 73 indicates.

Since the wage level was set at only 55.8 times the base period level, government workers felt a continuing source of grievance and they soon demanded that their wages be raised to a standard of 5,200 yen per month retroactive to April 1948. This would, if granted, have completely disrupted the government's new budget in which personnel costs were based on a calculation involving a standard wage of 3,791 yen. The threatened strike of government workers in August 1948 led to General MacArthur's letter to Premier Ashida containing the recommendation that government workers be restricted in the right to strike and the subsequent cabinet ordinance which not only prohibited government workers from striking but also denied them

[87] See "Control of Wages and Prices," *Tokyo Mimpo*, April 6, 1948; "Prices and Wages," *Jiji Shimpo*, Tokyo, April 7, 1948; and "Fundamental Policy for Wage Standards Decided," *Nihon Keizai*, Tokyo, April 14, 1948.

TABLE 73

OFFICIAL WHOLESALE PRICES—TOKYO

	June 1948	*July 1948*
American cotton (lb.)	14.90	29.80
Coarse cotton cloth (pc.)	700.56	1372.98
Sheet glass (case)	1534.00	4161.00
Kerosene (kl.)	6980.00	13530.00
Gasoline (kl.)	7780.00	14780.00
Paper pulp (lb.)	6.40	13.25
Rayon pulp (lb.)	8.15	16.40

OFFICIAL RETAIL PRICES—TOKYO

	June 1948	*July 1948*
Unpolished rice (60 kg.)	873.60	1482.00
Wheat flour (10 kg.)	131.50	266.00
Salt (kg.)	5.60	13.27
Firewood (10 kg.)	17.05	39.50
Charcoal (10 kg.)	80.50	220.90
Sliding screen paper (roll)	17.00	32.95
Toilet paper (roll)	4.30	10.40
Bicycles (unit)	3731.00	6678.00
Soy sauce (sho)	19.30	41.50
Bean paste (kan)	31 50	77.00

Source: Price Board.

the right of collective bargaining. In the meantime, private wages have continued to climb. For example, the All-Japan Iron and Steel Company settled in June for a wage of 6,300 yen per month, Toyo Industrial settled for 5,850 yen, while Showa Denko and Mitsubishi Kagaku were negotiating for average monthly wages of 6,000 and 7,000 yen respectively. That the government could successfully hold to the 3,791 wage standard for very long, few observers believed. The Temporary National Personnel Commission, established to handle government workers' grievances after they had been denied the right to strike or bargain collectively, recommended a base monthly wage of 6,307 yen in November 1948 for civil service workers. This necessitated a new large supplementary budget. At the same time tax collections were running far behind estimates, which were themselves now outmoded. Thus the 1947-48 pattern of supplementary budgets, government deficits, inadequate taxes, slow collections, spiraling prices and wages and rising note issue was being repeated in 1948-49. Alarmed at this prospect, the U.S. Departments of State and Army publicly directed SCAP to order the Japanese government to "carry out an effective economic stabilization program calculated to achieve fiscal, monetary, price and wage stability in Japan as rapidly as possible." [88]

The consequences of the inflationary spiral on all phases of the economy are almost too numerous to recount. On the whole, labor has lost because

[88] See joint State-Army release, "Program to Achieve Economic Stabilization To Be Carried Out by Japanese Government." Washington, D.C., December 18, 1948.

of it. There has been much confusion—and contention—in the Japanese press as to whether real wages have risen or fallen during the occupation [89] Depending on the base period selected it can be proved that real wages have risen or that they have fallen Three different analyses will serve to make clear what has actually happened A broad picture of the extent of price changes in Japan since the beginning of the occupation may be seen in Table 74.

TABLE 74

STAGES OF INFLATION IN JAPAN
September 1945-September 1948
(Based on Consumer Price Index—Tokyo)

Period	*Length of Period (months)*	*Total Increase in Price Level (percent)*	*Monthly Increase in Price Index (percent)*
Sept '45-Mar '46	7	295	42
Apr '46-Nov '46	8	6	1
Dec '46-Apr '47	5	59	12
May '47-July '47	3	73	24
Aug '47-May '48	10	50	5
June '48-Sept '48*	4	80	20

*Estimated on basis of June-July rate of increase and changes in official prices

If we attempt to obtain a secular comparison and examine wages under the occupation with wages in the pre-war period, it becomes clear, as may be seen in Table 75, that real wages have fallen sharply.

TABLE 75

THE WAGE-PRICE RELATIONSHIP—SECULAR TREND [90]

Year	*Retail Prices*	*Wages*
1930	100	100
1942	185	129
1944	229	183
1945	752	300
1946	2706	1414
1947	9045	4616
1948-July	13009	7168*

*June

When both wage and price changes are measured from a 1930 base it is clear that while prices by mid-1948 were 130 times higher, wages had risen only 71 times Since the wage index is based on all workers in manufactur-

[89] See, for example, *Oriental Economist*, March 27, 1948, p 246, or "Real Wages on the Increase" in *Nihon Keizai*, July 7, 1948 On the other hand, see "Wage Rise Not Responsible for Price Increase," *Tokyo Mimpo*, May 28, 1948 See also "Wage Base and Wage Policy," in *Nihon Keizai*, July 3, 1948

[90] Sources (1) Retail Prices—Tokyo Chamber of Commerce and Industry Index of Official Retail Prices, 1930=100, *Oriental Economist*, Sept 11, 1948, p 757 (2) Wages —Average Regular Daily Wages—All Manufacturing—*Japanese Economic Statistics*, Vol 24, Aug 1948, p 94, index computed on 1930 base from actual yen values

ing only (factory workers) and does not include commercial, professional, government and domestic workers who have fared less well, real wages for all Japanese workers have fallen further than the statistics indicate.

What has been the wage-price relationship during the past three years under the occupation? This may be seen in the following table, which has been constructed with 1945 as a base.

WAGE-PRICE TRENDS UNDER THE OCCUPATION [91]

Year	*Retail Prices*	*Wages*
1945	100	100
1946	562	560
1947	2135	1827
1948—July	3335	2783 *

* June.

Again it is apparent that while prices increased 33 times under the occupation, wages rose only 27 times.[92]

If, however, a more recent base is used, the following picture becomes apparent:

RECENT WAGE-PRICE RELATIONSHIPS [93]

(Jan. 1947 = 100)

Date	*Wages*	*Black-Market Rice Price*	*Effective Rice Price*	*Family Expenditures*	*Consumer Price Index*	*Bank of Japan Official Retail Prices*	*Tokyo Chamber of Commerce & Industry Official Retail Prices*
Jan. 1947	100	100	100	100	100	100	100
July 1948	433 *	407	554	342	356	474	473

* June.

It appears that during the last year and a half wages have risen about as rapidly as prices. However, since the tempo of the price advance is increasing again (June, July, August) while management and government resistance to wage demands has been stiffening, this temporary respite may not last out the year.

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[91] Sources: (1) Retail Prices—Bank of Japan Index of Official Retail Prices converted from 1914 base. (2) Wages—same as in preceding table.

[92] The Economic Stabilization Board declared: "The present real wages and real family expenditures in urban areas are around 30 percent and 40 percent respectively of those of the prewar period." Second Economic White Paper, Tokyo, May 23, 1948.

[93] Sources: (1) Wages, *Japanese Economic Statistics*, Aug. 1948, p. 94; (2) Black-Market Rice Price, *ibid.*, p. 71; (3) Effective Rice Price, *ibid.*, p. 71; (4) Family Expenditures. *ibid.*, p. 63; (5) Consumers Prices, *ibid.*, p. 60; (6) Bank of Japan Index, *Oriental Economist*, Sept. 18, 1948, p. 779; (7) Tokyo Chamber of Commerce and Industry Index, *ibid.*, p. 779.

Farmers have gained appreciably as a result of the inflation and are today better off than at any period since the first World War.[94] There is considerable testimony to this effect. One report, for example, declares: "Accurate data on agricultural income are not available, but it has been roughly estimated that whereas before the war farmers—constituting about 45 percent of the population—received little more than 10 percent of the income, they now receive as much as 20 to 30 percent."[95] A Japanese provincial newspaper states: "The postwar plethora of money in farm villages, in contrast to urban districts, is already proverbial"[96] and Tokyo's *Dai Ichi* notes: "As is well known, our farming villages, favored with the recent boom, have acquired as much new yen notes as possible from the towns and cities".[97]

While the Ministry of Finance survey of national income distribution in Japan for 1944 showed agriculture receiving a 15 percent share of the income distributed, the survey of the Economic Stabilization Board for 1947 indicated that agriculture received slightly more than 30 percent, its gain coming largely at the expense of manufacturing and transportation. Furthermore, it is estimated that whereas farm villages had an estimated 6 billion yen debt in 1931, their deposits at the beginning of 1948 totaled 40 billion yen and, if domestically hoarded cash is added, 50 billion.[98] While urban inhabitants have frequently been hungry and undernourished during the past three years, farmers have been reported as diverting some 6 to 10

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[94] See *Changes in the Rural Economy during the War and Post-War Period,* Investigation Division, Hypothec Bank, Tokyo, December, 1947. After the tax drive in early 1948, however, there was considerable complaint in rural Japan over a shortage of funds and an undue tax burden. This was due, of course, to the unaccustomed impact of the tax drive and to the fact that with a sharply rising price level a larger and larger volume of money is required to finance any given operation. See, for example, "Farm Funds Policy," in *Mainichi,* May 26, 1948, Tokyo. There have also been frequent warnings in the press that the present agricultural boom will end disappointingly to the farmers in a "stabilization panic" and depression, with resulting large rural unemployment. See, for example, "Farm Household Economy." *Oriental Economist,* July 3, 1948, p. 538.

[95] *1948 Annual Report for Japan to Food and Agriculture Organization,* Natural Resources Section, SCAP-GHQ, Tokyo, June 1948, p. 8. See also *The Rice Economy of Asia, A Working Memorandum,* prepared by the FAO Staff for the use of the Rice Study Group, Food and Agriculture Organization of the United Nations, Washington, D.C. April 1947, pp. 33-36.

[96] "Inflation and the Future of Agriculture." *To-o Nippon* (*Aomori*), April 7, 1948. If the 1930 exchange rate of 40 cents to the yen were in effect, a single egg in August 1948 would have cost $8.69 and the average city family would have had to spend $4,250 for living expenses.

[97] "Need for Basic Agricultural Financial Policy," *Dai Ichi,* Tokyo, June 20, 1948.

[98] "Agriculture and Protectionism," by Uyeda, Bunzaburo, in *Toyo Keizai Shimpo,* January 17, 1948, p. 33. The Currency Stabilization Board estimates a higher figure of 65 billion yen.

million koku of rice per year to the black market.[99] To induce farmers to sell all of their rice to the government, and to eliminate the practice of under-reporting cultivated land, the government in September 1947 instituted a commodity bounty-award system. Urban inhabitants had long been bartering clothing and household goods for rice from the farmers, since the latter refused to part with their crops for rapidly depreciating yen. Now the government was simply following the lead of the urban residents; for every hyo (72 liters) of delivery quota fulfilled, one of the following commodities was released to the farmer in the indicated quantity: fertilizer, 2 kan (7.5 kg.); textiles and clothing, 4 points; salt, 0.5 kg.; sake, 4 go (.72 liters); cigarettes, 8; sugar 0.25 kin (150 gr.). Under the ration system farmers might obtain work-gloves, footwear, work-clothes, cotton cloth, etc. for the points they accumulated.[100]

In addition, the government set purchase prices for deliveries in excess of quotas at 300 percent of the quota purchase prices for rice, wheat, sweet potatoes, etc., despite its contention that all staples produced had to be delivered to it. Mr. L. T. Souley of the Agriculture Division of the Natural Resources Section of SCAP, speaking at Nagoya on September 17, 1947, inquired, "If the delivery quotas are just, how is it possible to make extra deliveries?" A few weeks later, the *Economist* provided the answer, which was, of course, widely known. It declared:

> Since the adoption of the quota delivery system, prefectural authorities have made it a rule to underestimate rice crops under their own jurisdiction in reports to the Government. And it is mainly on the basis of such underestimated prefectural reports that the government has fixed delivery quotas for each prefecture. The Government, on the other hand, has found it inevitable to follow this procedure, owing to lack of positive counter-evidence showing that the prefectural crop estimates have been too small. Herein lies the very reason why a considerable amount of rice has annually flowed into black market channels after the completion of quota delivery."[101]

Within one month, in August-September 1946, informed estimates of the rice crop differed by 11 million koku. The prefectural governments' combined estimate was 54,160,000 koku, the Ministry of Agriculture and Forestry, 60,000,000 koku and the *Oriental Economist*, 65,000,000. The crop was finally reported as 61,380,000 koku. In October 1947, at a conference of prefectural governors, Lt. Col. Boulware, Chief of the Production Branch, Agriculture Division, Natural Resources Section, SCAP, declared:

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[99] See "Rice Deliveries," *Oriental Economist*, July 10, 1948, p. 559.

[100] For distribution of 1947 Fall Staple Crop Delivery Incentive Goods as of May 20, 1948, see *Weekly Summary*, No. 137, Natural Resources Section, SCAP-GHQ, Tokyo, May 23-29, 1948. For 1948 Summer Distribution of Incentive Goods see *Summation of Non-Military Activities in Japan*, No. 35, Tokyo, August 1948, p. 208.

[101] "Free Marketing of Rice," *Oriental Economist*, November 8, 1947, p. 904.

Many excuses have been made to assure us that crop yields will be low. . . . Acreage of rice is reported at 2,900,000 cho by the Ministry of Agriculture and Forestry. The prefectures have reported even less. Nevertheless, recent surveys by Military Government personnel in one prefecture revealed that of the land surveyed in 15 villages, the rice acreage was underreported by 6.8 percent. The correct acreage of agricultural crops for Japan is not being reported.[102]

In July 1948, at another conference of prefectural governors, Col. Schenck, Chief of SCAP's Natural Resources Section, declared that surveys in every prefecture showed unreported plots amounting to from 3 to 20 percent of the total area. While it is SCAP's public contention that measures such as the commodity bounty award plan, crop insurance, basic land reform,[103] etc. have strengthened the government's control over the rural economy, and figures on rice deliveries under the quota system, issued by the Ministry of Agriculture and Forestry, appear to bear this out, as follows:

QUOTA RICE DELIVERIES [104]

(in 1000 koku)

Rice Year	*Delivery Quota*	*Deliveries Completed*
1947-48	30,550	March 16, 1948
1946-47	28.063	May 20, 1947
1945-46	26.561	Only 70% completed
1944-45	37.250	September 10, 1945

The *Oriental Economist* declares bluntly, "the heavy flow of blackmarket rice gives the lie to the figures." [105] The black-market price of rice in Tokyo at the end of June 1948 was higher than ever before at 163.33 yen per kilogram, compared to the official price of 14.96 yen per kilogram and a black-market price a year earlier of 40.27 yen.[106] While the vernacular and provincial press reported bumper crops for 1946 and 1947 and estimated another bumper crop for 1948, the official figures when compared with prewar yields reflect the probable underreporting.

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[102] *Toyo Keizai Shimpo*, October 18, 1947, p. 845.

[103] For a useful discussion see *Some Aspects of Agrarian Reform in Japan*, by Yamaguchi, Shinrokuro, Nihon Taiheiyo Mondai Chosakai, Tokyo, 1948, 36 pp.

[104] Source is *Outlook for Japanese Agriculture*, Preliminary Study, No. 25, Natural Resources Section, SCAP-GHQ, Tokyo, May 6, 1948.

[105] March 20, 1948, p. 222. In its issue of September 4, 1948, it declares: "It is now known that some 6 million koku of the 1946 crop and 10 million koku of the 1947 crop were diverted into blackmarket channels."

[106] During July 1948 alone it was reported that the black-market price of rice rose 12.5 percent. *Oriental Economist*, August 21, 1948, p. 680. The government's official buying price for rice purchased from farmers rose from 550 yen per koku in 1946 to 1,700 yen in 1947 and to 3,595 yen per koku in 1948. Furthermore, in both 1947 and 1948, the government purchased excess rice above quota requirements at three times the official price.

TABLE 76

AGRICULTURAL OUTPUT—PREWAR AND POSTWAR [107]

Commodity	*Unit*	*1930–34*	*1936–39*	*1946*	*1947*
Rice	million koku	61	67	61	59
Wheat and Barley	" "	20	23	13	15
Sweet Potatoes	million kan	906	990	1430	1181
White Potatoes	" "	299	515	460	584

Since food was in relatively short supply and demand was increasing due both to natural increase and repatriation, over the first three years of the occupation, disposal of crops at constantly rising prices, due to the inflation, placed the Japanese farmer in an enviable position in contrast to other economic segments of the population.

Industrial activity [108] has been greatly hampered by the inflation.[109] This is not to imply that the limited revival of industrial activity has been checked by inflation alone. Inadequate supplies of imported industrial raw materials have been a major limiting factor. But the distortion of the relationship between costs, official selling prices, working capital, etc., has been a severely dislocating factor, resulting in large operating deficits in many cases, making profits uncertain in others and generally hindering output in all sectors of the economy. The Economic Stabilization Board noted:

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[107] Source is *Second Economic White Paper*, Economic Stabilization Board, Tokyo, May 23, 1948. See also "Inaccurate Agricultural Statistics," by Kita. Izumi. in *Nogyo To Keizai*, Tokyo, October 1948.

[108] Legitimate business, that is, apart from the dealings of the narikin and oyabun (new yen millionaires and labor contractors). Immediately after surrender, large stocks of military clothing and food. war plant materials, etc. disappeared. In the words of an editorial in *Tokyo Minpo* (March 18, 1948): "It is a well known fact that the great bulk of army materials, illegally appropriated by professional army personnel, bureaucrats, capitalists and political party bosses and then channeled into the hands of black-market brokers, have constituted the fundamental factor for the current rampant inflation. The so-called 'Seko' Case, the Osaka Army Arsenal Case, and other scandalous incidents occurring at various war plants are enough to make us shudder at the political implications of these cases. The tremendous scale on which these illegal disposals were made is unbelievable." A steady series of hoards have come to light. See *Summation of Non-Military Activities in Japan*, SCAP-GHQ, Vol. No. 30, Tokyo, March 1948, p. 35; also Vol. No. 33, June, 1948, pp. 33-36. Testimony in the Sekine. Nishio, Tsuji and Showa Denko cases appears to tie the narikin and oyabun very closely to the financing of political parties in contemporary Japan.

[109] And there is fear in Japan that it will also be the chief victim of a "stabilization panic" if and when financial reorganization and stabilization are achieved. The *Japan Economic Weekly* headlined a leading story, "Tighter Money to Bring a Depression in Autumn" (Vol. 2, No. 40, July 8, 1948), while the *Tokyo Times* declared: "One of the most serious industrial problems is financial difficulty due to inflation. . . . Governor Ichimada of the Bank of Japan disclosed that the deficit loans would be abolished hereafter and that efforts would be made to eliminate the causes of deficits. However, if deficit loans are abolished, our industry will, no doubt, break down before it is revived." "Price Increase and Its Influence", July 6, 1948.

Due to insufficient accumulation of funds through savings and also to loss of credit and inadequate working capital on the part of enterprises through increasing deficits and debts, enterprises are seriously suffering from a shortage of money. The shortage of money has gradually become conspicuous with the development of inflation. . . . Inasmuch as the current tightness of money has been brought about by inflation, the reckless creation of credit through loosening of financial control will undoubtedly lead to the acceleration of eventual inflation and to still tighter condition of money in the following stage. By raising the valuation of assets, inflation has so far saved many enterprises which otherwise would have gone bankrupt after the surrender. It is noteworthy, however, that since last year the same inflation has become an unavoidable and serious obstacle to the management of enterprises.[110]

The basic difficulty has been that the level of official prices has been consistently out of line with constantly rising costs and that as a consequence available working capital lags behind in sufficiency to meet a given volume of industrial activity, which for the same output over successive periods requires a larger and larger cash outlay. Either the resulting deficits must be financed directly by the government or its affiliated financial agencies, which only augments the inflation, or output suffers. The coal industry is a good example of the former. The official price of coal was raised to 956 yen per metric ton on July 5, 1947. At the time labor costs were estimated to be 579 yen per ton, but under the new wage contract signed that month they rose to 1,158 per ton. By the end of 1947 total production cost had risen to 1,617 yen per ton. By March 1948 it was estimated that costs reached 2,057 yen. A new contract signed in April gave coal miners a monthly wage in excess of 5,000 yen (compared to 2,549 per month in July 1947) and the mining companies could only produce coal thereafter at a loss of about 1,800 yen per ton. As a result, in July 1948 the legal price had to be raised to 2,388 yen.

This disparity between actual costs and official selling prices had, of course, to be made up by the government if coal was to be mined. The Japanese Coal Board had estimated that during fiscal 1947 it required 22 billion yen in loans and subsidies to carry the industry. The Reconstruction Finance Bank "loaned" 13.6 billion yen and direct government subsidies per ton provided the remainder.

Examples could be multiplied.[111] In hides and leather the cost price for purchasing and tanning one hide amounted, in the spring of 1948, to 2,700

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[110] Quoted in *Summation of Non-Military Activities in Japan*, Vol. 32, SCAP-GHQ, Tokyo, May 1948, p. 69.

[111] See, for example, "Enterprises in Financial Difficulties. Bank of Japan Survey Reveals," *Mainichi*, June 21, 1948, and "Price Revision Blow to Management," *Nihon Keizai*, June 28, 1948. The latter declares: "When it published the new price structure last July, the government stated: 'Japan's economy is at the crossroads leading either to economic stabilization or to complete destruction.' One year has elapsed, and now

yen, resulting in a deficit of some 600 yen when the leather was sold at the official price. In the case of a 3,750-ton steamer plying between Muroran and Keihin (Tokyo-Yokohama area), carrying 3,150 tons of coal and operating eighteen days a month on nine months a year, the per-ton transportation costs were 324 yen, or 2.19 times the current official allowable transportation charge of 148 yen. The government decided on June 15, 1948, to grant chemical fertilizer interests a loan of 535 million yen from the Reconstruction Finance Bank to help cover deficits resulting from producing ammonium sulphate and nitro-lime at 1,000 yen per ton losses.[112] In electric power generation, rates prevailing during the first half of 1948 were predicated on a total labor cost for the industry of 466 million yen per month. A new contract effective in April 1948 raised total labor costs to approximately 1.3 billion yen per month, so that prevailing rates (yielding a revenue of 987 million yen per month) were not sufficient to cover the wage bill alone. As a result, the government had to "lend" the industry, via the Reconstruction Finance Bank, over one billion yen.

Obviously, the monetization of business-operating deficits by the government has contributed greatly to inflation. The primary tool of the government in its efforts to meet the constantly growing financial needs of industry has been the Reconstruction Finance Bank. This institution, which was established in October 1946 but actually began operations in January 1947, had as its original purpose financing Japanese industry's requirements for new and replacement capital goods. It has, however, more and more been diverting funds to meet the ever-increasing working capital needs of Japanese business as operating deficits grow larger with the inflationary distortion of costs. The outstanding loans of the Bank increased from 4.1 billion yen in January 1947 to 81.7 billion yen as of July 1948. Of the latter figure, 57 percent were classified as working capital loans and 43 percent as equipment loans. Over the same period its original capital of 10 billion yen has been increased to 135 billion. Some 78 percent of the Bank's funds have been supplied by Bank of Japan purchases of its securities or loans, with most of the remainder coming directly from the government.

Thus the Bank has become a prime vehicle of inflation and its outstanding loans are a kind of side-pocket government deficit. The Bank has been the object of criticism from many quarters. Kogyo declared:

It is undeniable that the RFB loans made possible the maintenance of many industries which were suffering from huge deficits. We cannot overlook, however, that the amount of loans has become so enormous that it is

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the government has announced another price revision. Yet, Japan's economy is still at the crossroads. General circumstances, however, are more critical than last year."

[112] See *Asahi Shimbun*, Tokyo, June 16, 1948. The mounting inflation made the cost of new and replacement equipment a severe burden upon the capital of enterprises For example, the cost of a 44-inch cotton loom rose from 533 yen in 1934-36 to 35,000 yen in July 1947 and then to 58,300 yen in August 1948.

largely responsible for the increase of note issue and aggravation of inflation.[113]

Nihon Keizai states:

Present indications are that the government spending inflation at the end of last year has now been diverted to a Reconstruction Bank inflation, necessitating a large-scale increase of capital of the Bank.... With the tremendous total of funds issued exceeding that of all other financial institutions since last July, it has distinctly betrayed its real character as a secondary note issuing bank.... The Reconstruction Finance Bank inflation is by no means different from finance (government) inflation in its nature. Moreover, when appropriations from the Reconstruction Finance Bank are being planned, there is a tendency for all Ministries to make a rush for above limit appropriations. This is the principal cause of the irresponsible issue of funds by the Bank.[114]

While the Bank's working capital loans have been held to be inflationary, its capital expansion loans have been criticized on the ground that in most instances they went to industries in which there was considerable unused capacity and therefore added unnecessarily to the demand for scarce materials such as steel, cement, etc. Also the Bank's loans to the Kodans (new public distribution corporations which replaced the control associations) have been criticized as excessive, permitting the Kodans to build up wholly unnecessary inventories.[115] Finally, it has been charged that political rather than sound economic considerations guided the Bank in a number of its loans. An example is the three billion yen loan to Showa Denko, which ultimately led to the resignation of Kurusu, the Chief of the Economic Stabilization Board and to the resignation and subsequent arrest of Prime Minister Ashida.

On July 12, 1948, the government issued its "Immediate Measures for Industrial Loans in Relation to the Revision of Prices," in which it was stated that deficit-covering loans would no longer be granted and that the RFB was to confine itself to equipment loans only. At the same time, however, it was proposed to increase the RFB's capital by an additional 45 billion yen. As long as business deficits continue, however, there is little reason to suppose that the RFB will not continue to be used as it has in the past. As long as government policy forces enterprises to maintain full employment by keeping workers on the rolls even though they are not needed, and the

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[113] "Effective Use of RFB Loans," *Kogyo*, Tokyo, June 8, 1948. See also "R.F.B. Reform," *Oriental Economist*, Tokyo, October 30, 1948, p. 912; and "Industrial Finance in Inflationary Period," *Monthly Circular*, Mitsubishi Economic Research Institute, Tokyo, Nos. 221-22, April-May 1948.

[114] "Inflation Shifting from Government Finance to Rehabilitation Bank," *Nihon Keizai*, January 7, 1948; also *ibid.*, January 19, 1948. See also "Reconstruction Finance Bank Loans and Efficacy of Funds," in *Asahi Shimbun*, June 18, 1948, and "Role of the Reconstruction Finance Bank," *Jimmin*, Tokyo, February 7, 1948.

[115] "Kodan Management," *Oriental Economist*, September 4, 1948, pp. 726-30.

official price-control system provides for this in the cost analysis upon which price ceilings are presumably based, so that the government is not saddled with a costly and difficult unemployment problem, the government is likely to provide the funds business requires, because to do otherwise would result in a politically unfeasible growth of unemployment. Business deficits will continue as long as low output makes unit costs high and until the present inadequate allocation system is improved to the point where it is no longer necessary for enterprises to procure a considerable portion of needed raw materials in the black market.[116] Since increasing costs prevent firms from repaying their debts to the Reconstruction Finance Bank, the RFB loans from the Bank of Japan remain outstanding.[117] Consequently inflationary costs cause working capital loans to be monetized by the Bank of Japan, and more and more money is thereby drawn into circulation and never retired.[118] Thus inflation begets inflation.

Production

Despite the lack of any volume of imported industrial raw materials, and in the face of the mounting inflation, there has been a slow revival of industrial activity. On an over-all basis, production in Japan by the end of the

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[116] "According to the report on the administrative inspection conducted by the Economic Stabilization Board on certain materials, the government offices concerned were found busily occupied mainly with such procedural business as issuing of allocation certificates, having little time to make a fundamental and scientific study to improve the present allocation system. . . . As order in distribution has not been sufficiently established, a considerable part of the materials required had to be purchased through the black market. It should be reflected that this is due largely to the lack of skill and inefficiency of government officials concerned." Second Economic White Paper, Tokyo, May 23, 1948.

[117] The Bank of Japan held 51.4 billion yen of RFB bonds, as of June 30, 1948, compared to its holdings of 77.8 billion of direct Government bonds.

[118] With the growth of inflation and the restrictions imposed on legitimate commercial bank lending, a brisk business in black-market loans developed. The *Tokyo Times* declares: "The majority of small and medium enterprisers are known to be tiding over financial difficulties with black-market loans. Funds of from 500 million to one billion yen are circulating in this way in Tokyo alone, and there are indications that they will increase. The lenders include black-market dealers, commercial companies, and foreigners who have accumulated funds in the post-war economic chaos. In many cases, bargains are made between bank clerks and acquaintances. Some local banks are making large profits through back-door dealings. "Black Market Loan Sharks Active," *Tokyo Times*, July 8, 1948.

Another source notes: "A spectacular stage in black-market financing is unfolding. Because of sharp rises in commodity prices, the so-called ten-ten interest, 10 percent every ten days, has recently jumped to 10 percent for four or five days, spurring the advance of inflation and throwing the money market into confusion . . . the majority of black-market funds now flowing into the city are said to be coming from legitimate financial institutions, rather than from wildcat banks." "Blackmarket Interest Rates Climb," *Asahi*, July 16, 1948.

first half of 1948 had risen to 52 percent of the 1930-34 level. Mining was 99 percent of base-period output, whereas manufacturing was only 45 percent. Measuring and interpreting physical output from the 1930-34 base period, as SCAP statisticians do, involve two serious limitations.[119] In the base period the population of Japan proper was 66 million.[120] Today it is 80 million. While one of the objectives of the occupation now is to regain for the Japanese people the standard of living prevailing in the 1930-34 period, this must, of course, mean more than comparable physical output. Merely to achieve the 1930-34 level of output would not restore the Japanese to their level of living in that period, since on a per-capita basis they would be producing and consuming less. It has been estimated that a level of 130 percent of 1930-34 output is necessary to achieve an equivalent standard of living.[121]

Secondly, comparing current with base-period output ignores the relative over- and underdevelopment of specific industries and gives an erroneous impression of the relative recovery in certain fields. For example, in Table 77, the column which compares 1948 monthly output with 1930-34 production gives the impression of considerably better recovery in rayon, iron and steel, than in cotton and silk. However, by the end of the base period, cotton and silk had almost reached the peak of their expansion in the Japanese economy, whereas the peak in rayon output came later and, with Japanese planners in the late thirties stressing the expansion of the heavy industries, the peak of iron and steel output was not reached until the early 1940's. Therefore, a more realistic view of the extent of industrial recovery in Japan is achieved by comparing 1948 output with the peaks achieved in each field. When this is done (see last column of Table 77), it is apparent that the revival in iron and steel has been as limited as in cotton and silk and that the least progress has been made in rayon.

Perhaps the most extreme example illustrating that it would be better to place main reliance upon an examination of production trends in each of the more important industries, rather than upon SCAP's overall index of indus-

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[119] On a composite basis this SCAP index is of little value in relating postwar to wartime levels of output because, although it is computed for each of the war years, it does not cover such components as aircraft, shipbuilding, ordnance, etc. Thus, although the index runs as follows: 1940 = 195.3, 1941 = 201.5, 1942 = 192.7, 1943 = 180.9, 1944 = 154.8, 1945 = 61.5, 1946 = 32.5, 1947 = 40.9, and June 1948 = 52.7, it is hazardous to attempt to compare, say, 1947 with 1944 since the 1944 index figure does not reflect the real level of industrial activity in Japan.

[120] See *Annual Changes in Population of Japan Proper*, Oct. 1, 1920-Oct. 1, 1947, Research and Programs Division, ESS-SCAP, Tokyo, July 1948.

[121] In the target period, 1952-53, by which it is hoped to attain this level, population of Japan will be 25 percent higher than in 1930-34. Furthermore, since imports are no longer obtained cheaply from colonial areas, it is estimated that at least five percent more export goods will have to be produced and shipped to obtain the same volume of imports as in the base period.

TABLE 77

KEY PRODUCTION TRENDS, JAPAN, 1930-1948

(monthly averages)

Commodity	*1930-34 Average*	*Peak Year*	*1945*	*1946*	*1947*	*1st half 1948*	*1948 as % of 1930-34*	*1948 as % of Peak Year*
Coal (1000 m.t.)	2,597	4,777 ('40)	1,864	1,608	2,270	2,746	105	57
Pig Iron (1000 m.t.)	106	355 ('42)	80	17	30	49	46	13
Ingot Steel (1000 m.t.)	227	652 ('43)	174	46	78	110	48	16
Raw Silk (bales of 132 lbs.)	59,840	62,838 ('34)	7,768	7,452	9,202	9,391	15	14
Cotton Yarn (1000 lbs.)	96,497	132,207 ('37)	4,318	10,765	22,433	23,145	23	17
Cotton Fabric (1000 sq. yds.)	225,336	402,167 ('37)	4,783	20,142	55,102	71,101	31	17
Rayon Yarn and Staple (1000 lbs.)	6,888	45,092 ('38)	2,293	2,471	3,037	5,029	73	11
Chemical Fertilizer (1000 m.t.)	136	245 ('40)	26	65	133	165	121	67
Machine Tools (units)	1,026	5,607 ('38)	609	399	478	453	44	8
Cement (1000 m.t.)	308	504 ('40)	98	77	103	133	43	26
Electric Power (million kwh.)	1,463	3,222 ('44)	3,025	2 386	2,704	2,689	183	83
Refined Petroleum Products (kiloliters)	118,412	212,865 ('43)	23,755	18 076	13,780	15,020	13	7

Source: *Japanese Economic Statistics*, Bulletin No. 23, Research and Programs Division, SCAP-GHQ, Tokyo, July 1948.

trial output, may be seen in the way in which the output of trucks is reflected in official index numbers. The index of truck output, which is one of the components of the index of industrial production, on the 1930-34 base (= 100) stood at 2,038 in June 1948. The average number of trucks produced monthly over the 1930-34 period was 62, in 1941, 3,577 were produced monthly, while output in June 1948 was 1,260. Reflecting current output as a large gain over a base period in which the industry was virtually nonexistent (had not yet been developed) can only serve to mislead. Truck output is about half of what plant capacity currently available to the Japanese could turn out, were materials available. It would be well therefore to examine production trends in major industrial sectors.

Coal

On the assumption that increased coal output is basic to industrial recovery, both SCAP and the Japanese government have exerted considerable effort to induce more vigorous mining activity. Various stimulants such as subsidies, higher wages, better rations, increased allocations of essential materials, etc. have been administered.[122] In November 1945, with Korean, Chinese and POW labor no longer available, output fell to 500,000 tons for the month, less than the amount required to run the railroads. Thereafter, both production and employment rose slowly. Between 1946 and 1947 employment rose from 314,397 to 408,071 while output increased from 20.3 million tons in 1946 to 27.2 million tons in 1947. A goal of 30 million tons (compared to peak output of 57 million metric tons in 1940) had been set for 1947-48. Despite failure to realize this target, the goal for 1948-49 was raised to 36 million metric tons. Monthly output reached a peak of 2.9 million tons in December 1947, and then fell during the first half of 1948. Output for the first quarter of fiscal 1948 was some 600,000 tons behind planned output,[123] and thus it does not appear likely that the goal for the year will be attained. Employment has continued to rise and stood at 476,231 at mid-year. However, the ratio of underground workers to total employed

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[122] The enormous sums in subsidies and "loans," which the Government found necessary to grant the industry, resulted not only from the distorted cost-official price relationship but were also the consequence of the stagnation of the capital market and the apathy and disorganization of management. The biggest mines in the country had been owned by the Zaibatsu. Of the 11 mines which produced more than one million tons of coal per annum, Mitsui and Mitsubishi owned seven. Of the 18 mines which produced between 500,000 and 1,000,000 tons, they owned 12. Other Zaibatsu—Furukawa (Furukawa Mining Co.), Sumitomo (Seika Mining Co.), Nissan (Nihon Sekitan), and Okura-Asano (Joban Coal Mining Co.)—also had large holdings in the industry. See "Japanese Coal Mining Industry and Coal Problems," in *Survey of Economic Conditions in Japan*, Nos. 216-217, Mitsubishi Economic Research Institute, Tokyo, Nov.-Dec. 1947, p. 12.

[123] See "First Quarter Coal Figures Released," *Nihon Keizai*, July 7, 1948. See also "Coal Slump Branded Government Sabotage," *Tokyo Mimpo*, May 8, 1948.

was abnormally low at 52 percent compared to a 1930-40 average of 72 percent, while output per employee per month averaged only 5.8 metric tons compared to 16.43 tons in the 1930-40 period. Obviously, while the various incentives have raised productivity slightly from the 1945 low (4.7 metric tons), there is large ground for improvement.

The 36 million metric ton fiscal 1948 target represents SCAP's estimate of Japan's minimum requirement for an operating economy.[124] If we compute net supply (production plus imports minus exports) for the present year on a per-capita basis in the light of the comparable base period, 1930-34, figure, the result is interesting. Assuming output in 1948 (fiscal) will reach 35 million metric tons and that imports balance exports (a favorable assumption since in 1947 exports amounted to 735,000 tons while imports were only 33,000 tons), on the basis of an 80 million population, Japan's net supply will be 0.43 tons per capita, compared to 0.49 tons per capita in the 1930-34 base period.[125] This is a much more realistic view than the SCAP index which shows output currently running at 110 percent of the 1930-34 level. Furthermore there are other factors to be considered. Whereas in 1937, for example, 50 percent of the coal went for manufacturing uses, in 1947 only 34.5 percent, and over the first half of 1948, 36.5 percent, were so used. Thus coal was being utilized less effectively. For example, the railroads consumed 25.3 percent of 1947 coal supply, or 6,768,000 tons, to carry a slightly smaller transportation volume than they did in 1937 using only 4,128,000 tons of coal, or 7.8 percent of total coal consumed. During 1947 the occupation forces used 5 percent and during the first six months of 1948, 4 percent of the coal consumed compared to only 3 percent in 1946. Revival in the textile industry has been hindered in part because in 1947 it obtained only 2.5 and during the first half of 1948, 3 percent of coal consumed, compared to 13 percent in 1937, of a much larger total consumption.[126]

Perhaps more serious even than the slow increase of domestic coal output, despite enormous government subsidies and "loans," is the import situation. Cut off from war and prewar sources such as North China, Manchuria and Sakhalin, by political circumstances, Japan imported only 33,000 tons of coal in 1947 compared to imports of 3.6 million metric tons in the

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[124] *Newsletter*, Industrial Division, Economic and Scientific Section, SCAP-GHQ, Tokyo, Vol. 2, No. 13, March 24-30, 1948.

[125] The comparable figure for fiscal 1947 was 0.34 tons per capita. Thus per-capita net supply of coal in fiscal 1947 was only about 60 percent of the average per-capita net supply in 1930-34. Furthermore, it should be noted that relatively larger amounts of coal are now required for all purposes because the quality of the coal mined since the end of the war has deteriorated when compared with the caloric content of the coal of the prewar period.

[126] See *Japanese Economic Statistics*, Research and Programs Division, SCAP-GHQ, Bulletin No. 23, Tokyo, July 1948, pp. 16-18.

1930-34 period and 5.3 million tons in 1937. Since these imports were largely high-grade coking coal and true anthracite, which Japan does not possess, lack of imports at present, particularly of coking coal, are more of an obstacle to iron and steel production recovery than the volume involved would seem to indicate. While some coking coal is currently being obtained from the U.S. and Canada, the volume is small and the price higher. Furthermore, it results in a greater dollar deficit.

Impatient at the Japanese government's fumbling of the coal situation, General MacArthur, in a letter on September 18, 1947, prodded the government to take more energetic and effective steps to increase coal output.[127] As a result, despite adverse Committee reports in both Houses of the Diet, the Emergency Coal Industry Control Law (Rinji Sekitan Kogyo Kanri Ho) [128] was promulgated in December 1947 to go into effect on April 1, 1948. Originally a Socialist Party measure providing for the nationalization of the mines, the bill as passed was a watered-down version granting the government general powers of supervision, planning, financing, and control of the industry. The Law establishes an All-Japan Coal Mine Control Committee; four regional Coal Bureaus; four local Coal Mine Control Committees; and a Controller and a Production Council in each of the mines that have been designated by the Minister of Commerce and Industry for special government supervision. Management, labor, consumers and technicians are represented on the national and local coal mine control committees, and management and labor are represented on the production councils. Initially 42 large mines were designated for supervision. Reminding one much of the Munitions Company Act of 1944, the Act is ambiguous and rests wide discretionary powers in the Minister of Commerce and Industry. In May, one Tokyo newspaper demanded that Commerce Minister Mizutani "show the same enthusiasm in promoting future enforcement of the law as was shown during deliberations on it in the Diet." In June, *Nihon Keizai* titled an article "Increased Coal Output Under State Control Doubtful" and declared:

The argument has been advanced that it is too much to expect considerable success when state supervision has only just begun to take effect. However, the Government should have been able to make fuller preparations during the time between the passing of the bill in the Diet and its enforcement. Seeing that the Government took almost no preliminary actions during the period, we may perhaps conclude that Government agencies and bureaucrats are solely given to making laws and fabricating systems, leaving the rest to

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[127] *Coal Production and the Price Structure*. Publications Analysis No. 175, SCAP-GHQ, Analysis and Research Division, Tokyo, June 3, 1948.

[128] Law No. 219, December 20, 1947. See "Japan's Economic Rehabilitation Problem No. 1—Coal Mining." *Nippon Times Monthly Journal of Commerce and Industry*, Vol. 1, No. 1, Tokyo, August 15, 1948, pp. 22-27.

be solved as it comes up. Indeed, the Emergency State Coal Control Law is a mere half-way measure, which, however, does not excuse the incompetence of its implementation.[129]

Effectiveness of subsequent enforcement will determine the significance of the statute and it is as yet too early to pass judgment.

Iron and Steel

While the debate over the ultimate stabilization and retention level to be set for the Japanese iron and steel industry has continued unceasingly, output over the past three years has failed to reach even the very lowest levels suggested, and a large amount of capacity lies in deteriorating idleness. The shortage of domestic coal and the dearth of essential imported raw materials, such as coking coal, iron ore, etc., have held output to low levels. Coal consumption by the iron and steel industry, for example, averaged only 8.5 percent of total coal consumption during the first half of 1948, compared to 12 percent in 1935 (the earliest year for which an accurate breakdown is available), and 23 percent in 1943, the year of peak steel output. Average monthly consumption during the first half of 1948 was 243,000 metric tons compared to 438,000 in 1935 and 1,138,000 in 1943. In June 1947 the regular use of imported heavy oil was begun, to power steel production, but the electric power shortage which developed after August offset this favorable factor. Furthermore, the expected importation of coking coal from North China was not realized. Coal and coke imports combined averaged 303,000 metric tons monthly during the period 1930-34. There were no imports from the end of the war until July 1947. In the year from July 1947 through June 1948, imports averaged 16,403 metric tons monthly. There were no iron ore imports from the end of the war until February 1948. For the first half of 1948 iron ore imports averaged 15,567 metric tons monthly compared to 161,000 tons monthly in the 1930-34 period.

The consensus of current published opinion on the reparation problem seems to set an annual output of 3.5 million tons of ingot steel, a little less than half of current capacity, as the probable retention level for Japan.[130] Output in 1947 totaled only 936,000 metric tons. The 1948 rate, based on output during the first half of the year, is 1.3 million metric tons. This compares with an output of 2.7 million tons in 1930-34. Thus it is apparent that it will be several years at least before output reaches the probable capacity retention level. The Japanese Economic Stabilization Board has,

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[129] "What about State Supervision of Coal Mining?" *Nihon Keizai*, Tokyo, April 28, 1948, and "Increased Coal Output under State Control Doubtful," *ibid.*, June 13, 1948. The *Oriental Economist* was equally critical when the bill was before the Diet. See "Coal Mining Control." *Oriental Economist*, Tokyo, October 18, 1947. On September 3, 1948, *Nihon Keizai* reported "Coal Administration Faces Early Showdown."

[130] This is a recent figure. The final Pauley report recommended only 2,250,000 metric tons of retained capacity.

in its Five Year Recovery Plan, set a target of 3,840,000 tons (141 percent of the base period) for the 1952 fiscal year. Output of both pig iron and ingot steel may be seen in the following tabulation.

PIG IRON AND INGOT STEEL OUTPUT, JAPAN, 1930-1948
(in thousands of metric tons)

	Pig Iron	*Ingot Steel*
1930-34 av.	1,272	2,724
Peak	4,306 (1942)	7,821 (1943)
1946	204	552
1947	360	936
1948*	588	1,320

* Annual rate based on first six months output.
Source: *Japanese Economic Statistics*, Bulletin No. 23, p. 20.

It is estimated that 3.5 million metric tons of ingot steel will yield 2.7 million tons of rolled steel. Output in 1947 was but 20 percent of this level, and even should the Economic Stabilization Board's goal for fiscal 1948 be attained, it would be only 34 percent of the probable permissible level.[131] A further indication of the degree to which the Japanese steel industry has been whittled down to size may be had from per-capita consumption figures. In 1930-34, per-capita consumption of finished steel was 35 kilograms; in 1947 the figure was 10 kilograms, or 28 percent of the base period. In 1937 Japan produced 80 kilograms (176 pounds) of steel per capita, compared to 400 kilograms (880 pounds) in the U.S. Thus Japan's per-capita output in 1937 was 20 percent of the U.S. figure. Japan's production of 10 kilograms (22 pounds) per person in 1947 compared to 530 kilograms (1,166 pounds) in the United States, or 2 percent of U.S. per-capita output.

One Japanese commentator, analyzing such figures, observed: "The future of Japan's iron and steel industry is not very promising."[132]

Electric Power

The most favorable recovery record of any major industry is that of electric power. As Table 77 indicates, power output during the first half of 1948 was running at a rate 83 percent higher than in the base period, 1930-34, and was almost back to wartime levels.[133] With only insignificant war

[131] See "Iron and Steel," *Oriental Economist*, February 7, 1948, pp. 89-90.

[132] "The Iron and Steel Industry," by Chikui, Takehito, in the *Oriental Economist*, January 10, 1948. See also "Japan's Economic Rehabilitation Problem No. 2—Iron and Steel," *Nippon Times Monthly Journal of Finance and Commerce*, Vol. 1, No. 2, Tokyo, Sept. 15, 1948, pp. 24-31. It has been reported that the Japanese have been deliberately producing steel of a grade slightly below export standard in order to maximize retention for home consumption. See "Steel—For Export or Home Use?", *Nihon Keizai*, Tokyo, August 27, 1948.

[133] Hydro-electric generation is running ahead of wartime levels, while thermal output, due to the short coal supply, has lagged behind.

damage, dependent mainly upon rainfall as the principal raw material and confronted by a sharply rising demand as an alternative to coal, total power output generated rose from 28.6 billion kwh. in 1946 to 32.4 billion kwh. in 1947 and was expected to be about 50 percent higher in 1948. Nevertheless supply was not adequate to meet the demand. With the virtual collapse of coal output in the year after the war, demand was concentrated upon power. For example, from the end of the war until August 1947, more steel was produced in electric furnaces than in open-hearth furnaces.[134] Abnormally dry weather starting in August 1947, especially in Chugoku, Shikoku and Kyushu, where rainfall was only half of average yearly rainfall, brought a sharp drop in power output which lasted until March 1948. In the face of this, as the Economic Stabilization Board, in its Second Economic White Paper, noted:

Demand for electric power increased because of tremendous increase of demand for heating use in households and factories as a substitute for coal, after the war, increase of loss caused by the deteriorated conditions of equipment, and increase of illegal consumption as a result of meter shortage. Restriction of power consumption was also not so successful as expected. Consequently balance of demand and supply electric power was entirely broken, causing frequent emergency power stoppage and serious power shortage for both household and factory use. . . . When we consider the expected further increase in power requirements following the advancement of industrial production in general, the prospects in the supply and demand situation of electric power are not bright.

Thus the paradox of continued complaints in the Japanese press of power shortages, in the face of high power generation, is explainable by the greatly increased demand, and by the fact that since generation over the past three years has been almost entirely hydro, not thermal, output in recurring dry seasons and in abnormal drought periods falls to an industrially restrictive low.

Chemical Fertilizers

The quantity of chemical fertilizers distributed for rice planting per tan (one tan equals one-fourth of an acre) in 1947, rose to 4.3 kan (one kan equals 8.27 pounds), in terms of ammonium sulphate, or more than twice that of 1946, which amounted to two kan per tan. A further increase to five kan is anticipated when the final figures are in for 1948.[135] Yet supply is still not adequate to meet current requirements.

As the key to food production, chemical fertilizer has been awarded a high priority and heavy subsidies since the termination of the war. Also, as

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[134] See "Japanese Economic Statistics," Research and Programs Division, SCAP-GHQ, Bulletin No. 23, July 1948, Tokyo, p. 21.

[135] Fertilizer is now distributed in accordance with farm deliveries of food. For details, see "New Link System for Fertilizer," *Asahi Shimbun*, Tokyo, April 20, 1948.

Japan has all the necessary raw materials and sufficient plant capacity to meet its requirements for commercial nitrogenous fertilizers solely from domestic production, it was to be expected that recovery would be more rapid here than in other fields. While calcium superphosphate, the other major chemical fertilizer, is dependent upon imported phosphate rock, the high priority assigned to this item by SCAP and its relative abundance on islands not far from Japan resulted in imports being increased from a monthly average of 14,120 metric tons in 1946, to 90,648 tons in 1947. The latter figure was double the level of average monthly imports during the 1930-34 period.

As the previous survey of the chemical industry in wartime revealed (see Chapter 31), fertilizer output had been sacrificed for war chemicals. In the post-war period the process was reversed. After surrender the government converted former army and navy fuel plants, methanol, butanol, synthetic oil, etc. to the output of such nitrogenous fertilizers as ammonium sulphate, calcium cyanamide, etc. The goal set for fiscal 1947 was 1.8 million tons. While this was not achieved there was a significant increase in capacity and output. With a 871,620 ton goal for ammonium sulphate for 1947, output actually totaled 720,984, or 83 percent of plan. The ammonium sulphate goal for 1948 was set at 1,240,000 metric tons.[136] Output, at the first half of 1948 rate, would total 900,000 metric tons for fiscal 1948. Current Japanese thinking sets 1950 as the year for achieving domestic requirements, and by 1952 an exportable surplus for sale to other Far Eastern countries is anticipated.

Food

Japan's average food consumption during the period 1930-34 supplied 2,242 calories and 67 grams of protein per capita per day. Approximately 80 percent of these calories came from domestic output. Estimates, of a comparable nature, vary for the post-war period, but there is sufficient general agreement to indicate the trend. In May 1946 it was reported that caloric consumption in Tokyo was 1,352 per capita per day, while in the rural prefectures it was 2,022. In August 1947 the same nutritional survey indicated that caloric consumption had risen to 1,704 in Tokyo and stood at 2,041 for rural prefectures.[137] It would appear that on the average 1947 food consumption in Japan supplied about 80 percent of the caloric intake of the 1930-34 base period.[138] Further improvement has been noted in 1948.

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[136] See *Oriental Economist*, January 10, 1948. pp. 16-18. For earlier discussions see *ibid.*, March 2, 1946. pp. 124-26; February 1, 1947. p. 77; and August 16, 1947, pp. 659-60. Also "Fertilizer Industry Revises Production Policy." *Nihon Keizai*, Tokyo, October 12, 1948.

[137] "Results of Nutrition Surveys in Japan," in *1948 Annual Report for Japan to Food and Agriculture Organization, op. cit.* p. 33.

[138] SCAP has estimated 1946-47 food consumption at 1,490 calories per capita daily for the non-farm consumer and 2,100 calories for the farm consumer, or a national average of 1,765. This would be 79 percent of the 1930-34 average.

The February 1948 nutritional survey showed a 1,929 per-capita caloric consumption in Tokyo and 2,018 in the rural areas. It is probable that the figure for the rural prefectures is an underestimate by at least 200 calories.

Because of the questionable nature of the officially reported figures on rice and other crop production, due to the underreporting of acreage and yield and the large drain to the black market, there is little value in analyzing per-capita output in the post-war as compared to the base-target period. The accuracy of any such analysis would be open to objection. It is quite clear, however, that even with the bumper crops of the past three years, Japan's food situation was saved from chaos only by SCAP imports of American grains. SCAP's objective has been to prevent "disease and unrest" and its imports took the place of the rice and soy beans which Japan formerly obtained from subjugated areas. Although Korea supplied Japan with over a million metric tons of rice annually before the war, and with 20 to 25 percent of her soy bean imports, such shipments were largely at the expense of adequate nutrition of the Korean people. Furthermore, Korea had to import minor grains to offset the rice exports. The population of Korea has risen to the extent that its domestic food production is not now large enough to meet its own requirements. Thus it can no longer serve as a source of supply for Japan. Nor can Formosa, whose rice and sugar, formerly diverted to Japan, are now flowing mainly to China. It will be recalled (see Chapter 6) that Manchuria supplied the greatest part of Japan's considerable imports of soy beans. The post-war economic chaos in Manchuria has virtually stopped this flow. Thus U.S. grain imports have in the post-war period come to replace the traditional sources of Japanese food imports. Nor can the gap be closed by the expansion of domestic output and the gradual elimination of imports. The limited arable land area and the expanding Japanese population combine as factors to make this hope pure wishful thinking on the part of the Japanese.[139]

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[139] There has been some discussion in the Japanese press of converting land used for non-food (industrial crops) to food production. During 1930-34 the area devoted to industrial crops averaged slightly more than 750,000 hectares, or about 12 percent of the total area then under cultivation. In 1947 the area in industrial crops was estimated at 335,000 hectares, or 5 percent of the total cultivated land. To reduce this further could only be at the expense of mulberry acreage and since the proceeds from an acre of mulberries can buy several times the volume of food that can be grown on the same area, even at present low silk prices, the proposal is not sound. See *Outlook for Japanese Agriculture, op. cit.* pp. 11-12.

Another approach has been the Japanese government's 15-year plan for the reclamation of 1,650,000 hectares (4,090,000 acres) beginning in 1945. Even assuming the successful completion of the plan by 1960, which is doubtful, the estimated grand total output, in terms of calories, would be 55,304 billion. The requirements of 92 million people, consuming the average base period caloric intake, are 72,532 billion. Hence an estimated deficit of 17,228 billion, or 25 percent of the food intake of Japan in 1960, can be expected.

Whereas the Japanese would have preferred rice imports[140] by SCAP over the past three years, the U.S. has been sending grains, as the following table showing selected food commodity imports indicates.

TABLE 78

SELECTED FOOD COMMODITY IMPORTS

(in metric tons)

Period (Monthly Averages)	*Rice*	*Wheat*	*Wheat Flour*	*Corn*	*Legumes*	*Sugar*
1930-34	142,000	49,600	506	3,568	69,400	71,200
1936	163,519	26,165	1,881	25,958	76,455	87,651
1946	1,309	38,551	8,233	7,405	153	123
1947	225	67,495	19,031	34,661	7,068	3,496
1948*	7	60,300	2,865	0	7,600	45,100

* Monthly average for first six months of year.

Source: *Japanese Economic Statistics,* Bulletin No. 23. SCAP-GHQ. Tokyo, July 1948, p. 48.

It has been estimated that food imports in 1947 to the extent of two million metric tons were required.[141] The Economic Stabilization Board in its five-year recovery plan estimated that, if four million metric tons of food imports are permitted in 1952, it will be possible to raise average per-capita food intake to 2,111 calories per day in 1952, almost the 1930-34 level. United States estimates of Japanese import requirements vary. The Overseas Consultants' Report concluded that Japan would require twelve million metric tons in 1953. The United States Government estimates fall between the OCI and the Japanese figures. But regardless of whose estimate is accurate, it is quite apparent that the basic problem of Japanese food production and supply is not domestic output, but rather how Japan is to finance the necessary volume of required food imports.

Textiles

The uncertainty over the reparations question and the early reluctance to encourage the rebuilding of industries which might aid future aggression led SCAP to concentrate on the revival of textiles, as the one "safe" industry whose products would be in demand in foreign markets and yield an export surplus, over and above the cost of raw materials, to pay for the large and costly food imports. A variety of measures were therefore adopted to increase output in the various textile branches, though the immediate benefits of increased production were not to be made directly available to the Japanese people, since exports had to be stimulated at all costs. As we shall see, textiles have been Japan's leading export in the last three years

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[140] See "Importation of Foreign Rice," *Tokyo Times,* June 23, 1948.

[141] See "Japanese Food Ration Levels, Indigenous Supplies Available for Consumption, and Import Requirements," in *1948 Annual Report for Japan to Food and Agriculture Organization, op. cit.,* p. 5.

and the attempt is being made to have them retain this role over the post-war decade.

It was expected that silk would yield the greatest export surplus, since this had been the case in the pre-war period and since the raw material was entirely produced within Japan. The U.S. had been the principal market for Japanese raw silk exports in the thirties and since, in the post-war period, most of Japan's purchases had to be made in the U.S. because, among other reasons, needed materials were unavailable elsewhere, it was hoped that exports of silk to the U.S. would help settle the trade balance. Accordingly, during the first months of the occupation, SCAP took steps rigidly to control silk stocks of all kinds, encourage production of raw silk, restrict allocations of raw silk to the weaving industry and sharply reduce domestic consumption in order to maximize exports of raw silk. On September 25, 1945, SCAP ordered the freezing of all stocks of raw silk and its products. Releases could only be made with SCAP-GHQ approval.[142] On October 11, 1945, SCAP issued a directive revoking all regulations that had resulted in the reduction of mulberry areas.[143] A five-year plan for increased production of raw silk was adopted which looked to a target output in the last year of 272,000 bales. (Output was 89,424 bales in 1946 compared to a peak of 754,056 bales in 1934.)[144] Production of silk staple, a wartime product made of short silk fiber cut from skeins without regard to grade or denier, was prohibited after January 31, 1946.[145] Until mid-1947 only raw silk unsuitable for export was made available to weavers and of the cloth produced all that was suitable for export was so channeled. Previously, all stocks of silk fabric suitable for export had been set aside for shipment.[146] Thus a determined effort was made to regain for Japan its pre-war raw silk export position.[147]

Export sales were to be handled entirely by the United States Commercial Company (an RFC subsidiary). Initial overpricing by this agency plus a permanent lack of interest in silk by the largest pre-war U.S. consumer, the hosiery industry, due to the development of nylon, resulted in such disappointing sales that the price was sharply reduced from the initial figure

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[142] Directive AG 091.3, September 25, 1945 (SCAPIN 58).

[143] Directive AG 091.3, October 11, 1945 (SCAPIN 120). Despite this order, it was reported that farmers continued to convert mulberry land to food production because it was more profitable in view of the prevailing black-market prices for food. See *Nihon Keizai*, October 1, 1946.

[144] See *Sericulture in Japan*, Natural Resources Section Report No. 76, SCAP-GHQ, Tokyo, April 25, 1947.

[145] Cutting reeled silk in this fashion destroys much of its export value.

[146] Directive AG 423, April 25, 1946 (SCAPIN 901).

[147] For a useful discussion, see "The Position of Silk in Japanese Exports," by John R. Stewart, in *Pacific Affairs*, March 1948.

of approximately $10 per pound for the base grade, to $4.40 per pound on January 1, 1947. Lack of throwing facilities in the U.S. and the fact that nylon had become increasingly available, and the continued overpricing of silk, reduced raw silk exports in 1947 to even lower levels than 1946 and led to an accumulation of stock in the hands of the USCC. Exports fell from 86,520 bales in 1946, to 17,273 in 1947 (compared to average exports of 516,000 bales annually in the 1930-34 base period). As this trend became evident, SCAP acted to reverse its previous policy. In July 1947 SCAP authorized the release of 10,000 bales of raw silk a month to Japanese weavers for manufacture into cloth, half for export and half for domestic consumption. The emphasis was shifted to fabric output and to stabilization of silk production at existing levels. Output was to be held at 10,000 bales a month (120,000 annually, or 16 percent of the 1930-34 level).

In January 1948 SCAP's Foreign Trade office in New York took over sales of silk from the USCC and cut prices further.[148] Partly because purchases had been withheld toward the end of 1947 in view of the anticipated price reduction and partly because of the comparative attractiveness of the new price, sales boomed. For the first six months of 1948 they totaled 71,997 bales, while exports of raw silk from Japan were 53,674 bales, or three times the total for all of 1947.[149] Fabric exports have also risen though less sharply and are still far below the pre-war peak. They totaled 14.7 million yards in 1947 and based on the first six months of 1948 should total at least 16.1 million yards in 1948. This compares with 130.0 million yards in the peak year, 1935.[150]

Because of a carryover of 215,000 bales of raw silk from 1947, even if raw silk exports should continue at the new higher level, with domestic consumption held to present low levels and annual output stabilized at 120,000 bales, there will still be a carryover at the end of 1948. SCAP's present concern is to work off the large inventory. While domestic demand is far in excess of current fabric output retained domestically, the decision as to whether mulberry acreage should be held to present levels or expanded would, from an economic viewpoint, hinge wholly upon probable export demand over the next few years. To expand mulberry acreage and thus reduce food output to meet domestic textile needs does not seem logical, cer-

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[148] The price for base-grade raw silk was reduced from $4.40 per pound to $2.55 per pound. This is virtually at pre-war levels, and in view of the increases in prices of other textiles, makes silk relatively attractive. It is possible, however, that when an exchange rate for Japan is set and costs of production calculated, such a price will prove to be too low for profitable operation.

[149] Textile Information Bulletin No. 6, Textile Division, SCAP-GHQ, Tokyo, July 12, 1948, p. 3.

[150] See *Current Status of the Japanese Textile Industry*, U.S. Department of State, Division of Research for Far East, Information Note 176A, unclassified, Washington, D.C., July 8, 1948, p. 2.

tainly not in the next year or two. The earthquake in mid-1948 in Fukui and Ishikawa Prefectures struck at the heart of the silk and rayon weaving industry, damaging 38 percent of all looms in the region, which meant damaging 16 percent of all such looms in Japan. It seems probable therefore that for a year or two raw silk supply will be in excess of weaving facilities.[151] In the long run the determining factor in Japanese silk output should be, and probably will be, the export demand, not domestic needs. With the U.S. hosiery industry committed to nylon, and with the prospect of cotton and rayon prices being materially reduced over the next decade, the secular export outlook for silk does not appear favorable.

Pertinent statistics on the Japanese silk position are as follows:

Production	*Raw Silk (in bales of 132.3 lbs.)*	*Cloth (in million yards)*
1930-34 Av.	718,080	428.4
Peak	754,056 (1934)	637.1 (1942)
1946	89,424	44.0
1947	110,361	37.6
1948[a]	112,692	100.8[c]
SCAP est. for 1948[b]	120,000	100.0
Export		
1930-34 Av.	516,000	90.5
Peak	560,577 (1931)	130.0 (1935)
1946	86,520	.9
1947	17,273	14.7
1948[a]	107,348	16.1

[a] Annual rate based on actual figures for first six months of 1948.

[b] Source is Textile Information Bulletin No. 5, SCAP-GHQ, Tokyo, June 9, 1948.

[c] Without adjustment for loss of weaving capacity due to earthquake.

Source: *Current Status of Japanese Textile Industry*, Division of Research for Far East, Information Note No. 176A, Washington, U.S. State Department, unclassified, July 8, 1948.

As a producer of export surpluses, rayon was second to silk. Less than half of its basic raw material requirement, rayon pulp, had to be imported.[152] Domestic sources provide rayon pulp that is usable for domestic consumption, but in order to manufacture exportable grades of rayon, Japan must import higher-quality pulp to the extent of about 50 percent of total pulp requirements. This means that the value added to the raw materials in the process of manufacturing rayon permits a substantial contribution to Japan's foreign exchange position. In 1936, for example, Japan's net

[151] See Textile Information Bulletin No. 7, Textile Division, SCAP-GHQ, August 12, 1948.

[152] By 1939, for example, domestic pulp output had increased sufficiently so that foreign pulp constituted 47 percent of the total pulp consumed. The loss of Sakhalin and Korea, which supplied much of Japan's pulp in the thirties, may provide a temporary setback but it seems likely that Japan can again develop pulp output to the 1939 level in Hokkaido and Northern Honshu.

receipts from rayon exports over the cost of raw material imports were estimated at 170 million yen.

Recovery in rayon, when measured from peak output, has been relatively slower than in other major textile branches. In part this was due to the coal shortage since it requires more coal to produce a ton of rayon than is required to produce the same quantity of any other fiber.[153] Furthermore, since the end of the war, Japan's rayon pulp imports have been negligible because of the world pulp shortage and because of inability to arrange for financing of such imports until early 1948. While there is sufficient operable equipment to meet the current output goals, most of the Japanese rayon equipment is now obsolete in the light of worldwide improvements over the past decade, in which the Japanese, absorbed in tearing down their industry during the war, did not participate. As a result the Japanese rayon industry is today a high-cost producer turning out a low-quality product.[154] This is a poor combination for export. Modernization is the great requirement today, but the shortage of steel, the limited capacity of the Japanese textile machinery industry, and the priority which this industry has had to give to export orders first and then to cotton rehabilitation, have served to postpone the rebuilding of Japan's rayon industry. Rayon production has also been restricted by critically short supplies of caustic soda, sulphuric acid and carbon disulphide. Increased production of the former has lagged because of insufficient allocations of imported salt, while output of the latter two has been bottlenecked by the movement of pyrites.

SCAP has placed an interim limit on rayon capacity (both filament yarn and staple fiber) of 150,000 metric tons (330,000,000 pounds) a year.[155] This is approximately the figure which the first Textile Mission to Japan found in existence at the end of the war. Operable capacity, however, is at present about 175,000,000 pounds per annum, a figure well above 1948 output. Since the export demand, however, is for filament rayon, while three-fourths of the operable capacity is for staple fiber, there is a basic unbalance which remains to be corrected.[156] Output in relation to the operable capacity figure may be seen from the following tabulation:

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153 The contrast is greatest with respect to cotton. It has been estimated that whereas 1.7 metric tons of coal, of average current Japanese quality, are required to spin and weave one ton of cotton yarn, 8 to 10 tons are required to produce one ton of rayon. See "Significance of Textiles in the Japanese Economy," by Stanley Nehmer and Marguerite Crimmins, in Department of State *Bulletin*, April 25, 1948.

154 See "Japanese Textiles Will Be Slow in Revival," by A. W. Jessup,, in *Textile World*, January 1948, p. 101.

155 SCAPIN 1600. See "The Rayon Industry," in *Nippon Times Monthly Journal of Commerce and Industry*, Vol. I, No. 2, Tokyo, September 15, 1948, pp. 16-20.

156 SCAP's goal of 330,000,000 lbs. capacity provides for such a correction by raising filament rayon to 181,500,000 pounds, or 55 percent of the total.

RAYON OUTPUT, JAPAN, 1930-48

	Rayon Yarn and Staple (in million lbs.)	*Cloth (in million yards)*
1930-34 av.	82.6	373.2
Peak	541.1 (1938)	1,565.3 (1938)
1946	29.6	73.0
1947	36.4	78.3
1948*	60.3	71.1
SCAP est. for 1948	88.0	82.0

* Annual rate based on first six months.

Source: "Current Status of the Japanese Textile Industry," U.S. Department of State, *op. cit.*, p. 3.

Obviously, yarn and staple output in both 1947 and 1948 were less than half of reported operable capacity. On the basis of SCAP's requirement that 100 percent of the filament rayon that is produced be exported either as yarn or in cloth and that 40 percent of the rayon staple be exported, it was estimated that 32 million pounds of rayon would be exported in 1948.[157] If achieved this would be over three times the 1947 figure of 9.9 million pounds exported, but only one-fourth of the 1940 peak of 122 million pounds. Since 1948 cloth output is expected to be roughly the same as in 1947, exports are also expected to run about at the same level. It is in the export of rayon fabric that the failure of the industry to stage a comeback in the past three years is most apparent. Exports in 1947 were less than one percent (5.4 million yds.) of the 1936 peak of over 600 million yards.[158] This was due to the fact that because of a lack of high-grade imported pulp, most of the yarn and cloth produced was of very low quality unsuitable for export. Rehabilitation of the rayon and staple fiber industry would not only provide an inexpensive cloth for home consumption but find a better market abroad than silk and yield a greater export surplus than cotton.[159]

Despite the fact that the cotton textile industry was wholly dependent upon an imported raw material and could therefore yield far less than silk or rayon in the way of an export surplus, studies in Washington, the conclusions of the first Textile Mission to Japan, and SCAP analyses held that of all Japan's textile industries, cotton could be most easily rehabilitated. Possibly the existence in the United States of large government-held stocks of raw cotton influenced this determination. The destruction of cotton textile equipment during the war has previously been described (see Chapter 6). The post-war problem was how to rebuild the industry again, though there was some debate as to the proper level to be set. Pauley recommended

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[157] See "ESB Economic Estimate for 1948 Fiscal Year," *Asahi Shimbun*, Tokyo, September 6, 1948.

[158] *Current Status of the Japanese Textile Industry, op. cit.*, p. 3.

[159] For a discussion from a Japanese viewpoint, see "Rayon and Staple Fiber," *Oriental Economist*, Nov. 8, 1947, pp. 911-12; *ibid.*, July 24, 1948, pp. 606-07; *ibid.*, August 7, 1948, pp. 647-48.

reparations removal of cotton capacity in excess of three million spindles. The Overseas Consultants did not regard any textile facilities as available for reparations. The Anglo-American Cotton Textile Conference held in Manchester, England, in April 1948, recommended a limit of 3,500,000 spindles. A SCAP directive in February 1947 authorized the rebuilding of the cotton-textile industry to 4 million spindles.[160] This was based on a SCAP study in which the calculation was somewhat as follows.[161] It was assumed that approximately 1,109,000,000 yards of fabric were required for domestic consumer use, based on an anticipated population of 80,000,000 and consumption of 13.86 yards of fabric per capita (compared with 20 yards in 1930-34). Using a conversion factor of 3.3 yards of fabric to the pound of yarn, this was equivalent to approximately 336,000,000 pounds of yarn.[162] Then yarn requirements for industrial uses were added, giving the resultant picture.

	1930–34		*Proposed level*	
	Pounds	*Per Capita*	*Pounds*	*Per Capita*
Consumer	372,000,000	5.7	336,000,000	4.2
Industrial	90,000,000	1.5	91,560,000	1.15
Total	462,000,000	7.2	427,560,000	5.35

To this was added the then current estimate of 258,000,000 lbs. of cotton products expected to be exported. Thus in order to produce

258,000,000 pounds for export
427,560,000 pounds for home use
685,560,000 pounds total

it was estimated that 3,500,000 spindles would be required.[163] Since it was considered advisable to allow some leeway above 3,500,000 to allow for export expansion over the ensuing five years, a goal of 4 million spindles was set. Originally it was expected that this rehabilitation plan would be completed by June 1949. Now the completion date has been set back to the end of 1949. Progress thus far under the occupation may be seen from the following tabulation.

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[160] SCAPIN 1512, February 7, 1947 (AG 004.03 ESS/TD).

[161] See "Japan's Foreign Trade Industry Series No. 1—Cotton Textiles," in *Nippon Times Monthly Journal of Finance and Commerce*, Vol. 1, No. 1, Tokyo, August 15, 1948, pp. 16-21.

[162] This conversion factor was used because of the programmed emphasis on relatively heavier fabrics for work clothing, etc., and the elimination of lighter-weight luxury articles.

[163] This calculation was based on anticipated production of slightly under 200 pounds of 20s yarn per spindle a year, with operations of two 8½ hour shifts a day, 26 days per month.

COTTON CAPACITY
(in millions of spindles)

	Installed	*Operable*	*Operating*
1937 Peak	12.2	12.2	9.0
January 1, 1946	2.2	1.1	.3
January 1, 1947	2.5	2.4	2.1
January 1, 1948	2.9	2.8	1.7
July 31, 1948	3.2	3.1	2.2

Due to the mounting inflation, the cost of this rehabilitation has been much greater than originally anticipated.[164] In December 1946 SCAP permitted the "Big Ten" cotton spinning companies jointly to borrow 600 million yen. In September 1947 they were given permission to borrow an additional 718 million yen, and two additional loans in 1948 brought the total borrowed by mid-year up to 2.8 billion yen. Continued financial difficulties found the companies unable to repay the first rehabilitation loan when it came due in mid-1948.

In March 1947 SCAP directed that the "Big Ten" cotton spinning companies be limited to the number of spindles reported as owned by them on January 31, 1947. All outstanding orders and contracts for new spinning machinery were canceled as of the date of the directive and production of spinning machinery thereafter was made available only to small independent spinning companies.[165] This was done in order to prevent complete domination of the industry by the "Big Ten," all of which were on the list of restricted concerns as Zaibatsu subsidiaries.[166] As of the effective date of the directive, the "Big Ten" claimed 3.6 million spindles. The small independent companies were invited to apply for registration of 334,464 spindles, the difference between the spindles owned by the "Big Ten" and four million maximum. Even this would give them only a very minor role in the industry.[167]

As may be seen in the table above on cotton capacity, operable spindles have, since the end of the war, been in excess of those actually operating.

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[164] The "Big Ten" mills originally estimated that 1 3 billion yen would be required for the rehabilitation of their 3.6 million spindles.

[165] SCAPIN 1562, March 8, 1947, (AG 004.03 ESS/TD), Tokyo.

[166] At the outbreak of the war in 1937 there were 82 companies in the cotton spinning field. By 1941 this had been reduced to 23, and by the end of the war, to the "Big Ten."

[167] And would be difficult to achieve. SCAP noted: "Under inflationary conditions the difficulties of the smaller independents are particularly aggravated. Pursuant to instructions received from SCAP the Japanese Government has authorized 25 independent companies to install up to a total of 334,634 spindles. Approximately half of these spindles are already in existence, in greater or lesser degree of disrepair. The companies which must buy completely new equipment face the most difficult problem of all, since the machinery manufacturers are short of all raw materials and necessary fuel, and the prices are high. Export demand for spinning machinery has also tended to tighten the market."

Oddly, this has been due partly to uncertainty over supplies of raw cotton and to a lesser extent to shortages of fuel and power and financial and labor problems. It was not that the United States was unable to supply all the cotton Japan could use. The basic limitation was Japan's ability to sell the fabricated cotton products in markets that would provide the dollars which Japan needed to pay for the raw cotton. Under the original contract concluded between SCAP, the Commodity Credit Corporation of the United States and the United States Commercial Company in February 1946, some 915,000 bales of cotton were sent to Japan. The agreement provided that at least 60 percent of the finished yarn and piece goods were to be sold by the USCC and the proceeds applied to the cost of the raw cotton. The agreement provided that the balance of the textiles could be used for domestic consumption, but the need to maximize foreign exchange receipts to pay for food and other essential imports led SCAP originally to hold domestic consumption to 20 percent of yarn output. So rapidly did output respond to the increased import of cotton, increasing from an average of only 2.6 million pounds of yarn a month during the first half of 1946 to 20 million pounds in September 1946, and to a peak of 29.3 million pounds in June 1947, that the percentage allotted to domestic consumption was raised to 30 percent on July 1, 1947.[168] It had been expected that by June 30, 1947, when the CCC-USCC-SCAP agreement expired, arrangements would have materialized for private financing of raw cotton imports to Japan, but when this failed to eventuate, the agreement was extended in July 1947 to provide for an additional 350,000 bales of raw cotton and spinnable cotton waste. Slow repayment and difficulties in finding dollar markets for the cotton products held down the level of imports under the new interim agreement and led SCAP to seek other means of financing imports. As of July 1948, SCAP still owed the CCC 48 million dollars. At the beginning of 1948 when SCAP Foreign Trade Division took over from the USCC, the previous prohibition against sale of Japanese cotton textiles for consumption within the United States was dropped. As imports of cotton slowed down, output dropped. In November 1947, for example, only 53 percent of operable spindles were being used, in contrast to 82 percent in peak June. SCAP concluded agreements with India and Pakistan whereby a modest amount of their cotton was imported.[169] In August 1947, the Occupied Japan Export-

[168] Officially this was done to provide additional quantities of yarn for the manufacture of essential industrial goods, particularly fish netting, belting, insulating materials, etc. In addition, the Japanese were allowed to retain all of the cotton waste produced during the course of manufacture. This amounts to some 12 percent of the weight of the raw cotton put into process.

[169] In 1946 all cotton imported was American; in 1947 Indian cotton represented 28 percent of total cotton imports. Early in 1948 a trickle of imports of cotton from Egypt began.

Import Revolving Fund was created in Japan to utilize the $126,000,000 in gold and silver in SCAP's custody as a credit base to finance imports, but the hoped-for private banking agreement to finance cotton shipments to Japan on the guarantee of this "gold pot" was not announced until April 1948 and not approved by SCAP until June 1948.[170] Growing impatient over the delay in cotton imports and in private financing, the Department of the Army in January 1948 began for the first time to procure raw cotton through the New York Quartermaster's office as a direct Army responsibility. One of the many suggestions of the American Cotton Manufacturers' Association Textile Mission (headed by the late Dr. William Jacobs), which visited Japan in January 1948, was that the United States government establish a revolving fund of $150,000,000 to finance shipments of raw cotton to Japan. This was done in mid-1948. Thus adequate financing facilities are now available to finance the importation of U.S. cotton providing Japanese cotton exports can be sold for dollars to repay either the Quartermaster, the revolving fund, or the syndicate of banks. Cotton imports over the postwar period have run as follows:

JAPANESE COTTON IMPORTS
(in metric tons)

Period	*Quantity*
1930-34 av.	721,812
Peak-1936	924,816
1946	157,020
1947	102,816
1948 *	155,850

* Annual rate based upon imports during first six months.

Exports of cotton textiles fell off sharply during the last half of 1947 because of the growing shortage of dollar exchange in the sterling areas. Shipments against USCC contracts fell from 69 million yards in July to 15 million in October, and then to 8 million in December. The result was an accumulation of inventory which by May 1948 had risen to almost 400 million yards. It was for this reason that the ban on sales of Japanese cotton textiles for domestic consumption in the U.S. was lifted on January 1, 1948. A variety of other measures were also taken. Allocation of cotton yarn production to the Japanese for domestic consumption was raised from 30 to 40 percent, effective April 1, 1948. In addition, a release to the Japanese of 41,000,000 square yards of fabric was made which represented 10 percent of the cotton yarn production from October 1947 through March 1948. This, in effect, made the 40 percent allocation retroactive to October 1, 1947.[171]

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[170] A 60 million dollar revolving credit to the Occupied Japan Export-Import Fund was established. The U.S. Export-Import Bank contributed $29 million, the Chase National Bank, National City Bank and Bank of America, $10 million each, and the J. Henry Schroeder Banking Corporation, $1 million.

[171] Textile Information Bulletin No. 6, *op. cit.*, p. 2.

In April 1948 the CCC contracts were modified to permit cotton goods made from CCC cotton to be bartered for other commodities or sold for currencies other than dollars, at SCAP's discretion. Thereupon SCAP relaxed the terms of sale to the sterling areas and to other traditional Japanese textile markets. By mid-1948 cotton textile sales to the sterling bloc could be paid for entirely in sterling while sales to those countries having open account arrangements with SCAP (but outside the sterling area) could be settled 50 percent in dollars and 50 percent in acceptable commodities. Naturally, under these circumstances exports increased.[172] But the basic problem still remains unsolved.

If Japan continues to import 75 percent of her raw cotton from the United States, and the new financing methods involving revolving funds require ultimate payment in dollars for the raw cotton, while the fabricated products are sold chiefly in non-dollar areas, the revival of the cotton textile industry will involve Japan increasingly in financial maladjustments.[173] While in 1947 cotton yarn and fabric exports accounted for 60 percent of Japan's total exports by value, and over the next five years cotton textiles are expected to remain the largest single export item, the long-run outlook is not favorable.[174] The large prewar market in the sterling area has already been partially lost—India, for example, has become virtually self-sufficient in textile output—and will probably make strenuous efforts to become entirely self-sufficient over the next five years. If China remains in a

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[172] Japan's cotton cloth exports in 1947 totaled 360.9 million yards, compared to a peak of 2,980.1 million in 1935. In June 1948 export sales of cotton cloth amounted to 144.2 million yards, bringing the total for the first half of 1948 up to 215.8 million yards. Exports of cotton yarn totaled 23.4 million pounds in 1947 compared to 83.3 million in peak 1939. Yarn export sales for June 1948 were 4.3 million pounds, bringing the total for the first six months of 1948 up to 7.1 million pounds. On a value basis cotton textile shipments in 1947 amounted to $103 million while for 1948 (through Sept. 30) they were $75 million or at an annual rate slightly below 1947 export shipments. Unsold stocks were valued at $89 million on December 31, 1947, but on September 30, 1948, amounted to $66 million after substantial allocations of finished textile products for consumption in Japan.

[173] If U.S. takings of raw silk or silk fabrics greatly increased, the problem would be eased, for Japan would then in effect be able to continue the prewar practice of exchanging her raw silk for our raw cotton. One of the members of the American Cotton Textile Manufacturers Association Mission to Japan has suggested that the problem be solved by a three-way trade whereby Japanese textiles be exchanged for tropical products, which in turn can be sold to the United States for dollars. See speech by Donald Comer, head of Avondale Mills, as reported in the *Daily News Record*, August 3, 1948. This proposal, however, seems to ignore the fact that Japan must meet her own requirements for tropical products by shipping something, probably textiles, and that the capacity of the countries which supply tropical products to absorb textile imports is limited.

[174] See *Nippon Seni Shimbun*, Feb. 2, 1948. Also *Summation of Non-Military Activities in Japan*, No. 29, February 1948, p. 205.

state of confusion and chaos, Japan will not be able either to buy raw cotton, or sell fabricated cotton textiles in that market in any significant degree. If the economy is stabilized, China will probably want to retain as much of its raw cotton as possible for fabrication in its own mills. The Philippines are likely to meet their own requirements. Korea will undoubtedly attempt to minimize imports from Japan. Britain will probably supply Burma, Malaya and the African colonies. The outlook, therefore, over the long run in Japan's prewar cotton textile markets, is unfavorable.

The production record of Japanese cotton textile products during the first three years of the occupation has been as follows:

OUTPUT OF COTTON TEXTILE PRODUCTS, JAPAN, 1930-48

	Yarn (in million pounds)	*Fabric (in million yards)*
1930-34 av.	1158.0	2,703.6
Peak-1937	1586.4	4,826.4
1946	129.1	241.7
1947	269.2	662.3
1948*	277.7	853.2

* Annual rate based on first six months' actual output.

Source: *Japanese Economic Statistics*, Bulletin No. 23, July 1948, *op. cit.*, p. 31.

It must be remembered that only a small percentage of this output was made available to Japanese consumers. Of the 1947 yarn output only 65.4 million pounds, or 24 percent, was allocated domestically, while of the cloth output only 82 million yards, or 12 percent, was for domestic consumption. During the last half of 1947 a good deal of the yarn was hoarded by weavers in anticipation of higher prices and over the same period the cloth accumulated as inventory waited for foreign sale. Whereas in the base period, 1930-34, the per-capita consumption of cotton for all uses was 6.8 pounds, in 1947 it was only 1.2 pounds.[175] In view of the fact that the revival of Japan's cotton textile industry has not only not benefited Japanese consumers greatly, nor improved Japan's international financial position, but actually created a dollar problem of significant proportions, the wisdom of the great concentration of effort in this field would appear to be questionable.[176]

Ambitious plans for revival of the Japanese wool industry have until very recently been held back by difficulty in arranging for raw wool imports. The industry coasted along after the war, utilizing the wool stockpile which the military had hoarded during the war, but when this supply ran out in the latter half of 1947, output of both yarn and cloth began to fall off and the industry operated on a day-to-day basis, utilizing wool waste. SCAP was unable to arrange for wool imports in 1946 or 1947 except for one ship-

[175] See *Current Status of the Japanese Textile Industry, op. cit.*, p. 2.

[176] Current shrinking export markets for cotton textiles and declining cotton prices would appear to reinforce this view.

ment of 7,481 bales of Australian wool, which arrived in June 1947. During the first half of 1948, however, a barter arrangement was worked out with Australia and New Zealand for the exchange of raw wool for Japanese silk and rayon, while purchases were also made of South African and South American wool. Approximately 9.8 million pounds were imported during the first half of 1948, mostly from South Africa, and yarn and cloth output is expected to respond. Production has been as follows:

JAPANESE WOOLEN-WORSTED PRODUCTION, 1930-48

	Yarn (*in million lbs.*)	*Cloth* (*in million yds.*)
1930-34 av.	93.7	263.6
Peak	155.0 (1936)	322.5 (1935)
1946	28.1	22.9
1947	26.2	21.1
1948*	22.3	24.6

* Annual rate based on first half.

Source: *Japanese Economic Statistics,* Bulletin No. 23, *op. cit.,* p. 31.

The SCAP program for rehabilitation of the industry aims at production goals close to the prewar peaks.[177] Output is to be raised to 130 million pounds of yarn compared to 155 million at the prewar peak, and the export goal for yarn is 5.8 million pounds compared to a peak of 8.0 million in 1939, while for cloth it is 30.2 million yards compared to 38.1 million in peak 1936. Exports in 1947 were only 0.3 million pounds of yarn and 0.9 million yards of cloth. Because the projected program would require an annual import of 665,000 bales of raw wool, and since China, Manchuria and Korea, Japan's most important prewar woolen markets, are now beset by economic and political difficulties, it would appear that the program is somewhat unrealistic. The same attempt has been made in wool as in cotton, to hold down domestic consumption and maximize exports, but it has been even less successful in wool. It was found that the industry was not producing a product that was salable in current export markets, and thus SCAP was forced to allow the output to be consumed at home.[178] Now the industry has been instructed to allow export buyers to specify colors and patterns in advance of manufacture and SCAP hopes to reduce domestic consumption in 1948 to less than 1947 levels.[179]

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[177] See "Five Year Rehabilitation Plan," *Monthly Circular,* Mitsubishi Economic Research Institute, No. 223, Tokyo, June 1948, pp. 18-25.

[178] It has been reported that in a number of fields the Japanese have been producing a product slightly below export standards, so that output rejected for export may be sold domestically at high yen prices. Since the Japanese expect U.S. GARIOA and EROA funds to bridge the deficit between exports and imports, the incentive to export is not as great as it might be if the Japanese were on their own.

[179] See *Nippon Seni Shimbun,* February 10, 1948.

The overall pattern of Japanese textile consumption may be seen in Table 78. While Japanese plans look to the recovery of 1930-34 levels of

TABLE 79

JAPANESE PER-CAPITA CONSUMPTION OF TEXTILES FOR ALL USES, 1930-48

(in pounds)

Year	*All Textiles*	*Cotton*	*Silk*	*Rayon*	*Woolen and Worsted*
1930-34 av.	8.7	6.8	0.35	0.42	0.90
1945	1.1	0.5	0.11	0.11	0.18
1946	2.6	1.2	0.01	0.50	0.39
1947	2.7	1.2	0.24	0.27	0.40
1948 (SCAP est.) ..	3.1	1.8	0.14	0.25	0.25

Source: *Current Status of the Japanese Textile Industry*, Division of Research for Far East, Information Note No. 176A, U.S. Department of State, Washington, July 8, 1948, unclassified.

consumption by 1952-53, U.S. estimates are less optimistic. The whole problem revolves around the export-import relationship rather than upon domestic production capacity. Is the Japanese textile industry still a low-cost producer? Can it regain and hold its prewar markets? Over the past three years it has been beset by labor and financial troubles.[180] Output at a small percent of capacity is always costly. An uncertain supply of raw materials and poor allocation of those received have retarded planning of output and thus raised production costs. A world-wide marketing organization no longer exists. Technically the industry has fallen behind progress in other countries. Output in some former markets has been stepped up, while in others economic chaos prevails. Nationalism is stronger, competition keener. Export markets for textiles are contracting and prices dropping. Because of the inflation and the lack of an exchange rate it is still too early to determine whether Japan is now a low- or high-cost textile producer. It seems safe to hazard the guess, however, that she is a higher-cost producer than before the war, even at full capacity operation. And it is also likely that the Japanese textile industry will not, within the next decade, if ever, regain the world-wide role it had from 1930 to 1938. To base plans for Japanese revival, therefore, largely upon textiles would be a grave error.

Foreign Trade

Japan's trade, like her production, in the first three years under the occupation has been very small compared to prewar levels. Imports have been dominated by foodstuffs, exports by textiles, though the former have far exceeded the latter in value, resulting in a large unfavorable balance which has been largely financed by U.S. grants under GARIOA (Government and

[180] For a discussion, see *Nippon Boseki Geppo* (monthly report of the Japanese Cotton Spinners Association), September 1947. Also monthly letters on "Japanese Economic Conditions," Research Department, Sanwa Bank, Osaka, No. 1, April 1948, No. 2, May 1948.

Relief in Occupied Areas). Imports have come mainly from the United States, while recently exports have been going largely to Far Eastern areas and to the sterling bloc. An exchange rate has not been set. Instead a complicated series of implicit multiple rates, which vary from time to time depending on both Japanese costs and prevailing world market prices, have been established. Controlled by SCAP, all trade was originally on a government-to-government basis, but steps have gradually been taken slowly to restore it to private hands.

TABLE 80

JAPAN'S COMMODITY TRADE, 1930-34 AND 1947

(Values in millions of U.S. dollars, 1947 prices)

A. Imports

	1930–34		*1947*		*1947 as Percent of 1930–34*
	*Value**	*Percent of Total*	*Value*	*Percent of Total*	
Raw cotton	450	24.3	70	13.3	15.6
Other textile fibers	163	8.8	13	2.5	8.0
Metal manufactures	43	2.3	7	1.3	16.3
Ores & metals	123	6.6	1	0.2	0.8
Petroleum & petroleum products	45	2.4	38	7.2	84.4
Coal	55	3.0	[a]	...	0.6
Other mineral products	21	1.1	14	2.7	66.6
Lumber & paper products	127	6.9	2	0.4	1.6
Fertilizers	56	3.0	67	12.7	119.6
Chemicals & drugs	40	2.2	7	1.3	17.5
Foodstuffs	498	26.9	295	56.1	59.2
Fats & oils	16	0.9	5	1.0	31.3
All other	215	11.6	7	1.3	3.3
Total	1850	100.0	526	100.0	28.4

B. Exports

Exports					
Silk & silk goods	360	19.7	17	9.7	4.7
Cotton goods	510	27.9	105	60.4	20.5
Other textiles	330	18.1	11	6.3	3.3
Ores & metals	40	2.2	5	2.9	12.5
Machinery & metal products	140	7.7	7	4.0	5.0
Chemicals, paints and drugs	45	2.5	2	1.1	4.4
Handicraft, toys and sundries	35	1.9	[a]	...	...
Fats & oils	23	1.2	1	0.6	4.3
Processed foods	170	9.3	4	2.3	2.3
All other	174	9.5	22	12.7	12.7
Total	1827	100.0	174	100.0	9.5

* Values expressed in 1947 prices.

[a] Less than $500,000.

Sources: 1930-34—computed from data in *Nippon Gaikoku Boeki Nempo* (Annual Returns of the Foreign Trade of Japan), respective years. 1947—*Summation*, No. 29, Tokyo, February 1948, pp. 204-07.

Japan's exports in 1947 were approximately 10 percent of the 1930-34 level. Imports in 1947 were only a little over a quarter of the base-period

average.[181] Foodstuffs, which in 1947 constituted about half of the total as compared to only about a quarter in 1930-34, came to less than 60 percent of their 1930-34 average. While cotton goods constituted the largest single export item in both 1930-34 and 1947, they represented about 30 percent of exports in the base period compared with 60 percent in 1947. This may be seen in Table 79.

In the 1930-34 period Japan obtained 24 percent of her imports from the U.S. and 53 percent from Asia (excluding Australia), and shipped 23 percent of her exports to the U.S., 60 percent to Asia. In 1947 Japan obtained 92 percent of her imports from the U.S. and only 6 percent from Asia, while she shipped only 12 percent of her exports to the U.S. and 66 percent to Asia. This may be seen from Table 80.

TABLE 81

AREA DISTRIBUTION OF JAPAN'S FOREIGN TRADE, 1930-48

(in percent)

Area	*1930-34 Average*		*End of War to End of 1946*		*1947*		*First half 1948*	
	Imports	*Exports*	*Imports*	*Exports*	*Imports*	*Exports*	*Imports*	*Exports*
United States	24	23	95	63	92	12	72	22
Asia*	53	60	4	35	6	66	13	65
Other	23	17	1	2	2	22	15	13

* Does not include Australia.

To state the situation in another way: in 1936, 20 percent of the export trade of other Far Eastern countries and 30 percent of their import trade were with Japan. In 1947, however, Far Eastern countries sent only about one percent of their exports to Japan and received only about three percent of their imports from Japan. Thus one of the basic corrections in the future readjustment of Japan's trade will probably be to lessen dependence on U.S. imports and increase purchases from Japan's normal market, Asia.[182]

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[181] One Japanese paper declared: "The first outstanding feature of postwar Japanese economy is the drastic reduction of foreign trade. In order to enable the 80 million Japanese people to maintain the same living standard of the 1930-34 period level, Japan must import annually commodities worth over two billion dollars. But the imports of last year amounted to only 526 million dollars, or 25 percent of the necessary amount." See *Kahoku Shimpo*, Sendai, April 21, 1948, p. 1.

[182] ECAFE summed up the situation in the following points:

"(a) Since the end of the war, Japan's imports of food, fertilizers, petroleum, raw cotton and most other commodities have come predominantly from the United States;

"(b) As a result, countries in the region (Asia) have not had available adequate funds arising from proceeds of exports to Japan with which to purchase Japanese capital goods;

"(c) The general dollar shortage in the region has prevented extensive purchases of Japanese capital goods with dollars earned from other sources.

"(d) To the extent that sources of supply can be shifted from the United States to the countries of the region, the ability of ECAFE countries to purchase capital goods from Japan with current foreign exchange earnings is increased.

Japan has had a relatively large adverse trade balance since the surrender. From the end of the war to the end of 1946 imports were $300 million and exports $120 million, the deficit being $180 million. For 1947, imports totaled $526 million, exports were $174 million, and resultant deficit $352 million. During the first half of 1948 imports amounted to $348 million, exports to $77 million, and the deficit to $271 million.[183] Thus over the first three years of the occupation the total foreign trade deficit amounted to $796 million, which was largely financed by the U.S. appropriations for government and relief in occupied areas (GARIOA).

Obviously, because of the low level of output, Japan has not been shipping enough goods abroad to pay for her necessary imports (principally food, fuel and fertilizer), so that continuing U.S. expenditures have been necessary to prevent "disease and unrest."[184] To lessen this dependence it will be necessary to raise the whole level of Japanese exports and imports. But with the loss of traditional markets and sources of supply due to political and economic chaos in China, Manchuria, Korea, Burma, etc., and to hostility in Australia, the Philippines, etc., this will be difficult to do.[185] While several of the proposed recovery plans for Japan contemplate an "export surplus" by 1952-53, this seems most unlikely, unless there is a very rapid development of Japanese production of metals, tools, electrical and communication equipment, bicycles, automobiles, pots, pans, radios, mining and textile machinery, oil drilling equipment, railroad rolling stock, chemical products, etc. (all of which yield a much larger differential between final selling price and cost of raw materials than do textiles)[186] and an unex-

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"(e) The basic potentialities of obtaining capital goods from Japan, however, are hardly beginning to be realized."

See *Report on Action Taken on the Resolution (E/CN.11/113) Concerning the Japanese Economy*, Economic Commission for Asia and the Far East, United Nations, Economic and Social Council, Shanghai, October 19, 1948.

[183] "Far Eastern Trade—1948," by John E. Fields, in *Far Eastern Survey*, September 22, 1948, pp. 209-15. See also *Summation of Non-Military Activities in Japan*, No. 35, August 1948, pp. 189-192. With this issue SCAP discontinued publication of the monthly summations.

[184] See "Unfavorable Trade Balance Must Be Rectified," *Nihon Keizai*, April 10, 1948. Also "Economic Independence and Export," by Yoshida, Ichiro, in *Kogyo*, June 28, 1948.

[185] In the prewar period (1936) China, Korea, Formosa, Manchuria and Sakhalin supplied approximately 35 percent of Japan's imports—most of its foodstuffs, salt, coal, iron ore, lumber and pulp—and took about 45 percent of Japan's exports. See "Trade Board Stresses Former Markets," *Tokyo Shimbun*, April 11, 1948. Also, "The Trend of Japan's Trade with China," *Hompo Zaikai Josei*, February 1946.

[186] Yoshida declares: "As Japan lacks raw materials, she must depend upon their importation in order to export processed articles. The exportation of highly processed articles, therefore, is more profitable and desirable in obtaining dollars than that of

pected increase of consuming power in Japan's traditional markets in the Orient. The hard reality for American policy in the Far East is that to allow Japan to regain Asian industrial preeminence, and thereby to expand her export trade, may incur the displeasure and enmity of other Asian countries,[187] while the failure to do so will require continued support and aid, because of the fear that in the absence of such aid Japan might fall into the Soviet orbit.

On a more technical level are questions of how Japan's trade is to be conducted and how it is to be financed. The basic initial post-surrender directive to SCAP gave him complete control of Japan's foreign trade and provided, among other things, that "all proceeds of exports shall be controlled by you and made available in the first place for approved imports." Accordingly all trade was originally placed on a government-to-government basis with SCAP acting for Japan. The United States Commercial Company was designated to act for SCAP in sales of goods abroad while the Japanese government established the Boeki Cho (Trade Board) to purchase all goods for export from Japanese producers and to sell all imported goods. No single exchange rate was set but a complicated substitute system adopted.

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coarse manufactured goods. In other words, the value of yen spent for obtaining dollars through export must be lower in the case of highly processed articles than in that of coarse goods." See "Economic Independence and Export," in *Kogyo*, June 28, 1948.

[187] For example, the *Manila Times*, on May 7, 1948, declared editorially: "Is there any reason why the Philippine Republic, with all its just and rightful sympathy for the American taxpayer, should agree to a deal under which the Japanese will profit and prosper and the Philippines will remain on the old colonial basis of providing basic and strategic materials to a former enemy in exchange for the modern equivalent of glass beads, brass rings and hand mirrors? Especially when the Philippines can make its own glass beads, brass rings and hand mirrors."

Chinese comments have been much more explicit, while even the Australians have expressed a restrained disapproval. For example, the Melbourne *Age* declared:

"It was determined by the Great Powers at Yalta, and later in the British Commonwealth discussions at Canberra, that in a military sense, Japan should not be allowed to menace the peace of the world again. Corresponding safeguards will now be necessary to insure against a revival of Japanese export trade of a kind that could again threaten the soundly conducted industries of Britain by ruinous competition from inferior Japanese manufactures dumped at a fraction of the cost of production under improper standards. To this extent military and economic security are interrelated and Australia, no less than Britain, must continue to exercise strict vigilance against the dangers inherent in the resumption of large-scale trade with Japan." "Need for Vigilance in Trade with Japan," February 24, 1948.

On the other hand ECAFE has resolved "that the Governments in the ECAFE region give immediate consideration to the possibility of entering into working arrangements with Japan for the supply of capital goods, materials and consumer goods needed by them" and has prepared a tabulation of "Japan's Manufacturing Capacity for Capital Goods" and "Imports Needed by Japan and Potentially Available in Asia and the Far East."

Stated as simply as possible, Japanese foreign trade operates upon the basis of multiple exchange rates, utilizing two separate trade funds, a dollar account maintained by SCAP and a yen account in the hands of Boeki Cho. The determination of any of the numerous yen-dollar ratios works in the following manner. The Boeki Cho determines the unit cost of production of a particular article.[188] If it costs 6,000 yen to produce a bicycle in Japan, SCAP determines what the bicycle will bring, in dollars, in world markets. Assume the figure is $20. Thus an equivalence of value between 6,000 yen and $20 is established, or a yen-dollar ratio of 300 to 1 for bicycles.[189] The exporter of the bicycle is paid 6,000 yen from the yen fund of Boeki Cho, that is, from the Foreign Trade Revolving Fund. When the bicycle is sold abroad the proceeds ($20) go into the SCAP dollar account. Funds in the dollar account are used to purchase essential imports, the yen returns from the sale of which, within Japan, go into and replenish the Foreign Trade Revolving Fund.

Thus the dollar fund is depleted by imports and replenished by exports while the yen fund is diminished by purchase of goods for export and revived by yen proceeds from the sale of imported goods. Since the yen prices of imported goods, particularly foodstuffs, have been kept artificially low in order to subsidize consumers and hold prices down, while prices paid for export goods have been high since they cover current costs of production, however high, the yen fund has constantly operated with a deficit, which has had to be made good each year by a government budget appropriation. Thus both the multiple exchange rate system and the method of handling the yen trade fund have contributed to the inflation, the former by recognizing and meeting export goods production costs, no matter how high, the latter by contributing to the budget deficit and thereby causing further note issue expansion.[190] That a single exchange rate would bring into line or drive out of business the high-cost export goods producers on the one hand, and cause import goods prices to rise somewhat, thereby absorbing more of the surplus funds in circulation, and at the same time balance the yen trade fund and stop the deficits, is recognized by Japanese economists, but they fear the possible deflationary impact of such a single rate.[191] It would bring on, they hold, a stabilization crisis, thereby creating unrest and disturbing the reputation of the occupation. That it would tend to limit the inflation by helping to bring Japan's internal price structure into line with world mar-

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[188] Including an allowable profit.

[189] For an approximate tabulation of yen-dollar ratios, ranging from 66 for canned bamboo shoots to 600 for lacquerware, see "Yen-Dollar Rates for Selected Export-Commodities, Sept.-Dec. 1947," in *Nippon Times*, February 19, 1948.

[190] See "Foreign Trade Account." *Oriental Economist*, July 17, 1948, pp. 581-82.

[191] See "Single Exchange Rate and Export," *Oriental Economist*, Sept. 4, 1948, p. 732; also "Single Exchange Rate Issue," *ibid.*, August 21, 1948, p. 674.

kets, is not denied. It is precisely what is feared. It may then be found that in many lines Japan is a high-cost producer and cannot compete in world markets, thereby further unbalancing exports and imports. But this must ultimately be known and the necessary readjustment accomplished if Japan is to regain a permanent realistic role in world trade. The present condition of constantly increasing multiple exchange rates would, if Japan were a sovereign power engaging in this practice on her own, receive the strongest condemnation from the International Monetary Fund, for it amounts to nothing more than continued disguised devaluation. At the present time there appears to be no effective check on the cost analysis by which Boeki Cho determines the yen purchase price for export goods. This permits producers of export goods to pay black-market prices for raw materials and pirate workers from other fields by offering increasingly higher wages, thereby inflating costs and further contributing to inflation.

GARIOA funds have been used for food, fertilizer, petroleum and medical supplies, but not for industrial raw materials. By mid-1948 it is estimated that more than one billion dollars had been expended in this fashion for Japan. More recently the U.S. Congress has provided EROA (Economic Rehabilitation Occupied Areas) funds in small amounts for Japan, but such appropriations are likely to increase. The establishment of OJEIRF in August 1947, and the subsequent establishment of the various raw cotton import revolving funds, were discussed previously.[102] Since so great a part of Japan's imports presently come from the United States while exports go to non-dollar areas, if Japan is to pay, either convertibility must be maintained or Japan must shift her imports to non-dollar areas. SCAP has acted in several ways to solve this problem.

When Britain suspended the convertibility of sterling in August 1946, SCAP was confronted with a dilemma. Textiles, if disposed of in traditional Japanese markets in Asian sterling countries, would no longer provide the dollars to pay for the raw materials. A series of agreements were accordingly negotiated, beginning November 15, 1947, and extending over a year, which ultimately provided that sterling area purchases could be paid for 100 percent in sterling, with the added provision that SCAP could convert ster-

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[102] OJEIRF was established to finance not only raw cotton but other necessary raw materials imports. In order to avoid depleting the fund, however, purchases must be so placed as to result in manufactured goods which can in turn be exported to pay the cost of the raw material imports (old link system). Because of the present non-convertibility of many currencies, this will necessitate, in many cases, exporting sufficient goods to each country or area to pay for materials purchased from that area. See "Occupied Japan Export-Import Revolving Fund," in *Monthly Survey*, Bank of Tokyo, January 1948, Vol. 2, No. 1; also *ibid.*, Vol. 2, No. 4, April 1948. By October 1948 $20 million raw cotton credits had been extended to the Fund by American banks, but thereafter it was anticipated that SCAP would rely more heavily upon the $150 million U.S. Raw Materials Revolving Fund established by P.L. 820 (80th Congress—the Eastland Bill) because of the more favorable terms permitted.

ling balances to dollars every six months only if a surplus of sterling accumulated which SCAP could not reasonably be expected to utilize within the sterling area over an appreciable period of time. Aside from the superior negotiating ability of the British, the theory was that Japanese purchases of raw materials, such as rubber, tin, jute, etc. from the sterling area on open account, would be offset by sales of textiles, and possibly ultimately a portion of the raw materials acquired by Japan could be resold to the U.S. for dollars with which to pay for raw cotton.[193]

Furthermore, SCAP has also entered into simple open trading agreements with a number of governments. The agreements provide for the exchange of commodities without specification as to types or quantities. Settlement in U.S. dollars or in other currencies acceptable to SCAP is to be made semi-annually. Negotiations are currently in progress for a number of comprehensive trade agreements which will include schedules of commodities to be exchanged.

An example of an open account trading agreement may be seen in the following description of the "Financial Arrangement for Trade Between the Kingdom of the Netherlands and Occupied Japan."

The arrangement, pending authentication by the Government of the Netherlands, provides that all trade, both government and private, shall be conducted on an open account basis, and that an open account shall be maintained in terms of U.S. dollars by the Foreign Trade and Commerce Division of the Economic and Scientific Section, and by the Netherlands Trading Society and the Netherland-India Commercial Bank on behalf of the Kingdom of the Netherlands. Exports from Japan to the Netherlands shall be listed as credits in this account and all imports into Japan from the Netherlands as debits therein. In addition, the present debits and credits of open account trade between the Netherlands Military Mission and Japan shall be incorporated in this account. Settlement of the account is to be effected by offsetting the debits and credits of the account as of June 30 and December 31 of each year during the term of the agreement. After reconciliation of accounts, payment of the net credit balance due is to be made to the recipient in U.S. dollars or such other currency as may be acceptable to the Government of the Netherlands and to the Supreme Commander for Allied Powers or his successor.[194]

Similar arrangements have been concluded with China, French Indo-China, India, etc., while barter agreements have been negotiated with India,

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[193] See "Trade with Sterling Bloc," by Mori, Hiroshi, in *Oriental Economist*, August 21, 1948, p. 685. For example, a Memorandum of Understanding dated August 11, 1948, provided that Japan would exchange specified commodities valued at approximately $122 million with the United Kingdom and its sterling orbit but no participant was bound to types or quantities of goods, in fact. The agreement was for the period to June 30, 1949.

[194] "Financial Arrangement for Trade Between the Kingdom of the Netherlands and Occupied Japan," unclassified, Foreign Trade and Commerce Division, ESS-SCAP, 300.6, Tokyo, May 25, 1948.

Pakistan, Egypt, Australia, etc. Indo-Chinese anthracite is to be exchanged for Japanese silk, Indian cotton for Japanese textile machinery, Australian wool for Japanese silk and rayon, Siamese rice for Japanese rolling stock, etc. Even the Philippines, generally reluctant to take Japanese goods, agreed to exchange its lumber for Japanese cement. China has two separate open accounts with SCAP, one for government-to-government trade involving China's Central Trust, the other for private trade with Chinese merchants. Since, during the first two years of trade, the Central Trust failed to deliver merchandise promised, a sizable balance in Japan's favor developed in the open account and SCAP refused to permit further shipments unless there was a simultaneous transfer of Chinese goods. As a result a very logical Chinese proposal to exchange Kailan coking coal for Japanese mining timber was turned down by SCAP on the ostensible ground that Japan itself was short of timber.

Along with this attempt to develop inter-Asian trade, SCAP moved to restore foreign trade to private hands. In August 1947, private foreign traders were admitted to Japan for the first time, for limited stays. Later the time limitation was relaxed. The hold of both the U.S. Commercial Company and SCAP's Foreign Trade Office over the marketing of Japanese goods abroad was relinquished and in August 1948 Japanese exporters were finally permitted to conclude direct contracts with foreign buyers as SCAP moved to break the grip of Boeki Cho over the Japanese end of the foreign trade. All contracts, however, must still be validated by SCAP.

Such are the essential features of Japan's foreign trade over the first three years of the occupation. While the trade and financial agreements have put a slight dent in Japan's dependence on the United States for raw cotton and an even lesser mark on her dependence upon food imports from the United States, they have not solved the major problem of imports from dollar areas and exports to non-dollar countries. Bridging this gap by means other than the current dependence on U.S. grants, is one of the two basic solutions which must be forthcoming before Japan's foreign trade (and her economy) can be placed on a self-sustaining basis. The second problem is how to raise the whole level of trade so that exports pay for a volume of imports sufficiently large to sustain 80 million people in four poorly-endowed islands. To solve this problem without increasing the dollar gap because of increased imports, or incur the enmity and retaliation of other countries because of increased exports, is fundamental to achieving a self-supporting, stabilized Japanese economy.[195]

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[195] See "Japan's Role in World Markets," by Takahashi, Kamekichi, in *Contemporary Japan*, Vol. XVI, Nos. 7-9, Tokyo, July-September, 1947, pp. 252-59; also "Overcome Deficit in Foreign Trade," by Okusa, Takeo, in *Sekai Keizai*, October 18, 1948, and "Rehabilitation of Asia and Japan," *Kokusai Times*, October 18, 1948.

Prospects for Recovery

A variety of attempts have been made to blueprint Japanese recovery over a five-year period. Plans have been drawn up within SCAP, in Washington, and by the Japanese themselves. The target date for a self-supporting economy is 1952-53.[196] Until then continued dependence on the United States is envisaged. Let us examine the one plan that has been made public, that of the Japanese Economic Stabilization Board.[197]

Noting that "the way of our economic recovery is far and steep," the plan contemplates more than a threefold increase (over 1947) in mining and manufacturing, a ninefold increase in exports, a threefold increase in imports, a twofold increase in labor productivity, and a twofold increase in the real national income in the target year. To achieve this it is further assumed that over two billion U.S. dollars will be forthcoming during the interim period and that the following conditions are fulfilled:

1. The current inflation shall be settled within the first half of the planned period and its effect and menace to our economic stability will not assume such magnitude as will make the execution of the plan impossible.
2. (a) The instability, political and economic, in East Asia will be speedily relieved, and (b) the free exchange of foreign currencies reinstated.
3. Substantial aid from foreign countries may be expected in the process of economic revival and the export industry and modernization of key industries will be stimulated by foreign credits from private sources.
4. Difficulties in power supply and transportation will be solved during the earlier part of the years under project, and the achievement of the plan will not be vitally affected by these factors." [198]

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[196] Although recently has come the more realistic rumor that "Economic Recovery Plan May Be Delayed Two Years," *Tokyo Times*, October 17, 1948.

[197] Two reports on recovery have been published by the ESB since the first of 1948. The first report, the "Five-Year Plan for Japan's Economic Rehabitation," of January 1948, gives a detailed plan for the rehabilitation of major industries for each year, beginning in fiscal 1948-49 (April 1-March 31) and ending in fiscal 1952-53. The second report, "Outline of Japanese Economic Stabilization Plan," of May 17, 1948, is essentially the same as the plan reported in January but covers only the target year 1952-53, in which it is expected that Japan will be self-supporting. Later it was proposed that 1948 be regarded as a preliminary year and that the plan cover 1949-1953.

By a self-supporting or stabilized economy, the Japanese mean:

"1. Livelihood of the people is stabilized on a reasonable standard of living.

"2. Export is enough to meet the import of foodstuffs, industrial raw materials and other necessary goods. In other words, the balance of international payments is maintained.

"3. Level of economy is raised and well-balanced structure of various component parts of economy is realized, so that the above conditions, 1 and 2, may be satisfied.

"4. Efficiency of labor, or productivity of labor, is raised and full employment is, if possible, realized."

[198] See "Economic Rehabilitation Plan Released," *Tokyo Shimbun* and *Nihon Keizai*, May 18, 1948; also "Five Year Recovery Plan," Pt. I, *Nippon Times*, May 18,

The Board confessed that "every item of these assumptions may seem to be too hazardous and optimistic. But, it must be emphasized that this is an ideal formula." The overall goals set by the plan were as follows:

TABLE 82

GOALS FOR 1952-53

Category	*1952 (A)*	*1930–34 Average (B)*	*Percent A of B*
Mining and Manufacturing	130	100	130
Coal (million m.t.)	44	31	147
Crude Steel (million m.t.)	3.8	2.7	141
Ordinary Steel (million m.t.)	2.3	2.2	105
Cotton Yarn (million lbs.)	990	1,157	85
Spindles (installed) (millions)	5.8	8.0	73
Agricultural Produce—Money Index	115	100	115
—Caloric Index	116	100	116
Rice (million koku)	67.9	61.0	111
Wheat and Barley (million koku)	24.4	20.5	119
Exports (in million dollars)	1,646	(in October 1947 prices)	
Imports (in million dollars)	1,657	" " " "	
National Income (million yen)	14.8	12.2	121
Living Standards			
Consumers' Expenditures (per capita per annum—yen)	116.0	129.6	90
Food (per capita per day—calories)	2,111	2,242	94
Clothing (per capita per annum—lbs.)	7.4	8.7	85

Source: Japanese Economic Stabilization Board.

From the standpoint of capacity alone it should not be difficult to achieve this program, since in only a few cases does the ESB assume a capacity above the interim retention levels of the FEC. In steel the ESB figure of 3.8 million metric tons is slightly higher than the FEC figure of 3.5, in shipbuilding it is slightly higher, and the ESB emphasis on electric power expansion would seem to assume the abandonment of any plans to remove thermal power generation plants for reparations,[189] but generally speaking

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1948, Pt. II, May 19, 1948, Pt. III, May 20, 1948, Pt. IV, 21, 1948, Pt. V, May 22, 1948. And "Hopes Pinned on the Economic Rehabilitation Plan," Pt. I, *Asahi Shimbun*, May 18, 1948, Pt. II, May 19, 1948.

[189] The recovery plan states: "the most important condition to determine the tempo of Japan's economic restoration consists of three factors, namely, restoration of fuel and power supply, import of raw materials, and increase of transportation capacity." The ESB anticipates a power shortage of about 200,000 to 250,000 kw. during each year of the program, even though it has mapped out an ambitious program for expansion of hydroelectric power generating capacity. Japan has an estimated capacity of about 6 million kw. at present but this is considerably reduced during dry seasons. The ESB hopes to expand dry season capacity by 970,000 kw., using part of this increase for the electrification of the railroads in order to conserve coal.

The Board also stresses the necessity for rehabilitating transportation, emphasizing extensive repairs and maintenance rather than new production of rolling stock, due to the shortage of lumber, steel, etc. It advocates meeting transportation needs by shifting long-haul and bulk commodities to coastwide shipping. In view of the shipping shortage, however, this is questionable. It has an ambitious plan for building ships at a rate

ESB estimates of 1952-53 output are within the range of present or permissible capacity. Nor are the agricultural estimates unobtainable.

It is in the assumptions regarding convertibility of currency, adequate internal controls, availability of U.S. funds, import-export goals, and the level of output, to the extent that it is dependent upon provision of U.S. funds and attainment of export-import goals, that the plan seems optimistic. Furthermore, to the degree that realization of export-import goals depend upon the assumption of recovery and stability in the rest of the Far East, it is highly precarious.

If the U.S. does not appropriate the 2.3 billion dollars which the ESB plan assumes, then imports will fall short of the scheduled level, since even though overall Japanese import-export totals were in balance in 1952-53, a basic unbalance, assumed by ESB, would exist within the overall totals. In 1936, Far Eastern countries supplied nearly 60 percent of Japan's imports and were markets for nearly 70 percent of her exports, while dollar countries (the U.S., Canada, etc.) received 17 percent of Japan's exports and supplied Japan with 25 percent of her imports. It is estimated, however, that, over the next five years, dollar countries will absorb no more than 15 percent of Japan's exports while they will be called upon to supply from 50 to 60 percent of Japan's imports. Thus, unless there is currency convertibility or unless the U.S. finances the difference, the scheduled level of imports cannot be attained and production and exports will therefore also fall far short of the goals.

The crux of Japan's recovery problem is her foreign trade, and this in turn is dependent upon three factors over the next five years, currency convertibility, U.S. appropriations, and recovery in the Far East. The first is unlikely on a sufficient scale to help Japan. The second is, even if forthcoming, a temporary palliative. The third holds the key to Japan's recovery. With colonies lost, and with conditions chaotic in northeastern Asia,

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in excess of that allowed by the FEC interim retention level and also plans to charter between 500,000 and 1,000,000 gross tons of foreign shipping during the five-year recovery period. That a million tons of foreign shipping can be found and chartered seems optimistic. See "The Five-Year Economic Recovery Program," in *Sekai*, Tokyo, May 18, 1948. Present Japanese steel shipbuilding capacity is about 800,000 gross tons annually. This compares with actual construction in 1948 of 144,000 tons of steel shipping. In peak 1944 Japan built 1.6 million tons of steel shipping and in 1930-34 an annual average of 81,000 tons. The goal for 1952-53 is about one-third of the 1944 peak.

Japan's merchant marine (steel ships of 100 gross tons or more), which totaled 3.8 million gross tons in 1930-34 and 6.3 million gross tons in peak 1941, was 1.3 million tons in mid-1948. The target for 1952-53 is 2.3 million tons or 60 percent of 1930-34 and 40 percent of 1941. While this year less than 5 percent of Japanese imports have been carried in Japanese bottoms, it is hoped to raise the percentage to 50 in the target year. U.S. shipping interests have objected strongly to the large-scale reconstruction of Japanese merchant shipping. See publicly released letter of September 22, 1948, to General Draper by National Federation of American Shipping, Inc. on "Japanese Merchant Marine," Washington, pp. 1-13.

Japan's principal alternative to dollar areas as a source of imports, Japan is presently dependent upon dollar areas while looking to unsettled southeast Asia as a supplementary source of food and other imports and a probable major market for fabricated products. Basic solutions for Japan can come only with the complete integration of its economy with those of all other Far Eastern countries.[200] Unfortunately this waits upon the cooling of the boiling, turbulent cauldron that is presently Asia. But the longer this economic rapprochement in Asia is delayed, the more costly and the less successful will be United States efforts in Japan alone. Real economic recovery for Japan would be greatly aided by the formulation of a comprehensive and coordinated program for the revival of all Far Eastern economies, along the lines which the United States is now pursuing in Europe. An integrated and cooperative Far Eastern economic recovery program would demonstrate to Asian countries, which have not as yet indicated a desire to welcome Japan and the Japanese back into world economic and political relations upon a free and equal basis, quite clearly that our primary interest is their economic recovery and well-being. Such a program would make them much more amenable to the revival of Japan's economy. The United States has the power, prestige and resources to bring about such an economic settlement. For the United States to attempt to foster the unilateral development of a Japan dependent upon the American economy might not only hinder but actually postpone the resumption of those economic and political relations with the world upon which Japan's self-support depends. To pursue independent, unrelated and ineffective programs in China, the Philippines, Southeast Asia, Korea, Japan, etc. simply does not make sense. Japanese recovery cannot be achieved in a Far Eastern vacuum.

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[200] For a further discussion see "Conflicting Purposes in Japan," by Sir George Sansom, in *Foreign Affairs*, January 1948, pp. 302-11; see also, "Trial Balance in Japan," by W. I. Ladijinsky, in *Foreign Affairs*, October 1948, pp. 104-16, and "Japan's Economy on the Road Back," by Jerome B. Cohen, in *Pacific Affairs*, September 1948, pp. 264-79.

APPENDIX

Charts 1-17

CHART 1

Organization of the Chemical Industry Control Association

PRESIDENT

CHIEF DIRECTOR

BOARD OF DIRECTORS (19 Members)

DEPARTMENT OF GENERAL AFFAIRS

BRANCHES IN HOME ISLAND

SIX GROUPS (EACH UNDER A DIRECTOR)

GROUP No	DEPARTMENT (Each under a manager)	COMMODITIES CONTROLLED OR DUTIES	CONTROL COMPANY HANDLING DISTRIBUTION
1	Ammonium sulfate	Ammonium sulfate	Nippon Fertilizer Control Company
	Calcium cyanamide	Calcium cyanamide	
	Superphosphate	Superphosphate basic slag mixed fertilizers	
	Sodium salts	Caustic soda soda ash sodium bi and sequi carbonates, chlorine hydrochloric acid bleaching powder sodium hypochlorite	Industrial Sodium Salts Control Company
		Magnesium oxide carbonate and chloride carnallite	Nippon Bittern Products Control Association
2	Inorganic chemicals	Phosphorus titanium oxide	Nippon Industrial Chemicals Control Co
		Sodium sodium peroxide cyanide ferrocyanide and ferricyanide	Industrial Sodium Salts Control Company
		Potassium hydroxide potassium salts	Nippon Potassium Salts Control Company
		Sodium sulfate and sulfide	Nippon Sodium Sulfate Sulfide Control Assn
		Carbon disulfide	Nippon Carbon Disulfide Control Association
	Artificial abrasives	Carborundum alundum	National Abrasives and Grindstone Control Association
3	Ammonia Sulfuric and nitric acids and their salts	Ammonia ammonium salts nitric acid sodium nitrite and nitrate sulfuric acid	Nippon Sulfuric and Nitric Acids Control Co
	Synthetic organic products	Methanol butanol formaldehyde urea hexamethylenetetramine acetylene derivatives esters synthetic rubber plastics plasticizers	Synthetic Organic Products Control Company Synthetic Resin Control Company
	Explosives	Dynamites ammonium nitrate and perchlorate explosives black powder blasting caps detonators fuses (All for industrial uses only)	Nippon Explosives Control Company
	Coke oven products	Intermediate (aniline synthetic phenol nitro benzene etc)	Coke Oven Products Control Company
		Synthetic dyestuffs Photographic developers Rubber chemicals (accelerators antioxidants, etc)	
4	Carbon black	Gas lamp naphthalene and acetylene blacks	Nippon Carbon Control Company
	Oxygen and calcium carbide	Oxygen calcium carbide	Nippon Carbide Control Company
5	Oil and fat products	Vegetable and animal oils and fats	Oil and Fat Products Control Company Nippon Foreign Candle Industry Association
	Treated oils and fats	Treated vegetable and animal oils and fats	Nippon National Japanese Candle Industry Association Nippon Rubber Substitutes Industry Assn Nippon Polishing Agents Association Nippon Polishing Agents Association Nippon Margarine Industry Association
	Varnishes and paints	Varnishes paints lacquers printing inks	Varnish and Paint Control Company
6	Investigation	Price fixing and collecting data on production costs and financial status of member companies	
	Labor	Labor allotments and labor statistics	
	Materials	Material allotments to member companies	
	Transportation	Planning for transportation as used by member companies	
	Supervision	Financial supervision of member companies	

CHART 2

GROWTH OF "BIG FOUR" ZAIBATSU

Japan — 1930-1945

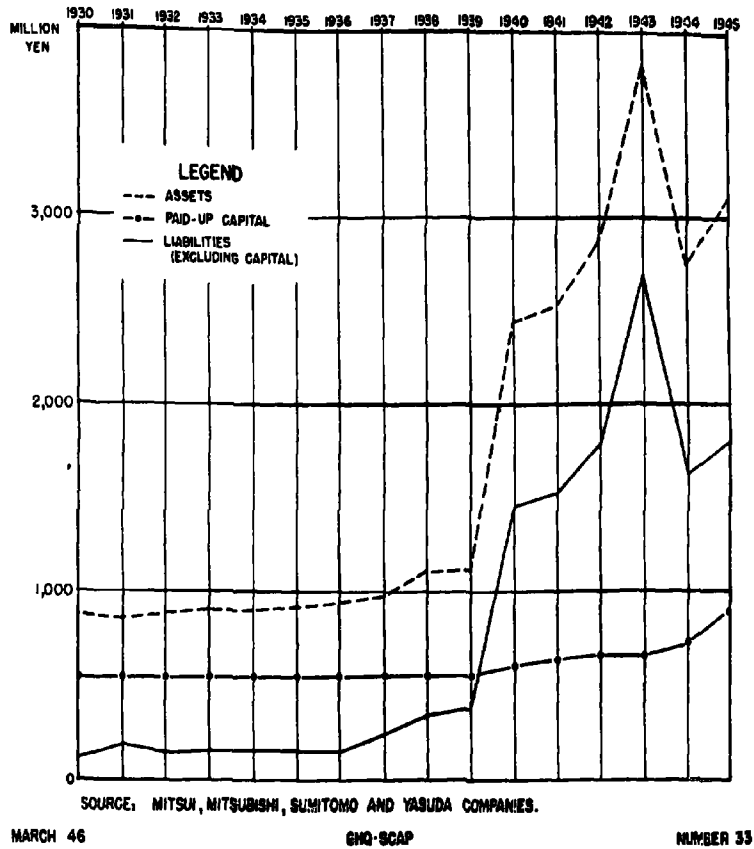


CHART 3

FINANCIAL POSITION OF 17 HOLDING COMPANIES — JAPAN

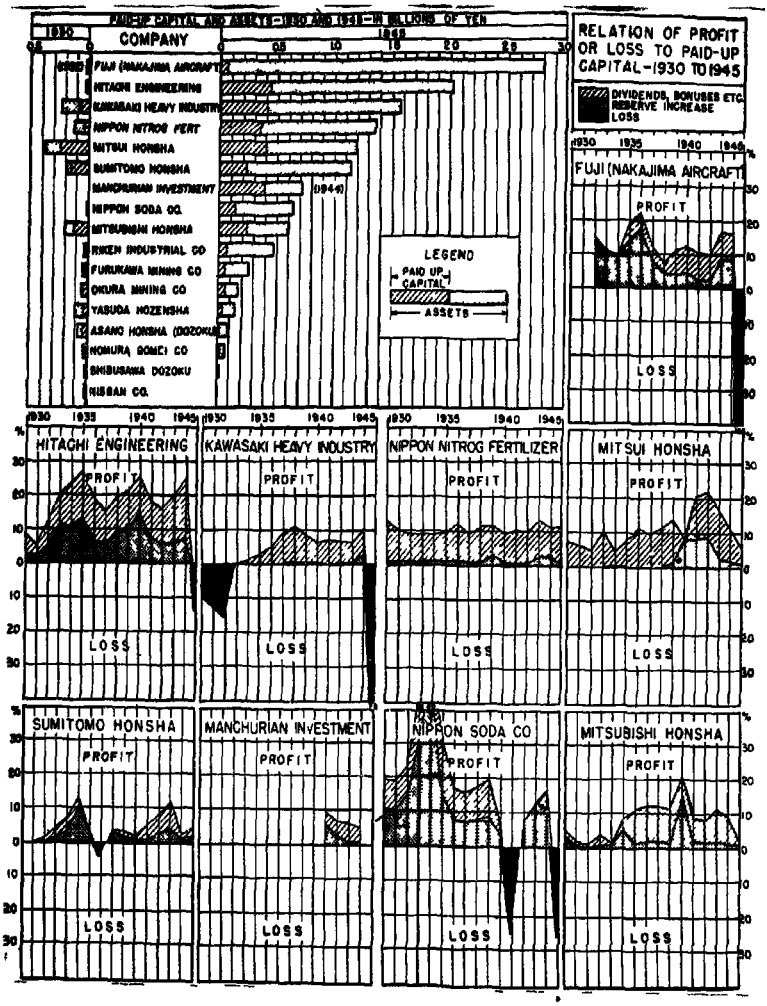


CHART 3—(*Continued*)

FINANCIAL POSITION OF 17 HOLDING COMPANIES—JAPAN

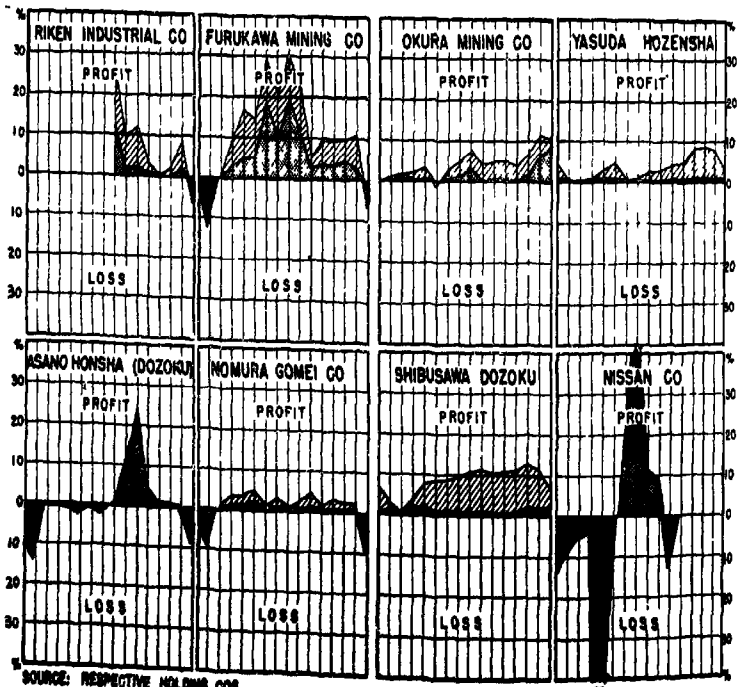
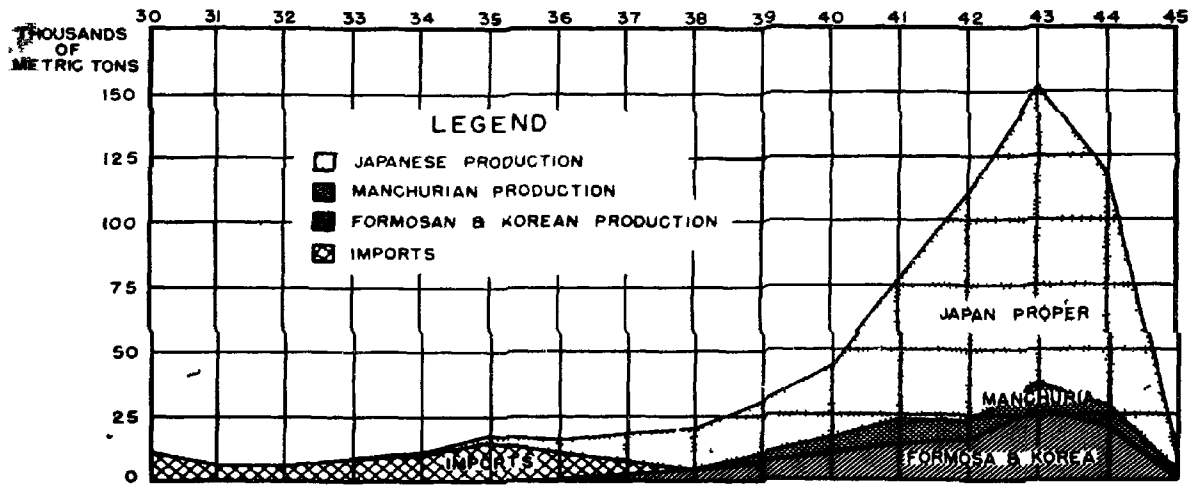


CHART 4

ALUMINUM PRODUCTION AND IMPORTS

Japan—1930 to 1945



SOURCE: KOEKI EIDAN CO, LIGHT METAL CONTROL ASSN AND MINISTRY OF FINANCE

NOTE: 1943-5 FIGURES FOR MANCHURIA ARE ESTIMATES

MAY 46 GHQ · SCAP NUMBER 17

CHART 5

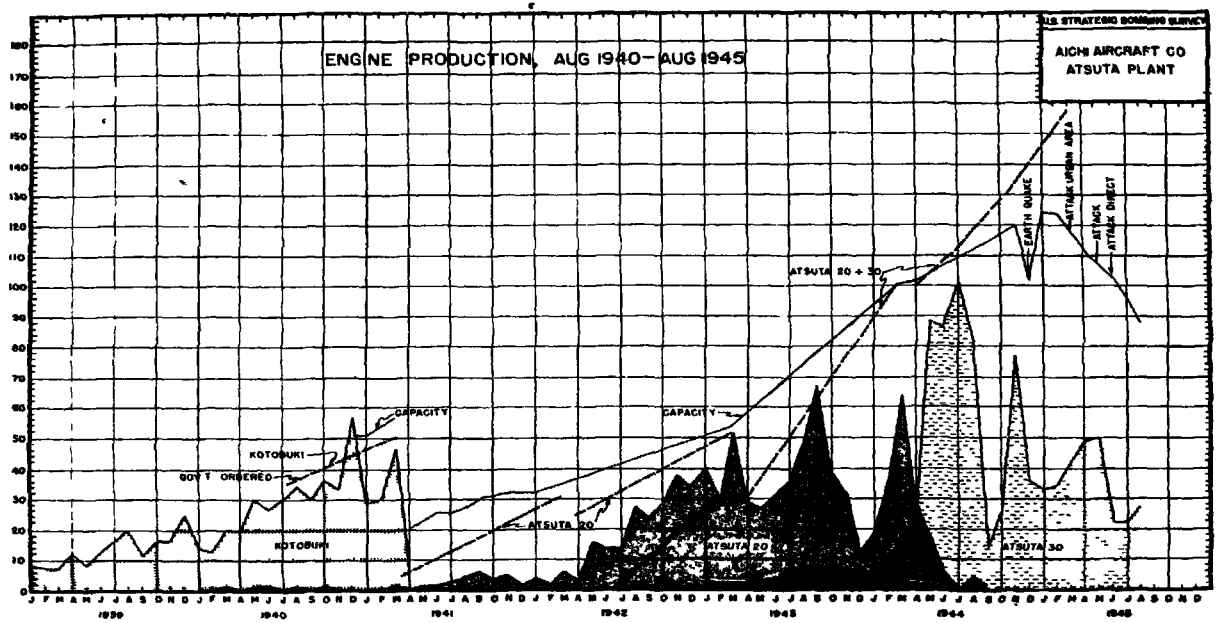
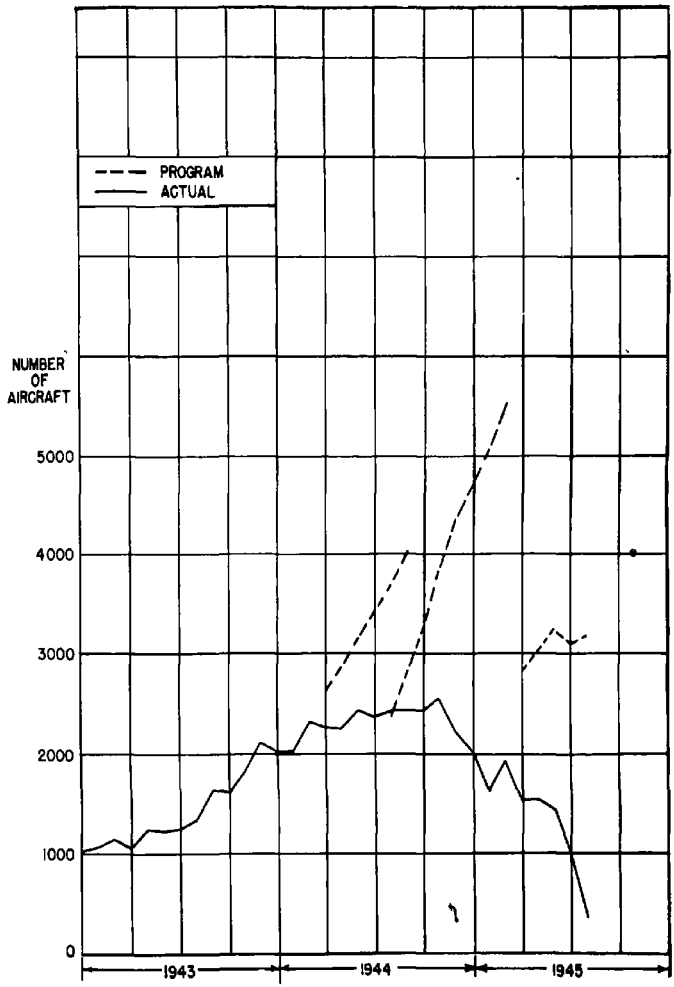

ENGINE PRODUCTION, AUG 1940–AUG 1945
U.S. STRATEGIC BOMBING SURVEY
AICHI AIRCRAFT CO
ATSUTA PLANT
CAPACITY
KOTOBUKI
GOV'T ORDERED
KOTOBUKI
CAPACITY
ATSUTA 20
ATSUTA 20 + 30
ATSUTA 20
ATSUTA 30
EARTH QUAKE
ATTACK URBAN AREA
ATTACK
ATTACK DIRECT
1939
1940
1941
1942
1943
1944
1945

CHART 6

PROGRAM VS. ACTUAL PRODUCTION OF AIRCRAFT

January 1943-August 1945

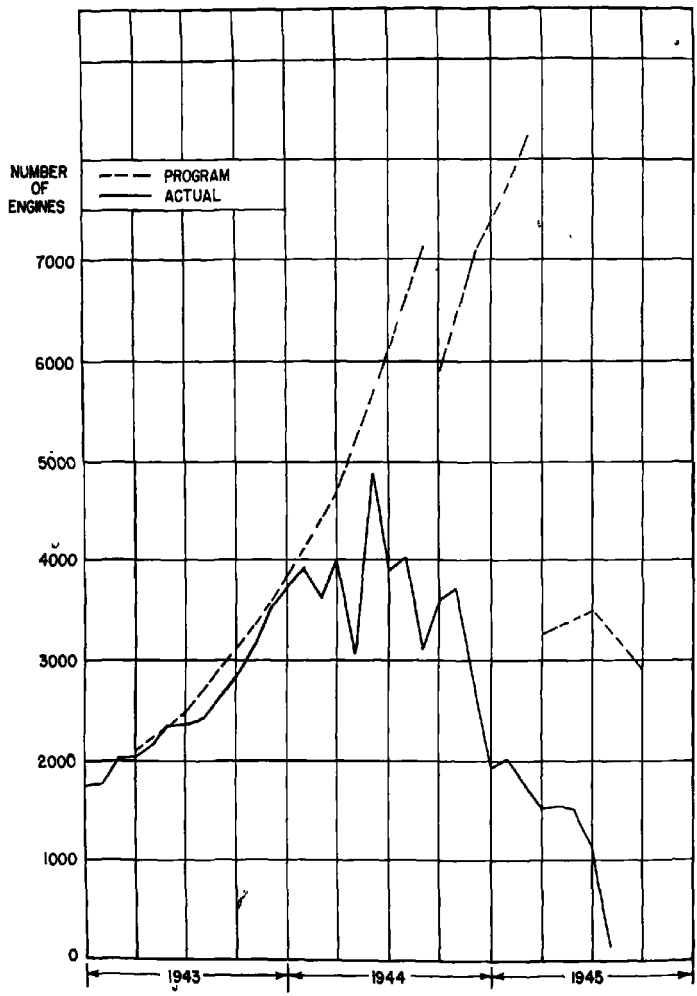


Source: Industry Report, Aircraft Division, U.S. Strategic Bombing Survey.

CHART 7

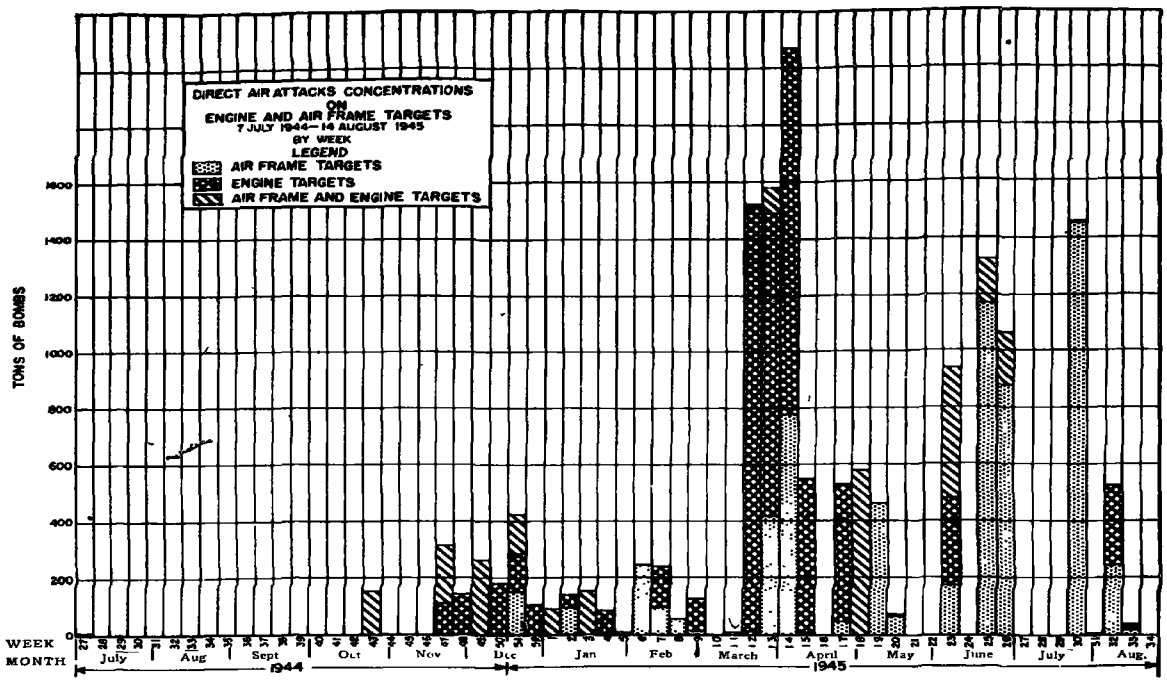
PROGRAM VS. ACTUAL PRODUCTION OF ENGINES

January 1943-August 1945



Source: Industry Report, Aircraft Division, U.S. Strategic Bombing Survey.

CHART 8

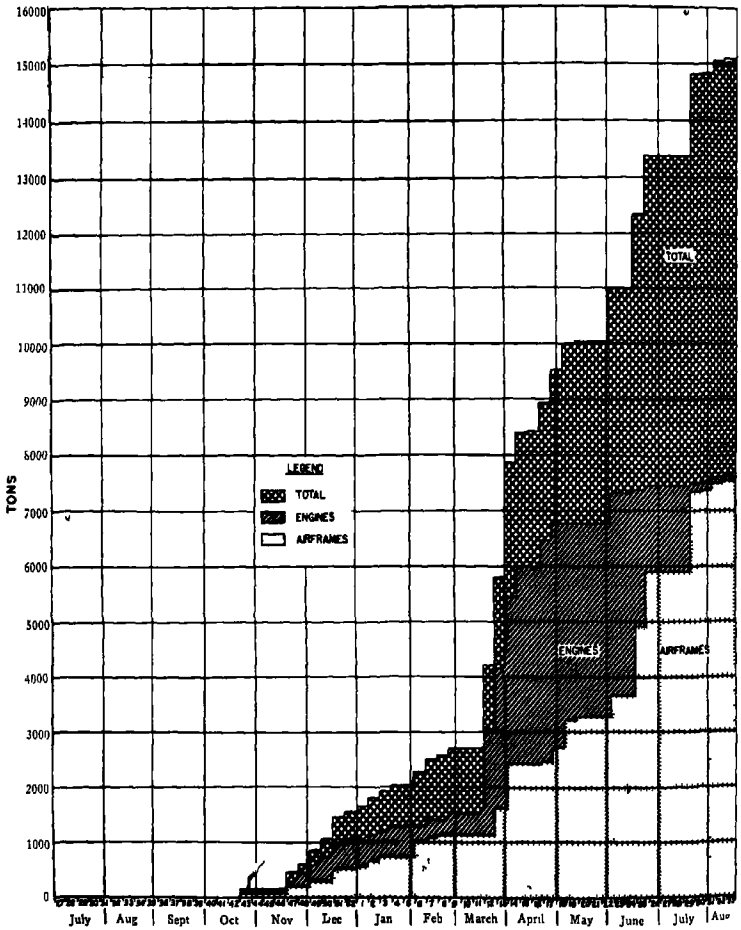


Source: Industry Report, Aircraft Division, U.S Strategic Bombing Survey.

CHART 9

DIRECT ATTACKS ON ENGINE AND AIRFRAME TARGETS, CUMULATIVE TOTALS

July 7, 1944-August 14, 1945



Source Industry Report, Aircraft Division US Strategic Bombing Survey

CHART 10

JAPANESE NAVAL ORDNANCE INDICES OF OUTPUT

(1941 Monthly Average = 100)

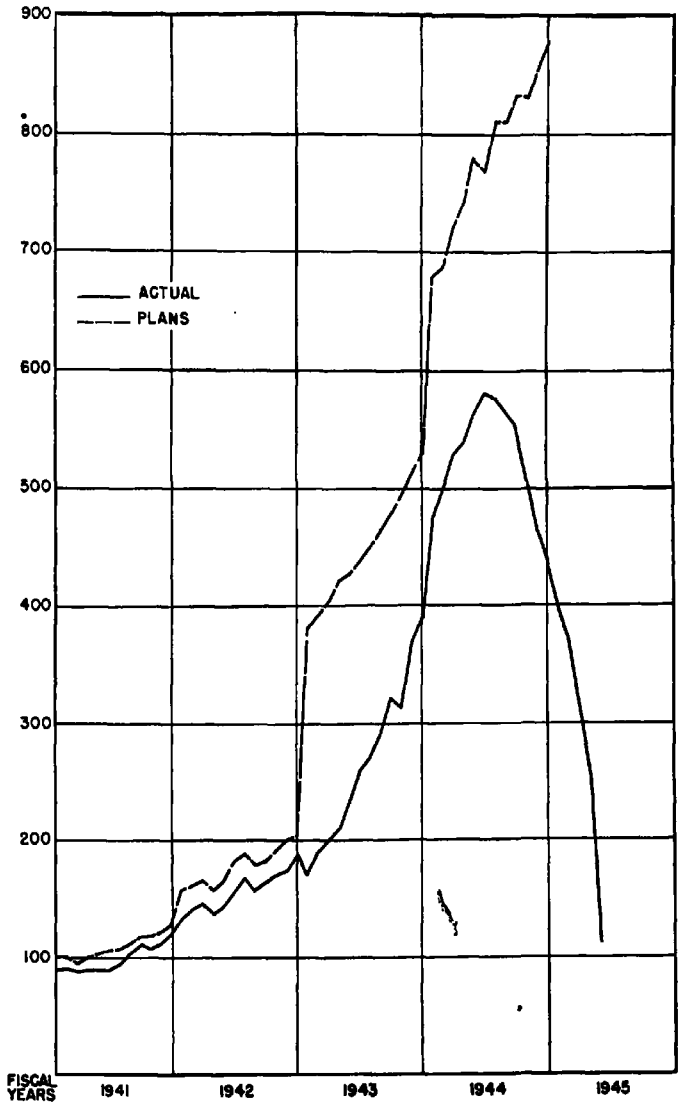


CHART 11

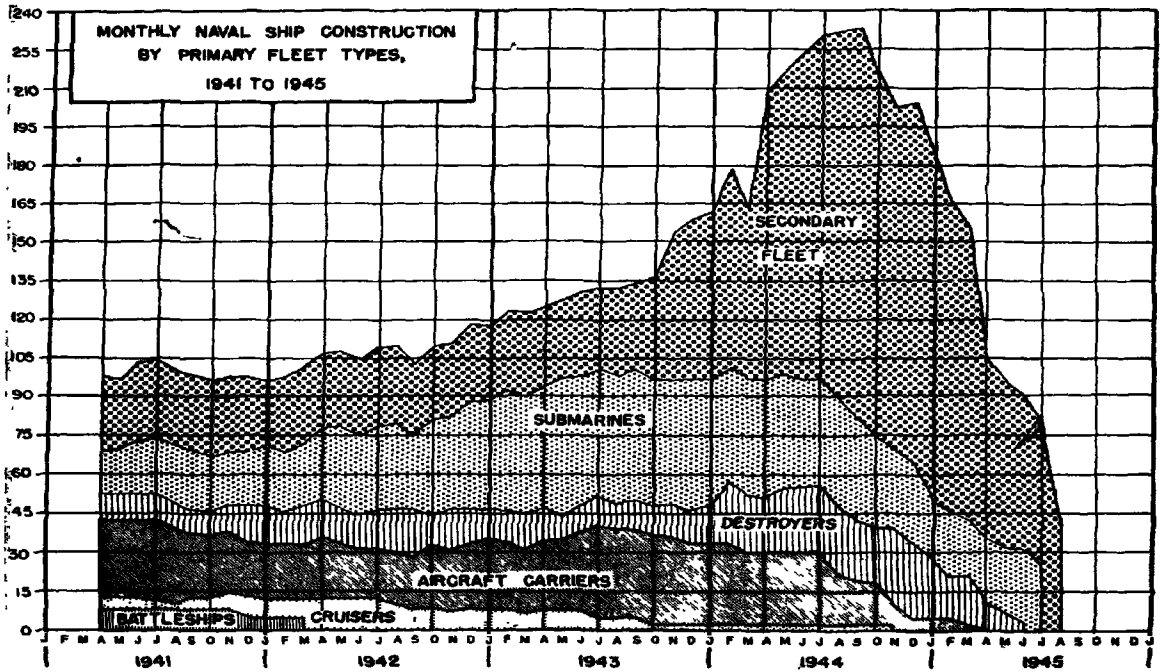

MONTHLY NAVAL SHIP CONSTRUCTION
BY PRIMARY FLEET TYPES,
1941 TO 1945
240
255
210
195
180
165
150
135
120
105
90
75
60
45
30
15
0
SECONDARY FLEET
SUBMARINES
DESTROYERS
AIRCRAFT CARRIERS
BATTLESHIPS
CRUISERS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J
1941
1942
1943
1944
1945

CHART 12

The Organization and Business-Management of Osaka Prefectural Police Bureau

Governor of Osaka Prefecture

Osaka Police Bureau

Police Dept.

- Police Section . . . .
  - Matters in relation with Personnel
  - Matters in relation with Establishment
  - Matters in relation with Expenditure
  - Matters in relation with Communication
- Guard Section . .
  - Matters in relation with Firearms and Explosives
  - Matters in relation with Guards in General
  - Matters relating with Guards of the Advancing Allied Forces
- Peace Preservation Section
  - Matters in relation with Movies and Dramas
  - Matters in relation with Business in General
  - Matters in relation with Moral
- Establishment Section — Matters in relation with Constructions
- Fire-Brigade Section — Matters in relation with Fire-Brigade
- Police Training School — Matters in relation with Training Police-men

Public Peace Dept.

- Special Police Service Section No. 1
  - Matters in relation with Thought and Religion
  - Matters in relation with Inspection of Newspaper and Publication
- Special Police Service Section No. 2 — Matters in relation with Koreans in Japan
- Foreign Section . . .
  - Matters in relation with Protection for Foreigners
  - Matters in relation with Nationality
- Criminal Section . . — Matters in relation with Criminal Cases
- Economical Section — Matters in relation with Economical Crime
- Transport Section . . — Matters in relation with Transportation on Land and by Sea

Labor Dept.

- Labor Section . . . . — Matters in relation with Factory
- Schedule Section . . — Matters in relation with Laborers
- Mobilization Section
  - Matters in relation with Distribution of Laborers
  - Matters in relation with Employment
- Insurance Section . . — Matters in relation with Health Insurance

Information Section . . . . Matters in relation with Politics and Election

Chief of Police Affairs . . Matters in relation with Supervision of Police Affairs in General

Police Defense Division . . Guards on Actual Duty

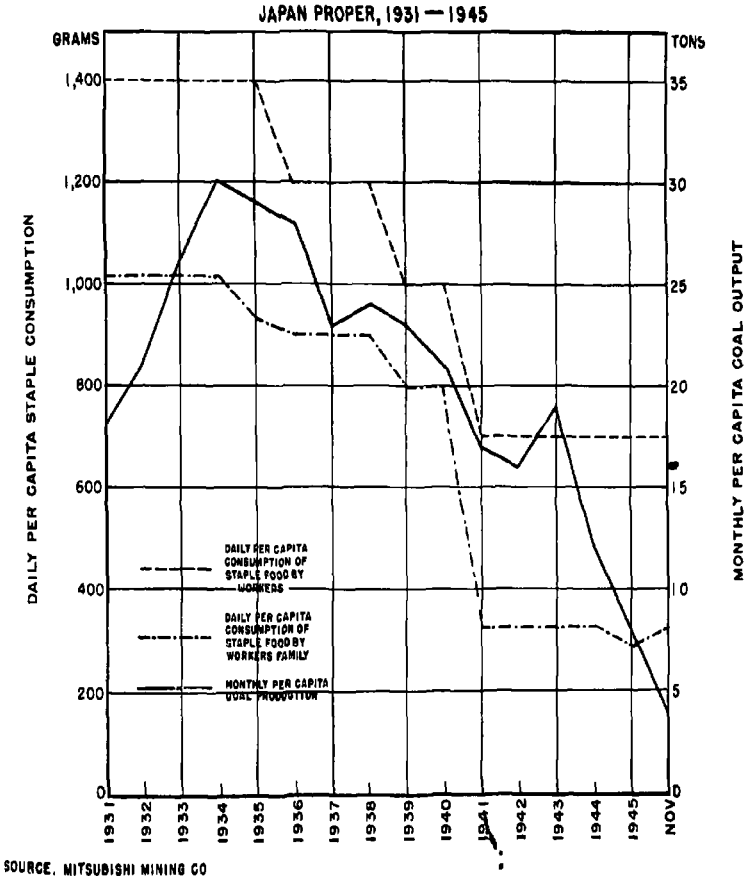
CHART 13

Organization and Function of the Executive Headquarters of the Osaka Prefecture for the Allied Forces Police Bureau

Organization			Duties Alloted
Director of Police Bureau Keijiro Inomata	Chief of Police Guard Division Konai Kurashina	Head of Communication Section Takashi Ogino	Matters concerning Police and Ordinary Telephone
		Head of Police Guard Section Sadaharu Yuasa	Matters concerning Police Guards
		Head of Public Preservation Section Kenshuro Matsumoto	Matters concerning Comfort and Amusement Facilities
		Head of No 1 Establishment Affairs Section Keiji Horii Head of No 2 Establishment Affairs Section Kajuji Kawaguchi	Matters concerning Dormitory Facilities, etc
	Chief of Transportation and Public Peace Division Kiyoshi Odagiri	Head of Special Service Section Takao Hayashi	Matters concerning Thought etc
		Head of Foreign Section Takao Hayashi	Matters concerning Allied People Matters concerning Translation and Guide
		Head of Transportation Section Akikichi Yamada	Matters concerning Traffic and Transportation
	Chief of Public Utility and Labor Division Tadashige Tanaka	Head of Labor Section Masato Hamada	Matters concerning Distribution of Labor
		Head of Gas and Electric Section Hidemi Fujita	Matters concerning Gas and Electric.

CHART 14

CONSUMPTION OF STAPLE FOODS BY MINERS AND FAMILIES, AND COAL PRODUCTION

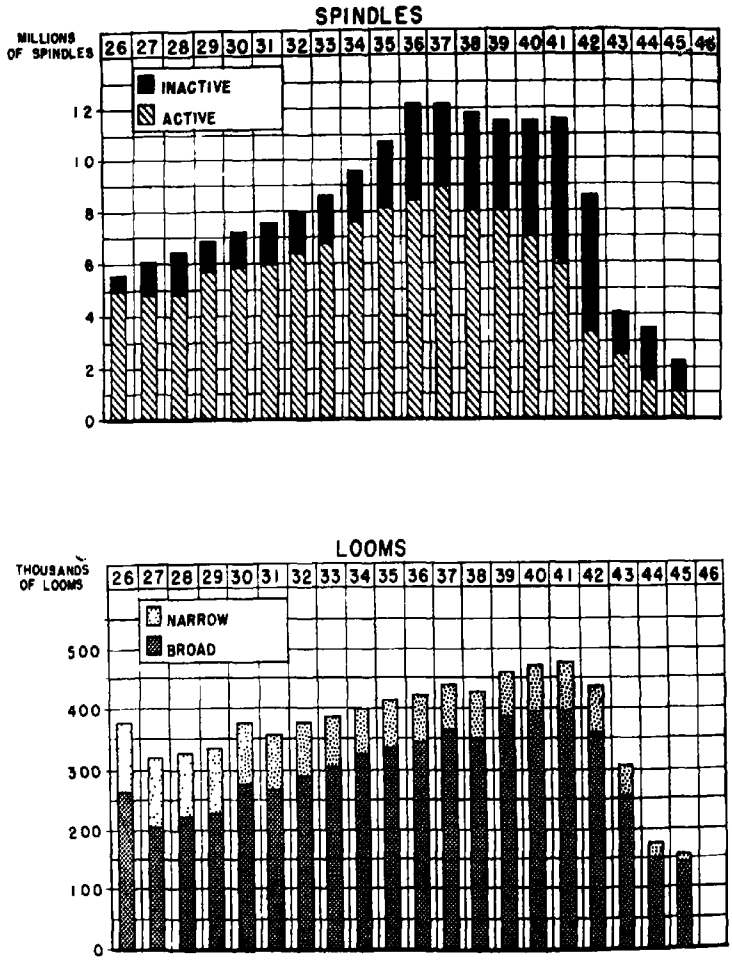


SOURCE. MITSUBISHI MINING CO

CHART 15

COTTON INDUSTRY

JAPAN — 1926-1945

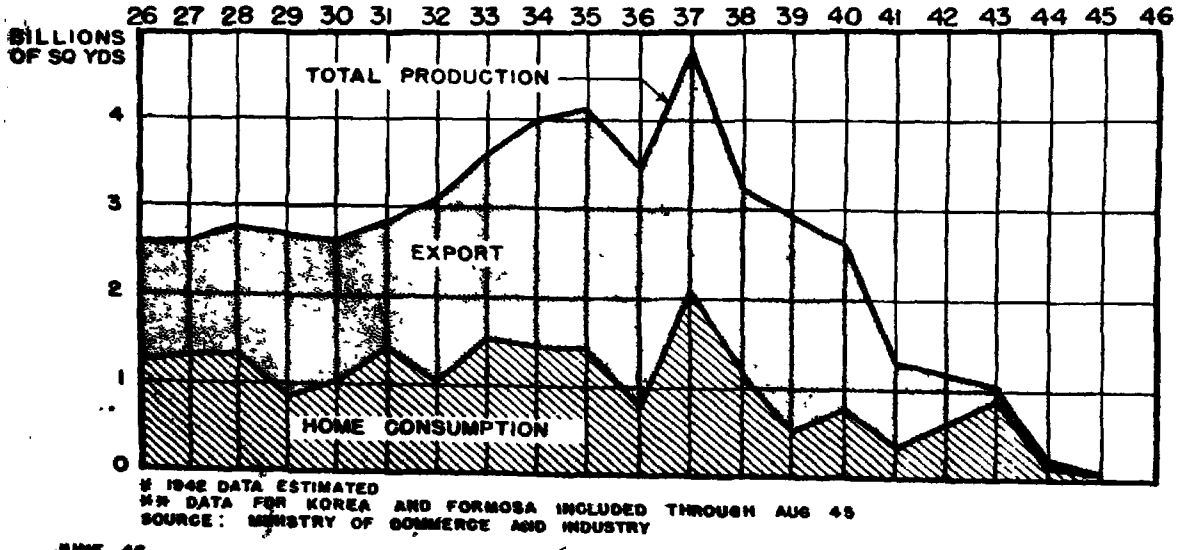


SOURCE: JAPANESE TEXTILE ASSOCIATION

CHART 16

COTTON CLOTH

PRODUCTION, EXPORT & CONSUMPTION—JAPAN, 1926 TO 1945



JUNE 46

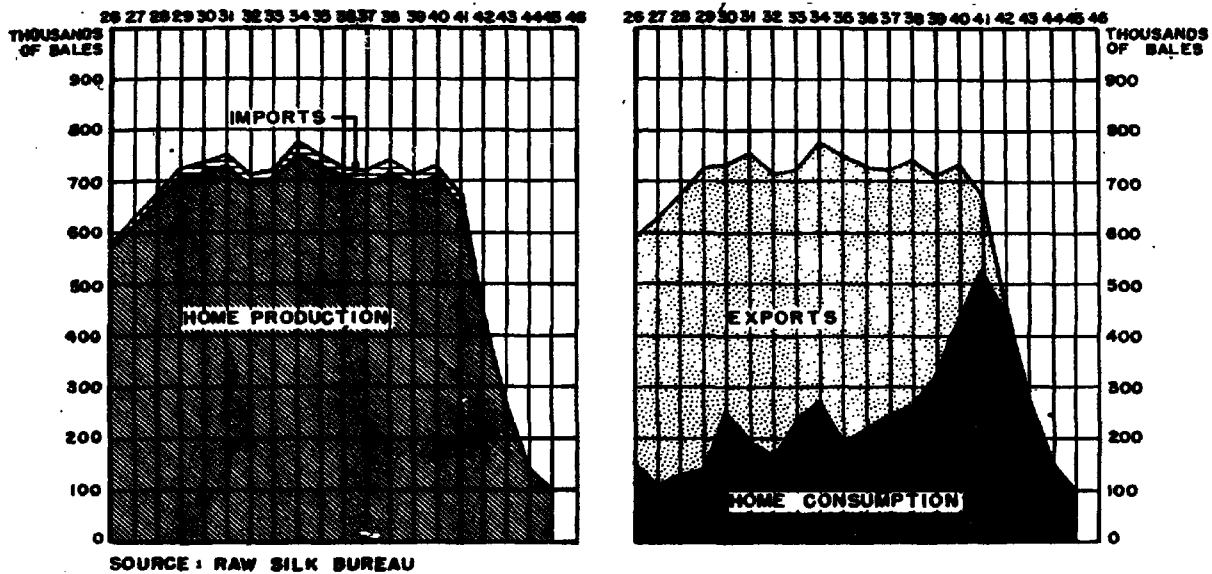
GHQ·SCAP

NUMBER 32

CHART 17

RAW SILK—PRODUCTION, IMPORTS, EXPORTS AND CONSUMPTION

JAPAN — 1926 TO 1945



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