
Lessons the United States Must Relearn

The foundations of the Japanese 'economic miracle'

by Ramtanu Maitra

According to the latest report of the Keizei Koho Center (Japan Institute for Social and Economic Affairs), *Japan 1991—An International Comparison*, the gap in per capita income between Japan and the United States has widened further in favor of Japan. Japanese per capita Gross National Product (GNP) is \$23,387 a year, against \$19,873 for the United States.

The latest available figures also show that Japan, with about half the population (and 12 times the population density of the United States), has a GNP of \$2,867 billion, compared with \$4,001 billion for the U.S.—an indication that, as Japan is growing at a much faster rate, it is going to overtake the United States in absolute GNP terms sooner or later. These figures are also interesting when compared to similar figures for 20 years ago.

Japan's "economic miracle," a pet subject of admirers and Japan-bashers alike, has been analyzed and reanalyzed umpteen times. Some in the West who are particularly disturbed by Japan's economic might, have attributed this miracle to a mystical work ethic that they believe is a mixture of Confucianism and Calvinism. Others assert that morality in Japan is based on human relations, and that there is no confrontation between the self and a set of unchanging principles. Some state that trying to be on top in every field is a stronger impulse in Japanese society than most others.

According to one view, the key is that Japanese corporations live in "near absence of any idea that there can be no truths, rules, principles, or morals that always apply, no matter what the circumstances." All these conjectures and speculations alike hide the factors that make Japan grow and prosper.

Free trade not a dogma

The United States has attacked Japan as an opponent of free trade, whose nasty competitive ruses have taken advantage of the world. Japan *does* support free trade, but not as a dogma. The Japanese view an open trading system as a practical means of helping promote all-round development, not

some magical formula for success or a ruse to loot other nations. While the Japanese recognize the necessity for external trade to get access to technologies being developed worldwide, they have at the same time paid a great deal of attention to providing their own domestic industries the required protection and help until they build up strength.

Lately, Japanese leaders have been inclined to be less deferential to Western nostrums like "free trade," when they see one of its chief promoters, the United States, declaring that its allies' economic activity has replaced the communist menace as its primary security threat and hastening to lock up the Americas through a string of "free trade agreements."

The Japanese allergy to the economic dogmas of the Anglo-American establishment was evident, for instance, at the annual meeting of the Asian Development Bank (ADB) in New Delhi last May. ADB President Kimimasa Tsurumizu, formerly a senior adviser to Japan's Finance Ministry, complained at that time in an interview with the *Economic Times* of India, that some donor countries insist on taking a "totally macro-economic approach. . . . That is wrong, you know. The macro-economic approach is not always appropriate. Japan, for instance, is still on the way to 100% liberalization. So the success of Japan cannot be explained by a totally macro-economic approach. Perhaps you are thinking of the U.S. Perhaps they are sticking to the macro approach. I think the development thrust of the developing member countries has to have another approach."

American analysts have for the most part limited their analysis of Japan's economic miracle to scrutiny of the role of the Ministry of International Trade and Industry (MITI) and its role in setting the parameters and overall direction of industry—precisely the dirigistic role played by the federal government in the early United States republic.

However, little attention has been paid to the extremely careful way in which Japan fostered the growth of a myriad of high-technology firms and small corporations which feed into the huge "brand names" most familiar to the world—Mitsubishi, Sony, Toyota, and so forth. These high-tech

firms, each employing under 1,000 employees, are the core of Japan's industry, where individual initiative and the entrepreneurial spirit have been granted conditions in which to thrive. Americans might recognize this layer of industry as the many high-tech firms that once spun new products out of the technologies used by the U.S. space program, for example. The highly skilled labor force of this *Mittelstand*—as this key middle layer of industry is referred to in Germany—has been carefully nurtured so as to ensure that employees can assimilate and work with new technologies.

Roots of success

Although the decades of the 1960s, '70s, and '80s saw the fuller development of Japan's economic muscle, the roots go back more than 100 years to the days of the Meiji Restoration in 1868. It was the period when banking, supported and managed by trading families, was developed to provide the essential capital for the fledgling industries then in the hands of large family groups called *zaibatsu*.

These *zaibatsu* groups used family fortunes to build up the traditional sectors. Prominent among them, for example, is Mitsubishi, founded by former warrior-bureaucrat Yataro Iwasaki, which started off as a shipping firm that grew under governmental protection. The Mitsui family is another *zaibatsu* group which was composed of merchants going back to the pre-Meiji Edo period and was active in wide-ranging economic activities such as banking, insurance, cotton spinning, sugar, and machinery. Although some signs of professional management were visible even in the Meiji period, such as the case of Oji Paper, the Meiji era was essentially a period of individual capitalists involved in traditional industries.

Modern industry was established during the Meiji period, and did not absorb more than 10% of the working population even by 1915. The Russo-Japanese war in 1907 and World War I boosted Japan's shipping, railroad, and iron and steel industries immensely, and also gave birth to hydroelectric power. The economic boom caused by these industrial developments began to show up in post-World War I Japan immediately. From a perpetual debtor nation with balance of payments problems in 1914, Japan emerged a creditor nation in 1920.

Despite a series of economic ups and downs caused by such external factors as the Great Depression, an escalating war in China and Manchuria, and a highly unstable internal political situation, Japan progressed during the decade of the 1930s. In fact, the foundations of Japan's postwar growth were laid under the direction of the unorthodox Finance Minister Korekiyo Takahashi in the decade that preceded Japan's entry into World War II. In the early 1930s, when the Great Depression threw Japan into a financial quagmire, it was Takahashi who took a number of bold steps: He took the yen off the gold standard and devalued it gradually, injected a massive dose of government spending into the economy, imposed low interest rates to revitalize industries, and facili-

tated the issue of government bonds.

Takahashi's financial measures prompted an economic growth centering around export of cotton. At the same time, the low interest rate regime revitalized industry. With booming exports backed by a domestic fiscal expansion under government control, the Japanese economy got a shot in the arm. During this period, the output of the heavy and chemical industries overtook light industry in total yen valuation for the first time. The impact of government spending on rural relief projects during this period also paid dividends, and it seemed then that Japan was on the road to recovery despite a worldwide depression.

The rise of the military, which resulted in the assassination of Finance Minister Takahashi, put a halt to the robust and varied economic activities of the mid-1930s. But the groundwork had been laid. A whole range of chemical industries such as Showa Hiryo, which started indigenous ammonium sulfate production, Tejin, Asahi Kenshoku, Toyo Rayon, which turned Japan into the largest rayon producer in the world, and others, are the legacies of the Takahashi period. This period also saw the rise of Toshiba, Hitachi, and Mitsubishi Electric, which began mass production of heavy electrical machinery; Toyota and Nissan, which pioneered automobile production in Japan; and Nakajima Hiroki and Mitsubishi Heavy Industries, which started airplane production. No doubt, some of these engineering firms were hijacked by the military to produce armaments later, and particularly after the assassination of Takahashi who was keen on curbing military spending.

American occupation policy

Japan's total defeat in World War II brought its economy to its knees. The victors in the Pacific theater moved in quickly with reforms in the midst of a grave food shortage. American occupation authorities implemented demilitarization and democratization reforms pertaining to the *zaibatsu*, land, and labor. But postwar growth in Japan cannot be accounted for simply by reforms prescribed by the occupation forces; these reforms merely helped grease the moving parts of the economic machine built up during the 1930s.

Zaibatsu groups were dissolved and an Anti-Monopoly Law was enacted in 1947. Another law, The Elimination of Excessive Concentration of Economic Power, was passed in 1947 and under it some 325 firms became subject to partitioning, although only 18 were actually split. These measures broke or significantly reduced the concentration of economic power in the hands of the family groups.

The land reform policy, a great success, acted as an extremely effective measure to overcome the semi-feudal nature of Japanese society. The ownership system was completely eliminated for absentee landlords through the compulsory sale of their holdings to the tenants who farmed them. Exceptions were permitted only in the case of resident landlords, who were allowed to let the tenants one hectare of

land. As a result of the land reforms, the owner-farmer became the mainstay of Japanese agriculture. A direct result of the land reform was that the proportion of total agricultural land utilized by tenant farmers was decreased from about 50% to 10%.

The American occupation also brought about the trade union movement. In 1945, the number of workers associated with the trade union movement was minuscule. In a span of three years, due to the encouragement of occupation authorities in the name of democracy, 60% of the workers in Japan became members of trade unions. Although most of the unions were organized on company lines, collective bargaining resulted in higher wages, better working conditions, and the acceptance by management of the career-long employment and seniority wage systems.

While these crucial inputs—dissolution of the *zaibatsu* groups, land reform, and the trade union movement—helped Japan to stagger back to its feet following the devastation caused by its participation and defeat in the war, the road remained rocky. Inflation became endemic, while unemployment was swamping the nation. In order to create jobs, Finance Minister Ishibashi increased fiscal spending, directing funds through the Reconstruction Bank to under-utilized industrial companies to revive production. Reconstruction Bank funds were allocated to the coal industry, and millions of war veterans who were unemployed were recruited as workers. Strict food rationing was imposed. The measures had partial success.

In 1949, Joseph Dodge, head of the Bank of Detroit, came from the United States to advise the occupation forces on how to curb inflation. Dodge imposed strict fiscal and monetary policies and forced the government to balance the budget. The Dodge Line, as it came to be known, killed inflation to a large degree, but caused a severe shortage of funds. Dodge insisted that Japan must not look to the United States for funds, but rather achieve recovery through its own efforts amid free competition.

From 1945 to 1951, Japan went from one economic crisis to another. The Dodge Line, described by some Japanese economists as “bitter medicine for taming inflation,” provoked a serious recession. Many businesses which had depended on government expenditure since the prewar years were plunged into bankruptcy and forced to lay off *en masse*, adding to the multitude of unemployed and nationwide labor unrest.

Organizing the export boom

Amidst this bleak economic scene, the Korean War broke out. The U.S. decision to acquire military procurements, known as “special procurements,” from Japan, provided the economy an infusion of fresh blood. Industries ranging from coal to textiles began to revive. The special procurements, to the tune of \$800 million annually, accounted for two-

thirds of Japan’s total exports at that time. The export earnings helped Japan to import and build up its capital-intensive industries.

A series of measures followed the beginning of the export-led economic recovery. Two government-funded banks, the Export-Import Bank of Japan and the Japan Development Bank, were set up in 1951. The first was to handle deferred export payments and the second was to supply gov-

Labor-management relations vital to Japan’s economy

Japan had a minuscule labor movement at the time the war in the Pacific ended. Following defeat, Japan was in shambles. There were immense shortages of food and clothing, and runaway inflation was pauperizing the citizenry. Under these circumstances, Japanese workers formed trade unions to defend their interests amid violent nationwide demonstrations. The most powerful union, the Sanbetsu Labor Federation, was led by the Japanese Communist Party.

Following the political dogma of the JCP, the Sanbetsu demanded revolution and complete control over the production centers. A series of violent clashes ensued, of which the Yomiuri Shimbun strike of 1945 and the Toho Motion Picture studio strike of 1946 were the most notable. A number of other strikes, such as that by electric machinery workers, employees of Japan National Railways, the seamen’s union, the steelworkers’ union, and the coal miners’ union brought the country to its knees. When a call for a nationwide strike on March 1, 1947 was given, the American occupation forces threatened the unions by putting tanks on the streets.

The concept of democratization began to take shape following the birth of the Ministry of Labor, which formed laws and systems to regulate labor relations. A new national labor center was born in the form of Sohyo (the General Council of Trade Unions), which campaigned against the JCP’s domination of the labor unions and its policy of violent revolution, and advocated creation of a free and democratic labor union movement.

With the Korean War and the subsequent boom to the economy, the Sanbetsu collapsed, giving way to the Shin Sanbetsu (National Federation of Industrial Organizations). It seemed at that point that Soyo and Shin Sanbetsu

ernment funds to strategic industries as long-term, low-interest loans. According to Takafusha Nakamura, former professor at the University of Tokyo and former director-general of the Economic Planning Agency's Economic Research Institute: "At the time, four industries were treated as strategic: electric power, coal, shipping, and steel. Electric power and coal were needed because energy shortages were hindering reconstruction, and shipping had to be helped because Ja-

pan's merchant marine had been almost totally destroyed by the war. The reason for giving steel preferential treatment was the urgent need to boost capacity—and to introduce Western steel-making technology—to meet the rising demand for steel caused by the economy's recovery. The priority assigned to these four industries is evidence that policy-makers planned to replace Japan's industrial structure, which was centered on light industry, with a structure featuring

would lead a free and democratic labor movement, but in 1951, when Japan signed the San Francisco Peace Treaty and Security Pact with the United States, the Sohyo turned leftwards, attacking the treaties (as they say in Japan: "The hen turned into a duck"). Soon the labor unions began to leave Sohyo *en masse* to form Zenro (which later became Domei), and the trade union movement was once again polarized between leftists and rightists.

Even in these difficult times, however, a distinct current emerged within the labor unions advocating productivity and elimination of political ideology in labor struggles. The concept of a labor movement that is "economically motivated" came to the fore and asserted itself within the four parallel labor confederations—the Sohyo, Domei, Churitsu Roren (a neutral union), and Shin Sanbetsu.

Exhausted by confrontation, both management and labor agreed to stabilize labor relations in the mid-1950s. Earlier, a number of strikes had crippled industry, and many businesses had lost their competitive edge as a result of labor problems.

The new labor-management relations, the cornerstone of Japan's fast growth, saw management agreeing to maintain career-long employment, seniority-based wages, enterprise unions, and equality in wages and work.

In subsequent years, Japan's trade unions have gone through mergers and changes, but labor stability has prevailed. A number of changes brought about by the dual structure theory have also changed the nature of the labor unions. The Metalworkers Union, which became the core of the labor movement in the 1960s and 1970s, began gathering the support of private labor unions to form a labor federation in the early 1980s. On Dec. 14, 1982, they formed the National Council of Private Unions (Zen Nihon Minkan Roso Kyogikai) with 425,000 members. In 1987, the movement gained further ground when the neutral Churitsu Roren and Domei were dissolved and merged into the National Federation of Private Labor (Zen Nihon Minkan Roso Rengokai). In 1988, the old Shin Sanbetsu, and in 1989, Sohyo, too, were disbanded, clearing the way for establishment of a General Confederation

of Japan Labor Unions (Nihon Roso So Rengokai), 8 million strong, into which the government workers union will also be absorbed.

Under the current career-long employment system, employees are promoted by both seniority and merit to higher wage categories. A new recruit expects his wages to be doubled by the time he is 35 years old and tripled by the time he is 50. To help ensure stable living standards, wage levels also take into account personal circumstances and needs. Thus, men are generally paid most when their family expenses, especially for education, are expected to be heaviest. The gap between the wages paid to high school graduates and university graduates is very slight and widens only with age. But even at the age of 35, when the gap reaches its peak, wages for most high school graduates are about 60-80% of those for university graduates.

Today, income differentials between managers and workers and between white-collar and blue-collar workers are much smaller than in almost any other country. Compensation for workers or managers usually does not change even if they are transferred, as they are working for the same company. Supervisors are not necessarily paid much more than their subordinates and, in fact, they are often paid less than their senior subordinates. This income system is another factor in creating a sense of unity.

Enterprise unions are a unique feature of Japan's labor-management equation and are composed of employees working for a single employer at a single location, for example, in the small industry sector. They are both a product of and a means for many structural reforms, such as the unity between white-collar and blue-collar workers, equitable wage distribution, merit-based promotion from within a company, and fewer status barriers between managers and workers. Most importantly, the enterprise unions, organized as they are in the thousands of ancillary units tied to the large companies, bring all of the company's employees together in helping the company to deal with the continuous changes in technology and the market.

heavy industry.”

Along with these policies, the government also implemented measures to boost industrial capacity and introduce new technologies. One of the crucial measures was a 50% special depreciation system for investment in major capital facilities. In 1952, the Enterprise Rationalization Law, which permitted companies to set up tax-exempt reserves to meet various risks, and also waived import duties for key items of machinery, was enacted. In 1953, the government amended the Anti-Monopoly Law to permit formation of cartels to fight recessions. This was done with an eye on the state of affairs in the textile industry, which was then caught in a severe slump. Simultaneously, an anti-monopoly provision banning companies from holding interlocking shares was struck down.

Two other events also helped to shape Japan’s “economic miracle.” The first was the end of the occupation brought about through the San Francisco Peace Treaty in 1951, which provided for a low level of defense spending. The second was the official abandonment of the Dodge Line, which occurred in 1960 and was followed by the unveiling of Prime Minister Hayato Ikeda’s famous income-doubling plan. The plan called for an annual growth rate of 7.2% during the decade—sufficient to double the GNP in 10 years. At the same time, trade was liberalized, and Japan braced up for fast growth.

Fast growth also ushered in various difficulties. The ghost of the Dodge Line, which imposed a balanced budget as a prerequisite for curbing inflation, was finally buried in 1965, when Japan accepted deficits in its balance-of-payments as a necessity for sustaining fast growth. During the 1960s, the brakes were put on twice, triggering slumps in 1962 and 1965. From 1965, however, Japan began to experience a consistent trade surplus and the growth rate reached 11.6% during the second half of the decade.

Indicative planning

A number of policy initiatives, institutional interventions at critical junctures, and innovative concepts helped to lay Japan’s economic foundation. Perhaps the most significant is the approach to labor-management relations (see box). It is a feature that cannot be overemphasized.

In a speech to an annual meeting of the World Economic Forum in Davos, Switzerland, Masaya Miyoshi, president and director-general of the Keidanren, Japan’s leading business organization, pointed out that the criticism to the effect that the Japanese government helps the private sector strengthen its unfair competitive edge has been repeated over the years, but what this cooperation amounts to is simply smoothing communication between the government and the private sector such that the two are able to share a long-term vision for industrial development. This has allowed the government to efficiently improve industrial infrastructure,

one of the principal roles the government intended to play in the first place.

In fact, Japan’s postwar policy, which made industry productive and put it technologically in the front-ranks, has been characterized first and foremost by the government’s refraining from direct intervention, and instead offering information and recommendations to form the guiding principles for industrial development. It is what one economist calls the government’s “indicative planning.” Generically speaking, it is dirigism.

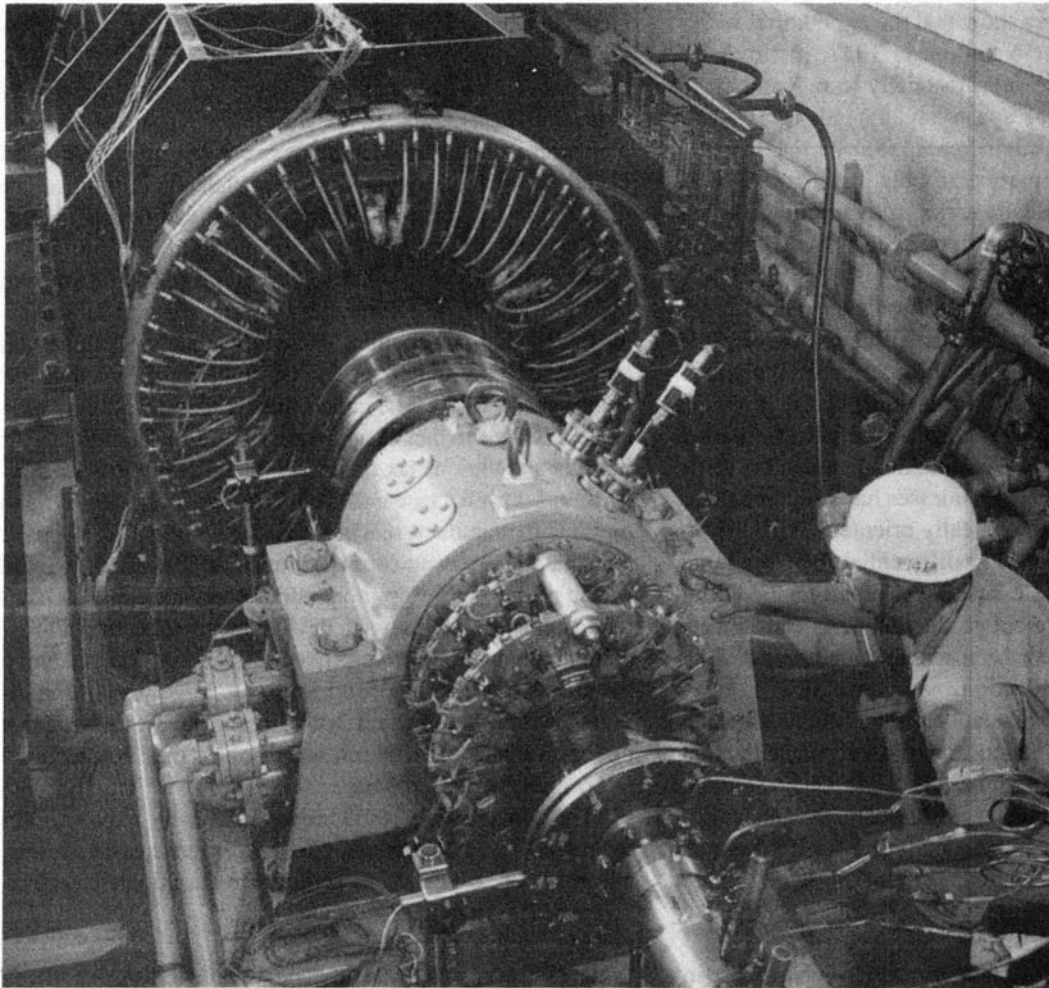
Such “indicative planning” was the key in overcoming one of the crucial problems that Japan faced in the late 1950s and early 1960s. The economic boom in manufacturing had attracted a large number of rural people to a few major cities along the east coast. Absorbing a large portion of the migration from rural areas were small businesses, whose average wages were far lower than that paid by the large concerns. Larger firms saw in it an opportunity to cut costs by subcontracting out to smaller firms. And there was the added advantage that during recessions, the subcontractors could be dumped or made to work at a lower cost. The government foresaw the problem arising out of this new development.

The smaller firms, technologically far behind the larger firms, had low productivity, which in turn perpetuated low wages and affected overall productivity growth in industry. Amid intensifying international competition, the government passed the Basic Small Business Law in 1963. This law required small businesses—capitalized at 50 million yen or less and employing 300 or fewer in the commerce sector, and 10 million yen and 50 employees in the service sector—to take measures to avoid excess competition and rationalize subcontracted transactions. With the Small Business Modernization Promotion law introduced the same year, funding was provided to modernize small business facilities and promote cooperation among firms.

The policy of promoting the technological modernization and upgrading of small firms, known as the “dual structure theory,” is still very much in practice and has matured significantly. A recent study showed that car and electrical appliance makers in Japan have a very high rate of dependency on “outsourcing” (subcontracting out to small facilities). Automakers such as Toyota and Nissan, for instance, farm out between 70-80% of their work to outside firms, compared to around 50% elsewhere in the world. General Motors (GM), the largest U.S. automaker, subcontracts only about 30% of its work.

‘Dual structure’

But, in this, too, there is a difference. While Japanese manufacturers of finished goods are heavily dependent on outsourcing, the number of primary parts manufacturers they deal with directly is extremely limited. Toyota, for example, uses only 260 parts suppliers, and Nissan only 180. General



An experimental superconducting generator. A commitment to high-technology, a highly skilled labor force, and capital and infrastructure investments—policies which are known as the "American System" of political economy—has led Japan to surpassing the United States in per capita Gross National Product.

Motors, on the other hand, has a line-up of some 12,000 suppliers and subcontractors; Ford and Chrysler use 4,000 and 2,000 respectively.

In Japan, as a result of the dual structure theory, there is an assumption that business between the manufacturer and his suppliers, and between the various tiers of subcontractors, will continue over the long term. Parts suppliers are willing to upgrade their equipment and management in order to meet the cost and quality targets set by the maker or his subcontractors. The contracting firm at the end of the product line will give strong technical supervision and managerial back-up. Such a cooperative association keeps the lines of communication open between the manufacturer and his suppliers, and ensures information exchange among the subcontractors.

By contrast, the basis of the system prevalent in the United States, in particular, is short-term competitive bidding. Manufacturers take their business to the subcontractor able to supply the lowest price at any given time, and it is rare for a business relationship with any one firm to continue for long. Parts manufacturers and suppliers are thus forced to diversify their customer base. As a result, there is only limited techni-

cal and managerial exchange between manufacturers and suppliers. While the manufacturer in Japan will assist his suppliers and subcontractors to meet cost and quality targets, manufacturers elsewhere never develop a close relationship with the companies with which they work. The effect of this is to rob small and medium-size supplier industries of stability, and burden them unnecessarily with marketing overhead costs.

Despite the small number of contractors that each manufacturer turns to, the Japanese subcontracting system has developed into a multi-tiered stable pyramid. Typically, a manufacturer will rely on about 200 primary subcontractors. Primary subcontractors themselves employ about 4-5,000 subcontractors, who in turn farm out work to an additional 20-30,000 businesses. Besides developing a vast pool of small business facilities technologically abreast of the requirements of large firms, the dual structure theory also helped Japan's agriculture sector. The huge migration from the agricultural sector which was productively absorbed in the urban small industries, in fact, enhanced Japan's agricultural productivity overall.

National census figures show that the agricultural working population was over 16 million in 1947, just over 13 million in 1960, and then fell drastically to 6.7 million in 1975. For the same years, respectively, the index of agricultural production (1970=100) increased from 41 to 80 to 105, with livestock showing a particularly big jump from 3 to 36 to 113. On the other hand, land under cultivation, which had increased from 1947 to 1960, dropped consistently by about 10% up to 1975.

Of particular interest also, is that the functions of former traditional industries shifted to small businesses, as witnessed by the textile and light industries. Professor Nakamura points out that in the 1960s, the small firms accounted for the greater portion of consumer goods output, the market for which they had secured. The situation is much the same today, even though the small businesses have become more capital-intensive and technologically oriented. With the labor shortage and narrowing wage differentials between large and small firms, small-scale businesses rapidly adopted labor-saving technologies to cut production costs and, undergoing rapid growth, achieved considerable modernization of their management and production.

The significance of the subcontracting system has been in the process of transformation from the indirect utilization of cheap labor to a more rational division of labor among firms having original technology. In this way, high-technology, efficiency, and quality in manufacturing has been spread throughout the economy.

Research and development

The results of indicative planning are also observable in Japan's research and development. The goal of technological and scientific excellence as the basis of national development, was underlined by steady, significant increases in private and public sector R&D spending. At the same time, Japan's continuing lag in basic research as of the 1980s also became a matter of concern to MITI and the government generally.

The characteristic of Japanese R&D policy, as described by Fumio Kodama, research director of the National Institute of Science and Technology, is the central focus on building a strong engineering infrastructure. The building of this infrastructure was carried out at every level of the production process, starting with the finished goods, and then moving backward to the building of manufacturing facilities and the development of materials. In terms of technological content, this strategy promoted development first in assembly technology, then in component technology, and finally in materials technology, Kodama points out.

In 1971, the Japanese government combined two laws, the law on Temporary Measures for the Development of the Machinery Industry (1956) and the law on Temporary Measures for the Development of the Electronics Industry (1957), to make the law on Temporary Measures for the

Development of Specified Machinery and Electronics Industry. The law was the forerunner to the development of numerical control (NC) of manufacturing, and research on very large scale integration (VLSI). In 1975, Japan became the pioneer in mechatronics, a marriage between mechanical and electronics engineering. The computerization of machine tools through numerical control, a classic example of mechatronics, took off that year.

In its R&D work, Japan uses what are known as research consortiums. Within these consortiums, numerous companies that were in competition with each other pool both capital and research personnel to establish research laboratories and conduct joint R&D. The government also provides considerable assistance to these joint research centers through project funding and various tax breaks. A prime example is the consortium set up for research on VLSI formed by Japan's five major chip manufacturers between 1976 and 1979. To make sure that there was no conflict of interest, the consortium did not do research on chip production technology, but concentrated on the experimental development of manufacturing equipment and ways to improve the process for crystalizing the silicon used in computer chips. A large part of the research was subcontracted out to companies that were not members of the consortium, including equipment manufacturers and silicon suppliers.

The consortium's R&D efforts ultimately led to the development of the optical stepper by camera manufacturers, and provided scientific data pertinent to the silicon crystallization process for silicon suppliers.

New phase of infrastructure development

With a sound basic foundation, it is expected that Japan will move toward improving its R&D facilities—basic research in particular—and continue to develop technologies which are both labor-saving and capital-intensive. Japan has already conceived a second major phase of infrastructure development, the first having been completed in the mid-1960s. In the 1980s, MITI, in collaboration with the Ministry of Construction, the Japanese Land Agency, and the Science and Technology Agency, began the task of reshaping the physical geography and population distribution of the country as a whole. The plan calls for:

- 1) entirely integrating the country by connecting all major islands by land transport;
- 2) initiating the development of 19 new cities of a few hundred thousand people each as new "technopolis" centers; and
- 3) relieving the population pressure on the Tokyo region, possibly by dispersing certain governmental institutions to other regions or by the creation of an entirely new capital city, with Tokyo retaining the role as Japan's center for commerce and finance.

The new land transport links, in particular the several-billion-dollar Honshu-Hokkaido rail tunnel, were completed

by 1989, and further development is now concentrating on new high-speed rail links and U.S. Interstate-type or German autobahn-type highways. A law for the establishment of the new cities on the Tsukuba "Science City" model was introduced in 1983.

For the 1990s, MITI has targeted the aerospace sector (including satellite communication and commercial space flights) as the cutting edge for leveraging the further growth of the industrial sector. A still modest Moon-Mars exploration program will spearhead research and development, with results being passed on to companies such as Mitsubishi Heavy Industries, already significantly engaged in both civilian and military aerospace work.

Community of interest

The strengths of the Japanese economy, especially the mechanisms it has institutionalized to deal with crises and achieve a consensus among business, government, and labor on a long-term economic vision, enable the nation to continue to prosper economically despite almost total dependence on the outside world for raw materials. The oil shocks of 1973 and 1979 did not paralyze Japan; in fact, the nation came out of these crises economically stronger because it took concerted measures to dramatically increase energy efficiency in industry and reduce its dependence on oil. Japan's burgeoning nuclear power program is testimony to that.

In 1985, Japan's currency was revalued upwards by 50% through the Plaza Agreement. Such upward revaluation, according to the camp-followers of the International Monetary Fund and World Bank, was expected to cripple Japan's economy, for a while at least, but the opposite occurred. Exports, which began to increase in the mid-1980s, expanded sharply even as the yen appreciated, nearly doubling in six years. Imports, static until 1986, began to rise thereafter. Japan's export surplus grew quite large, and though it has declined somewhat, it is still immense. In contrast, the U.S. dollar devaluation, by about 40% against major currencies between 1985 and 1988, did little to change the yawning trade deficit that that country is facing annually. The monetarists are still blaming each other for their foolproof theory going awry.

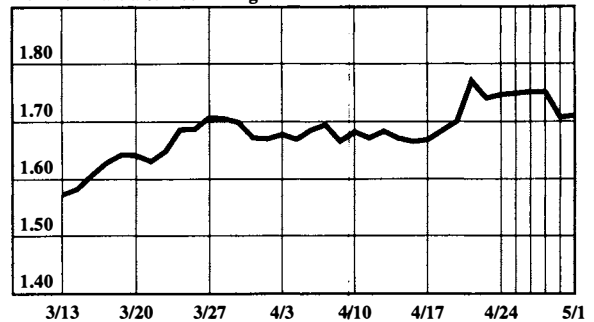
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Currency Rates

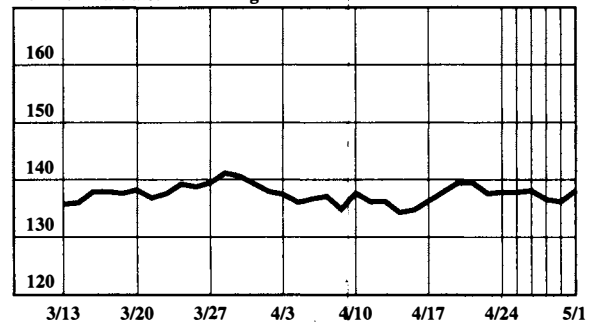
The dollar in deutschemarks

New York late afternoon fixing



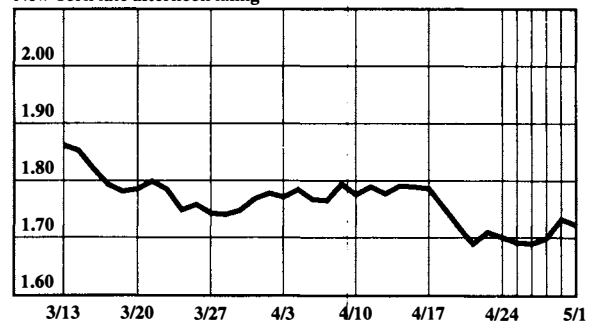
The dollar in yen

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing



The dollar in Swiss francs

New York late afternoon fixing

