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Strategies for Competitiveness in Production: A Far Eastern Method

Introduction

The principal issue to be dealt with in this chapter is how to increase productivity and competitiveness in the manufacturing sector, particularly when drastic changes are taking place through trade liberalization policies and the further opening up of free market economies. Two factors are crucial in relation to productivity and competitiveness: in-house measures and organizational aspects. In-house measures include improvements in the choice of raw materials, machinery and equipment, production and processing technology, product design, product quality, labor quality, and the methods of management—the relationships between managers and workers, and between workers and workers. Organizational factors include the intra-firm, inter-firm, and inter-industry division of labor, especially the functional linkages between parts-and-component makers and assembly or final producers, meaning the subcontracting system.

Large-scale enterprises tend to integrate the production process vertically within their own factories because they lack reliable parts-and-component suppliers. However, the East Asian experience shows that excessive vertical integration by "downstream" firms is not adequate in terms of cost and efficiency. If parts-and-component makers are created separately, and if the inter-firm linkages and the inter-sectoral web among them are tightly knitted, entrepreneurs are able to reduce transaction cost as well as risks throughout an industry as a whole. In particular, assemblers enjoy competitiveness and high-quality products which consist of thousands of parts and components supplied by these specialized makers. As long-run relationships continue in the industrial cluster, information is accumulated, and the information networks that develop as a result help reduce designing time as well as production cost. At the same time, supporting firms enjoy sustainable sales through stable, long-stand-

ing orders from final goods producers. In other words, both assemblers and supporting firms share quasi-rent and information among participants over the long run. Thus, it is vital to develop small- and medium-scale enterprises (SMEs) at the up- and mid-stream strata and to integrate them into down-stream enterprises. This system of grouping or subcontracting is a crucial factor for competitiveness.

In this chapter, East Asian corporate culture, especially the Japanese style of production management, is introduced. The first section deals with in-factory measures designed to increase productivity and quality. Worker initiative and cooperation to improve overall production efficiency are examined. In Section 2 a comparison through cost considerations between internal verticalization and external or horizontal integration is made. One key to supply chains is an existence of reliable SMEs. The Japanese promotion of these enterprises is explained in Section 3 with emphasis on supportive policy measures. Finally, Section 4 summarizes suggestions for developing countries in this respect.

1. In-house Measures

Competitiveness principally depends on demand. In a closed market, in which monopolies or oligopolies prevail, consumers have little choice of products. However, if many producers exist, consumers are able to select products according to taste. In the open market producers have to compete with each other. Generally developing countries have been characterized by closed economic systems, particularly those which adopted import-substitution strategies. The opening-up of these economies means competition, in which case their products will have to compete with other foreign products in the domestic market as well as in world market. The question is how to improve products with respect to price, quality, and service. In-factory measures affect these factors, particularly in the manufacturing industry.

Primarily two types of production methods related to organizational and human resource management are found in factory structures: the Western method (WM) and the Far Eastern method (FEM). The Western method has its roots in the Ford-Taylor mass production method in which the division of labor is clearly defined through specified job descriptions; workers only have responsibility for their defined area. The Far Eastern method, which originated from the Toyoda-Ohno production method, is a revised version of WM in which the division of labor is fuzzy. Workers are not specialized in a narrowly defined spot, but work as a team.

The Western method is very efficient and well suited for static mass production; however, when an error arises, it is also mass produced. For example, the production line may not be stopped even if the product contains defects. Line workers are not empowered to stop the line; the responsibility usually falls on the senior line manager. Moreover, inspection and the discovery of defects are the responsibility of yet another person. Workers are not encouraged to poke their noses into another person's territory. Far-Eastern-method workers, on the other hand, not only know their own jobs but also the duties of other positions because job rotation is standard routine. Workers are usually divided into units or groups of six to seven persons throughout

the line. When an error takes place, anybody can stop the line, and problem is immediately solved within the group. At the expense of specialization, FEM workers are able to judge what is going on and to cope with problems as they occur. The system is, in this context, flexible because line workers themselves are empowered to think and respond to sudden changes.

The essence of FEM is that information is shared among participants, i.e., a horizontal flow of information. With WM, however, information flows vertically. The Western method tends to subdivide people with control coming from the upper echelon ("divide and rule"). The upper echelon does not trust the bottom people, and it treats them as a spare part (i.e., changeable).

Factors that affect productivity and competitiveness in the FEM factory include quality control circles, continuous improvement or *kaizen*, job rotation, the work as a team concept, and the "just-in-time" system.

Quality Control Circles

Quality control (QC) circles are a form of self enlightenment. Workers form small groups which span unskilled and skilled workers, and engineers in various divisions. The groups hold regular meetings once a week or so, during or outside of the working hour, to study how to increase quality or to learn from successful experiences in other factories. Groups also discuss their own production process and recommend ideas to increase productivity and quality. Recommendations may cover the layout of machines, the order of processing, improvements in tools and equipment, and the inspection process.

One very important aspect is how to prevent defects caused by absent-minded operators, or how to make the process "fool proof." Sometimes QC circles end up with the suggestion that inspection procedures be internalized into the production line using small devices to check for errors. Differing from random sampling and spot inspection methods, internalization leads to zero defects because every part and component is checked during the production process. Moreover, the number of inspectors can be reduced.

Quality control circles are usually tied to regional and national associations involved in QC activity. Innovative cases and successful applications are introduced at annual meetings of the national associations and prizes are awarded for new, workable solutions.[1]

Continuous Improvement or Kaizen

Continuous improvement or *kaizen* is a manufacturing process concept in which each member of the working unit continuously surveys and looks after his or her working conditions. Usually factories have monthly objectives such as production or zero-defect goals. Continuous improvement helps achieve these goals by encouraging workers to discover more efficient and cheaper forms of production. If a worker suggests a production improvement, it will be looked into and, perhaps, implemented immediately.

Both QC circles and continuous improvement activities derive from a bottom-up

approach. Those who do not understand the East Asian factory believe that only educated workers can participate and that it is not applicable to unskilled workers in Western factories. This is wrong because these efforts do not require considerable intelligence or learned knowledge. Daily-life wisdom is enough to produce useful and thoughtful ideas. As water slowly erodes a rock, continuous efforts may result in greater efficiency and higher productivity, thus bringing greater profits and higher income. The key issue is the perception of workers who participate together in the making of goods. This perception is formed through job rotation and team formation.

The idea behind this self-improvement and group effort, usually without any short-term rewards, is that workers are assured that increases in productivity and quality will bring future returns. In this respect, job security (free from layoffs or being fired) and life-time employment are presupposed conditions in the FEM factory.

Job Rotation and Working as a Team

It is common for East Asian factories to rotate workers among several work positions. This allows workers to acquire new skills and to understand different stages of the manufacturing process. The Far Eastern method trains workers as multi-functional players. Cross-trained workers are able to fill in for absent workers, can assist with the training of new comers, and more importantly are able to perform different functions in various product mixes and model changes.

Compared to the WM factory, multi-skilled workers can perform at several different positions, and because of this, the job is loosely defined. Aoki [3] puts it as follows:

> Flexible job demarcation and the job rotation system at the shop level may sacrifice the static efficiency available in the specialization scheme in a stable market environment, but may contribute to the dynamic efficiency of horizontal coordination by encouraging workers to learn, which would enhance the capabilities of the work group at the shop level to adapt to continual changes in the market and other states and to cope with local emergencies autonomously. Also such capabilities may help the shop adapt to new technology more smoothly. [3, p. 38]

Cooperation is vital because no single factory process is independent. In the WM factory it is difficult to communicate because each area is compartmentalized. To break this blockade, the FEM factory organizes working units of six or seven workers throughout the production line according to the production process, and work is performed as a team under a team leader. This teamwork requires good communication between members and sometimes teams function as powerful decision-making units, determining job assignments, quality-control measures, and work ethics.[2] Decentralized decision making concerning the production process is common in FEM factories.

If egoistic managers always blame workers for losses or faults, or if workers always think of their self-interest (for example, leaving the factory after being trained), the factory will be totally disconnected, and its products will lack competitiveness. In a productive factory cooperation is essential between managers and workers, be-

tween skilled and unskilled workers, and between those involved in the production process. Everyone must cooperate. One of the demerits of FEM team formation may be sectionalism. Because of this, workers are rotated regularly to avoid a parochial mentality.

Just-in-Time System

The basic idea behind the just-in-time system is "needed goods in needed amount at needed time." Simply put, goods will be supplied when needed, in the needed amount, and at the needed time. The idea developed from a U.S. inventory method used at supermarkets. Toyota took note of it in the early 1950s, made some adjustments, and called its new system "kanban."[3] Kanban is a slip attached to pallets carrying parts and components. When parts start to be used in the final assembly line, the slip is hung on the nearest post. Slips are placed along posts throughout the assembly line showing the amount of the parts and components needed, the exact place where needed, and the specific delivery time. Upstream divisions and shops collect these slips regularly, and according to what is noted, start producing their parts and components and ordering their needed products by dispatching their own kanban to further upstream shops. The orders continue backward to the final upstream shops and, in turn, the required amounts are delivered forward at the required time, one by one. The kanban system is directly connected to the marketplace. When demand changes, adjustments can be implemented immediately from the downstream divisions through the upstream shops.

The idea behind this is that parts which begin to be used in the assembly line will be supplied immediately, just like goods on a supermarket shelf, when purchased, are supplemented quickly. The slips provide instructions or orders to the previous production stage, sending signals to start producing the needed parts and components. The kanban system, therefore, is an information system which connects the final marketplace to the furthest upstream part suppliers, and only the needed amount is produced at any one stage. The system minimizes the amount of inventory, reducing inventory costs, thereby lowering production costs.

There are three fundamental characteristics of the kanban system. One is based on the zero-defect concept of parts and components. The final assembly line will stop if parts are of poor quality, so no inspection at the delivery site is required. This leads to the second point: the upstream divisions or shops or subcontractors that provide parts and components must have almost the same level of standards as the final assembly plant in terms of productivity, quality, prices, technology, and delivery time. In other words, the degree of standardization and uniformity of products is fundamental, as is the synchronization of production. Because adjustments reflect final demand, workers are required to perform multi-function roles; idle workers will be shifted to other jobs. This is the third point. The system is not easy to adopt. Toyota took almost twenty years to fully realize a state-of-the-art system.

2. Inter-firm Relationships

In developing countries it is usually difficult to find good parts-and-component firms in terms of technology, quality, and delivery time. Thus, assemblers tend to produce parts and components internally (internal verticalization). Why then do East Asian countries, particularly Japan, Taiwan, and Korea, make use of separate parts-and-component firms, integrating them the assembly process through subcontracting (external verticalization)? What is the economic reasoning behind these inter-firm relationships between assemblers (prime firms) and subcontracting firms (subcontractors)? In some cases it may be that the prime firm lacks the necessary technology to develop a specific part. More likely, however, the economic reasoning for assembly/subcontractor relationships involves cost.

Transaction Cost Matters

If a prime firm wants to develop a new product, there are three basic options concerning new parts: (a) produce them internally; (b) purchase them from parts-and-component firms; and (c) subcontract their supply with parts-and-component firms (selective supplier groups). In the first option, start-up, operational, and production costs must be considered. The second option requires an examination of purchasing and transport costs, while the third involves purchasing, transaction, and transport costs. In the short run the second spot-purchase case seems less costly when compared to other options, provided that the purchased parts are of good quality and are supplied consistently according to the ordered amount and with no delay. However, taking ex post costs and long-term considerations into account, this might not be the case.

The second option may involve the switching of parts-and-component firms because of high prices, low quality, wrong specification, unstable supply in terms of volume, or sporadic delivery. As a result, the prime firm has to search for new suppliers, and then again, a stable supply of required parts and components is not certain. In the long run these searching costs can be too large to be ignored.

If the prime firm can establish solid relationships with parts-related subcontractors through assistance—which could be technical, managerial, and/or financial—the third option may be the least costly in the long run. Therefore, the prime consideration of the assembler firm, whether or not to set up a subcontracting system, is the internal verticalization cost versus the subcontracting cost. In other words, if internal verticalization costs are greater, the establishment of a subcontracting system is likely to come about:

Start-up, operational, and production costs in internal verticalization $>$ Transaction, purchasing, transport, and assistance costs in subcontracting.

Transaction costs are defined as the expenditures involved in "running the economic system," or the costs of social and economic "frictions" [71, pp. 18–20]. Coase [20, pp. 390–93] provides as examples of transaction costs: discovering costs of rel-

evant prices; negotiating and concluding costs of separate contracts for each exchange transaction; searching costs for an agent to make a long-term contract to avoid risks; and taxes on market transactions.

Costs associated with contracts or subcontracts include drafting, negotiating, and safeguarding of agreements. If society is based on mutual trust, transaction costs are small; if based on mistrust, they are very high. As an extreme example, Chinese merchants rarely use written contracts in daily business because they have strong, guild-type ties (called *"bang"*). If someone violates a spoken promise, he/she will be ostracized from society. Thus transaction costs in Chinese business traditions are negligible due to the severe sanction costs.

Another example is seen in industrial groups in Korea based on family-based or blood-related business relationships. Within the group, firms share information, and thus it is easy to form subcontracting relationships without high transaction costs.

Assistance costs from the prime firm to subcontractors include the transfer of technical and managerial know-how, the provision of designs, raw materials, molds, basic tools and instruments, and, in some cases, financial support. In modern assembly plants, parts and components must be ready whenever needed (such as the just-in-time system). Synchronization in production is required. This is why a standardized level of parts-and-component suppliers in terms of quality, quantity, and delivery is vital, as explained before. The stronger the degree of synchronization, the cheaper the assistance costs, the shorter the production time.

The decision whether to make parts and components, buy them directly, or buy them through selective supply chains depends on a series of complex factors. However, from the cost-reduction point of view, the FEM subcontracting system has worked well in modern assembly plants being more efficient and less costly in the long run. Womack, Jones, and Roos [72] wrote:

> In 1990, Toyota is offering consumers around the world as many products as General Motors—even though Toyota is still half GM's size. To change production and model specifications in mass-production firms takes many years and costs a fortune. By contrast, a preeminent lean producer, such as Toyota, needs half the time and effort required by a mass-producer such as GM to design a new car. So Toyota can offer twice as many vehicles with the same development budget. [72, p. 64]

Tenets and Characteristics of the FEM Subcontracting System

The organizational aspects of assembler-supplier relationships have several tenets and characteristics. First, the system works well for final products such as automobiles and consumer electronics which require thousands of parts and components, or for apparel goods which need several segmented processes. If the production processes cannot be divided, or if the final goods require few parts, outsourcing is not necessary.

Second, parts-and-component firms usually form a multi-layered structure with a prime firm providing the final assembly plant. This pyramid-type structure reflects the first point: a division of labor within the production processes. An example is Toyota which at the end of the 1970s had 122 first-tier subcontractors, 5,436

second-tier subcontractors, and 41,703 third-tier subcontractors. By netting out, Toyota stood at the top of a pyramid of 35,768 firms. A car consists of more than twenty thousand parts, still it is surprising that so many firms are involved in the car-manufacturing process.

Third, subcontractors have close ties with upper-echelon firms, and the relationships are quasi-permanent. Contracts usually last for five or six years depending on the development duration of a new model, and they will be extended repeatedly. Price adjustments are twice a year. The prime firm usually considers a certain amount of profit margin for subcontractors taking into account the production costs of parts and components. Moreover, the prime firm supplies designs, technology, processing tools, and sometimes financial assistance in the form of capital and/or loans. In return, a stable supply of parts and components is guaranteed by the subcontractors with almost zero-defect quality goods.

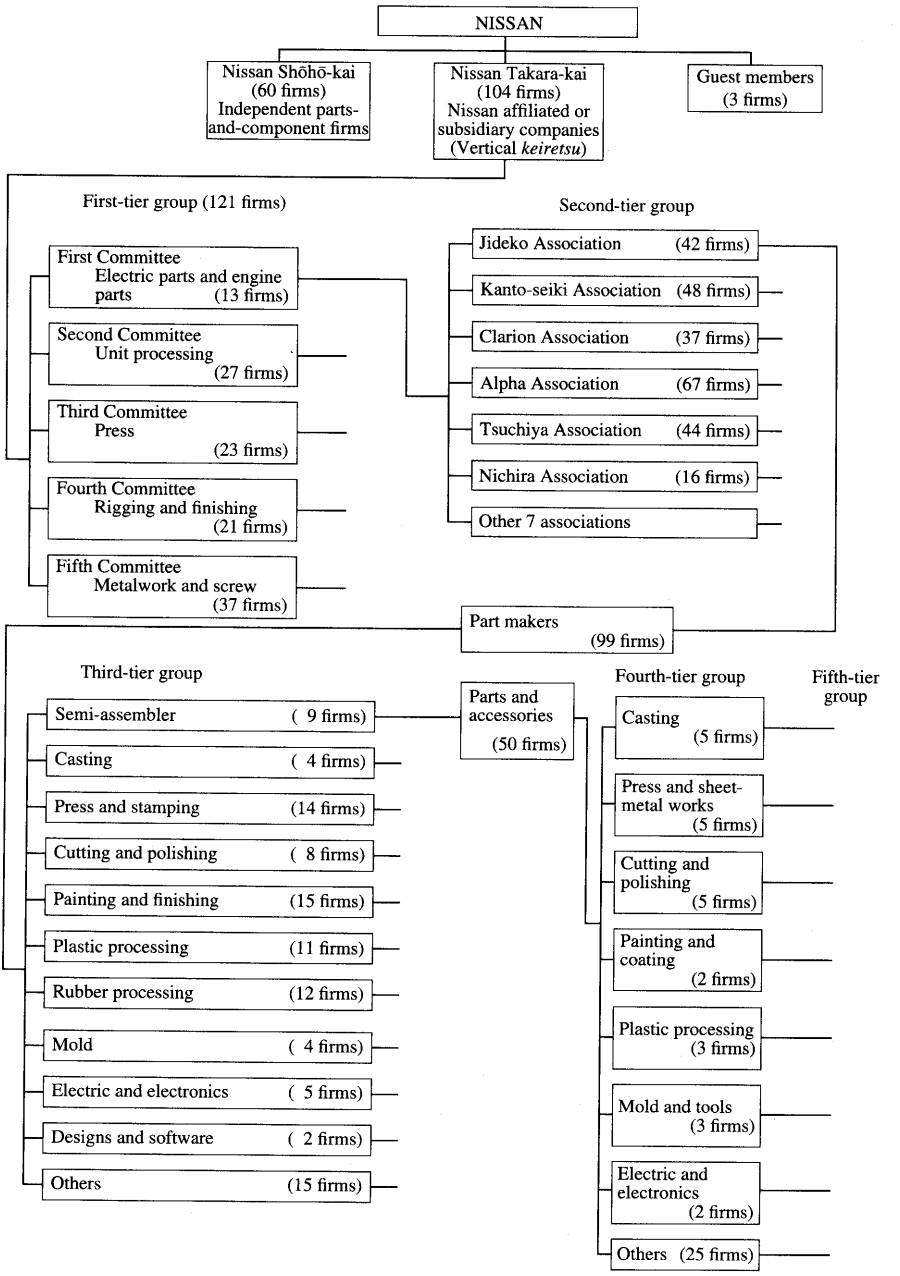
Fourth, cooperation and trust[4] are critical to keep the hierarchical supply chain moving. Information among group members should flow without a hitch vertically as well as horizontally. That is why in Japan some auto assembly firms organize club-type associations among members—the *kyōryoku-kai* system or vertical *keiretsu.* Toyota, for example, has a "Kyōhō-kai" group, Nissan a "Takara-kai" group, and Mitsubushi a "Kashiwa-kai" group. The Takara-kai group consists of about 104 auto parts-and-component companies that are affiliated with or subsidiary to Nissan. In addition, more than 60 independent parts and accessory suppliers form another Nissan support group called the "Shōhō-kai" group. The first-tire group includes approximately 120 association members, the second tire more than 950 firms. Generally these associations are mutually exclusive—each member of the group does not sell its products to another association. This loyalty or "thoroughbredism" is rewarded by long-run, stable orders from the upper echelon,[5] as mentioned above (see Figure 2–1).

Lastly, if information flows smoothly in this system—technology from the prime firm to the subcontractors, production cost information from the subcontractors to the prime firm—both enterprises share not only risk, but also "relational quasi-rent" [3, p. 218]. Once relationships have been established, the bargaining power between the prime firm and the subcontractors depends on the degree of technical specialization, the costs involved in the possible threat to break a relationship, and the degree of insurance—subcontractors pay a premium by accepting slightly lower prices while obtaining long-term orders.

3. Promotion of Small- and Medium-Scale Enterprises: The Japanese Experience

There are basically two types of small- and medium-scale enterprises (SMEs). One is closely related to locality, producing locally inherent products such as traditional textiles and porcelain; the other is related to large assembly plants which integrate supply networks in a specific area. In Japan this integration is known as *jōka-machi* or simply, the industrial-complex town.

Fig. 2–1. *Kyōryoku-kai* System of Nissan



Source: Kikai-shinkō-kyōkai (Association for Machinery Promotion), Tokyo

Small- and medium-scale industries play an important role in the service sector also. Retailers and wholesalers, most of which are SMEs, are almost always found near consumer gathering and dwelling places. Small- and medium-scale industries have been and continue to be a major factor in Japan's business structure, and as such their evolution and development is important. The present section examines this evolution, especially the experiences in the post–World War II period. The Japanese subcontracting system is then introduced and discussed.

In Japan subcontracting is common not only in heavy industries such as automobile and metal products, but also in light industries such as textiles and apparel. Information sharing and cooperation between large-scale enterprises (LEs) and SMEs through subcontracting have been a key to one of the most efficient production systems in the world.

Evolution of Small- and Medium-Scale Enterprises

Definition of small- and medium-scale enterprises

According to Japan's Small and Medium Enterprise Basic Law, an SME is defined by the number of persons engaged or by the amount of capital. This applies to corporations as well as to individual proprietorships as follows:

Mining and manufacturing sectors:

(a) less than 300 persons engaged or; (b) less than 100 million yen in capital.

Wholesale sector:

(a) less than 100 persons engaged or; (b) less than 30 million yen in capital.

Retail and other sectors:

(a) less than 50 persons engaged or; (b) less than 10 million yen in capital.[6]

In the case of small-scale enterprises (SEs), the definition depends only on the number of persons engaged:

Mining and manufacturing sectors: (a) less than 20 persons engaged. Other sectors: (a) less than 5 persons engaged.

Establishments

The number of establishments in private, nonagricultural sectors in Japan doubled between 1954 and 1986, increasing from 3,285,000 to 6,494,000. Of the 1986 total, the wholesale and retail sector accounted for 47 per cent, followed by the service sector 23 per cent, the manufacturing sector 13 per cent, and the construction sector 9 per cent.

Small- and medium-scale industries have always accounted for more than 99 per cent of all business establishments. The percentage of establishments with 1–4 persons engaged decreased from 80.2 per cent to 68.2 per cent, while larger establishments in terms of persons engaged increased their share (LEs remained unchanged). Of note is the percentage of establishments with 5–29 persons engaged which swelled from 17.8 per cent to 28.1 per cent during the period (see Table 2–1).

The increase in the number of establishments corresponded to rapid economic growth periods, as in the late 1960s and the late 1970s. Under the "doubling national income plan" (1961–70), the Japanese economy expanded rapidly, augmenting its

industrial structure particularly in the heavy and chemical industries. Between 1961 and 1973 Japan recorded an average annual GNP growth rate of 9.2 per cent. The first oil crisis, however, produced negative growth in 1974, the first decrease in GNP since the end of World War II. Since then the growth rate has never exceeded 6 per cent per year—averaging 4.4 per cent between 1975 and 1990. At the same time, the Japanese economy was gradually undergoing modification, changing from an industry-based to a service-oriented structure. The tertiary sector's share to GDP expanded from 46 per cent in 1965 to 56 per cent in 1989, while the manufacturing share declined from 34 per cent to 30 per cent during the same period. This triggered a boom of new SEs, including venture businesses in the commerce and service sectors.

Persons engaged

Employment in the private nonagricultural sectors also reflected economic fluctuations. The number of persons engaged in the sectors increased from 17.6 million in 1954 to 49.0 million in 1986. Between 1960 and 1972 the number grew 4.4 per cent annually, but it slowed to 1.9 per cent between 1975 and 1986. Of the 1986 total (49 million), the wholesale and retail sectors accounted for 32 per cent, followed by the manufacturing sector 27 per cent, the service sector 20 per cent, and the construction sector 10 per cent.

The percentage of persons engaged in LEs was rather high during the 1960s (16–17 per cent), but it declined to 11.6 per cent in 1986. Large-scale enterprises began to take drastic measures to cope with high energy and labor costs, especially after the second oil crisis in 1979. Labor was replaced by machinery, primarily robots, during the 1980s. On the other hand, the percentage of persons engaged in establishments with 10–49 persons increased to 32.2 per cent in 1986 from 26.7 per cent in 1954. Other-sized establishments also expanded their percentage during the period with exception of those that engaged 1–4 persons (see Table 2–2).

During the 1980s a fundamental transformation in the distribution system was taking place. The distribution system in Japan was said to be complex because of its multi-layered wholesalers and the existence of many individualized small retailers. The emergence of the supermarket and of large road-side shops, as well as the bypassing of intermediaries, reflected changes in consumers' life styles and the diversification of their tastes. Another factor was the gradual yen appreciation against the U.S. dollar after the Nixon shock in 1971 (abandonment of fixed exchange rates). Taking advantage of the strong yen, SEs expanded their importation of manufactured goods. In addition, some SEs even invested directly abroad, especially in the late 1980s, primarily after the Plaza Accord of 1985. These growing tendencies can be seen in Tables 2–1 and 2–2 which show that the percentage of establishments with 1–4 persons decreased while the percentage of mid-sized establishments increased.

In sum, SMEs contributed to employment in Japan, with more than 80 per cent of the total number of persons engaged in the nonagricultural private sector. They accounted for more than 99 per cent of the establishments in the sector.

TABLE 2–1

NUMBER OF ESTABLISHMENTS CLASSIFIED BY THE NUMBER OF PERSONS ENGAGED: JAPAN (PRIVATE, NONAGRICULTURAL SECTORS)

(1,000)

	Number of Persons Engaged							
	1–4	5–9	10–29	30–49	50–99	100–299	300–	Total
1954	2,634	369	216	35	19	8.7	3	3,285
(%)	(80.2)	(11.2)	(6.6)	(1.1)	(0.6)	(0.3)	(0.1)	(100.0)
1957	2,715	433	237	38	22	12	4	3,461
1960	2,727	463	271	49	31	16	5	3,562
1963	2,931	515	325	63	40	20	6	3,900
1966	3,083	607	388	74	48	24	7	4,231
1969	3,360	687	431	84	54	27	7	4,650
(%)	(72.3)	(14.8)	(9.3)	(1.8)	(1.2)	(0.6)	(0.2)	(100.0)
1972	3,676	763	482	94	61	31	7	5,114
1975	3,840	834	522	96	60	30	7	5,389
1978	4,105	956	583	103	64	31	7	5,849
1981	4,349	1,056	640	113	70	33	8	6,269
1986	4,428	1,118	705	124	75	36	8	6,494
(%)	(68.2)	(17.2)	(10.9)	(1.9)	(1.2)	(0.6)	(0.1)	(100.0)

Source: Japan, Management and Coordination Agency, Statistics Bureau, *Japan Statistical Yearbook, 1989* (Tokyo: Japan Statistical Association, 1989).

TABLE 2–2

NUMBER OF PERSONS ENGAGED CLASSIFIED BY FIRM SIZE IN PERSONNEL: JAPAN (PRIVATE, NONAGRICULTURAL SECTORS)

(1,000)

	Number of Persons Engaged							
	1–4	5–9	10–29	30–49	50–99	100–299	300–	Total
1954	5,033	2,369	3,385	1,320	1,263	1,407	2,841	17,618
(%)	(28.6)	(13.4)	(19.2)	(7.5)	(7.2)	(8.0)	(16.1)	(100.0)
1957	5,388	2,763	3,707	1,423	1,514	1,852	2,935	19,582
1960	5,447	2,956	4,277	1,835	2,068	2,554	4,021	23,158
1963	5,877	3,286	5,157	2,350	2,698	3,239	4,634	27,241
1966	6,268	3,902	6,194	2,786	3,243	3,812	4,871	31,076
1969	6,901	4,413	6,856	3,141	3,629	4,342	5,745	35,027
(%)	(19.7)	(12.6)	(19.6)	(9.0)	(10.4)	(12.4)	(16.4)	(100.0)
1972	7,577	4,893	7,664	3,497	4,111	4,932	6,120	38,794
1975	7,985	5,355	8,275	3,588	4,070	4,661	5,707	39,641
1978	8,655	6,135	9,210	3,854	4,342	4,809	5,290	42,295
1981	9,390	6,770	10,120	4,246	4,731	5,137	5,326	45,720
1986	9,486	7,214	11,134	4,648	5,103	5,734	5,676	48,995
(%)	(19.4)	(14.7)	(22.7)	(9.5)	(10.4)	(11.7)	(11.6)	(100.0)

Source: The same as Table 2–1.

Manufacturing by size

In the manufacturing sector, 436,009 establishments in 1986 employed 10,893,000 persons producing a total of U.S.$ 529.3 billion (value added) (see Table 2–3). Small-scale enterprise establishments employing 4–19 persons accounted for 76.7 per cent of all establishments and 24.7 per cent of the number of persons engaged, while the figures for medium-scale enterprise (ME) establishments with 20–299 persons engaged were 22.6 per cent and 47.6 per cent respectively. Large-scale enterprises (300+ persons engaged) accounted for only 0.9 per cent of the establishments but employed 27.8 per cent of the persons engaged.

The largest value-added producers were establishments with over 1,000 persons engaged. They accounted for 23.4 per cent of the total value added created in the sector in 1986. Establishments employing 500–999 persons produced 11.3 per cent, followed by establishments employing 100–199 persons which produced 11.1 per cent, and establishments of 50–99 persons producing 10.7 per cent. Small-scale enterprises (4–19 persons engaged) contributed 14.8 per cent in value added. It is notable that establishments of 50–199 persons produced more value added than those of 200–499 persons. Generally, in terms of value added per person engaged, the larger the size, the higher the value. On average, the manufacturing sector produced U.S.$48,600 value added per person engaged.

In sum, SMEs in the manufacturing sector in 1986 accounted for 99 per cent of establishments, 72 per cent of employment, and 57 per cent of value added.

Government Policies for Small- and Medium-Scale Enterprises

Historically government support for SMEs arose from the unfair treatment such firms experienced because of their weak negotiating position vis-à-vis large enterprises, their limited access to conventional financial institutions as well as technology

TABLE 2–3
MANUFACTURING INDUSTRY BY PERSONNEL SIZE: JAPAN, 1986

Size (Persons Engaged)	Establishments		Persons Engaged		Value Added		Value Added per Person
	No.	%	(1,000)	%	U.S.$ Billion	%	(U.S.$ 1,000)
4–9	247,466	56.8	1,488	13.7	39.8	7.5	26.7
10–19	86,726	19.9	1,195	11.0	38.9	7.3	32.6
20–29	43,468	10.0	1,062	9.7	36.8	6.9	34.6
30–49	23,200	5.3	898	8.2	33.4	6.3	37.2
50–99	19,846	4.6	1,372	12.6	56.6	10.7	41.3
100–199	8,963	2.1	1,227	11.3	59.0	11.1	48.1
200–299	2,601	0.6	627	5.8	35.2	6.7	56.2
300–499	1,862	0.4	708	6.5	46.0	8.7	65.0
500–999	1,198	0.3	815	7.5	59.6	11.3	73.2
1000 over	679	0.2	1,501	13.8	124.1	23.4	82.7
Total	436,009	100.0	10,893	100.0	529.3	100.0	48.6

Source: The same as Table 2–1.

development, and their large gaps in income and productivity. Moreover, until the 1970s, there was a strong Marxism influence in Japan's political and academic circles that insisted that the large enterprises were exploiting SMEs. As will be explained later, this argument of a "dual structure" influenced the government to adopt policies that protected SMEs.

Government SME policies can be divided principally into three parts: the removal of transaction constraints leading to improved productivity; the facilitation of financial resources at preferential rates and the provision of tax incentives; and development of technology.

Removal of constraints

In 1949 the government passed a law that allowed SMEs to form cooperatives and to strengthen their economic activity through group dynamics. It was recommended that SMEs jointly purchase materials, jointly market and sell products, and establish loans among members. To prevent undue pressure from large enterprises in subcontracting, the government introduced a law in 1956 that protected SMEs from payment delay by large enterprises (see Table 2–4). This law legally defined the subcontracting relationship between a prime firm and a subcontracting firm, and operational procedures on contracts were regulated, such as the documentation of a subcontract and the written orders. In the case of payment delay, the law stipulated that the prime firm pay for accrued interest.

Government protection of SMEs was furthered in 1963 with the introduction of three new laws. The most important was the Small and Medium Enterprise Basic Law which aimed at improving the economic and social status of SMEs by increasing productivity and correcting disadvantages. The law recommended that government provide integrated measures for SMEs in the following eight spheres: (a) modernization of facilities, (b) improvement in technology, (c) rationalization of management, (d) deepening of SME structure, (e) fairness in transactions, (f) increases in demand, (g) avoidance of excess competition or market reserve, and (h) good labor relations. In addition, the law required the Small and Medium Enterprise Agency of Ministry of International Trade and Industry (MITI) to compile an annual report, *Chūshō-kigyō hakusho* [The white paper on small- and medium-scale enterprises] [28], and to present it to the diet.

The rapid growth of the Japanese economy during the 1960s deepened its industrial structure; complex supply chains were formed, particularly in the automobile and electronic industries. The Law on the Promotion of Subcontracting Small and Medium Enterprises was introduced in 1970 to reflect this economic expansion. To modernize and to improve fair trade between prime firms and subcontractors, the law strengthened an organization called the Subcontracting Enterprises Promotion Association and gave it the role of matchmaker. The association developed lists of firms that wanted to establish subcontracting relationships. The association's authority for arbitration and dispute settlements was also reinforced.

The Law on Adjusting the Business Activity of Large Retail Stores, promulgated in 1973, regulated large-floor shops preventing them from monopolizing markets.

TABLE 2–4
LAWS AND POLICIES FOR SMALL- AND MEDIUM-SCALE ENTERPRISES: JAPAN

1930s	Financial support law: Law for the Shoko Chukin Bank, 1936 (Law No. 14)
1940s	SMEs support law: Law on Cooperatives of Small and Medium Enterprises and Other Parties, 1949 (Law No. 181) Financial support law: Law for People's Finance Corporation, 1949 (Law No. 49)
1950s	SMEs support laws: Law for Japan Chamber of Commerce and Industry, 1953 (Law No. 143) Law on the Prevention of Delay in the Payment of Subcontracting Changes and Related Matters, 1956 (Law No. 120) Special Law on Retail Commerce Adjustment, 1959 (Law No. 155) Financial support laws: Small Business Credit Insurance Law, 1950 (Law No. 264) Law for Small Business Finance Corporation of Japan, 1953 (Law No. 138) Law on Financial Support for Modernization of Small and Medium Enterprises, 1956 (Law No. 115)
1960s	SMEs support laws: Small and Medium Enterprises Modernization Law, 1963 (Law No. 64) Small and Medium Enterprise Guidance Law, 1963 (Law No. 147) Small and Medium Enterprise Basic Law, 1963 (Law No. 154) Financial support law: Law for Credit Guarantee Association, 1963 (Law No. 196)
1970s	SMEs support laws: Law on the Promotion of Subcontracting Small and Medium Enterprises, 1970 (Law No. 145) Small Retail Business Promotion Law, 1973 (Law No. 101) Law on Adjusting the Business Activity of Large Retail Stores, 1973 (Law No. 109)
1980s	SMEs support laws: Small Business Corporation Law, 1980 (Law No. 53) Law on Extraordinary Measures for Promotion of Technological Development by Small and Medium Enterprises, 1985 (Law No. 55) Temporary Law on Business Conversion and Adjustment Measures for Small and Medium Enterprises, 1986 (Law No. 4)
1990s	SMEs support laws: Law for Improvement in Employment Management to Reserve Labor Force by Small and Medium Enterprises, 1991 (Law No. 57) Promotion Law for Efficiency in Distribution Operations by Small and Medium Enterprises, 1992 (Law No. 65)

Source: Compiled by the author.

The basic idea was to protect tiny individual retailers in local community areas (as was the case in Europe) from the large-scale retailer, i.e., to reserve markets for small retailers.[7]

Since the 1980s, an industrial restructuring involving SMEs has been occurring. Three main changes have been taking place: labor shortages, overseas investment by SMEs, and rapid cycles of technological innovation. Because of Japan's demographic composition, along with real wage increases, all enterprises faced labor shortages that forced them to find low-cost labor. As a result, illegal immigration increased. Large-scale enterprises, as well as SMEs, paved the way in overseas investment due to the labor shortage, and the tendency was accelerated by the yen's appreciation against the U.S. dollar after 1985. Rapid technological changes and demand diversification generated more products in greater variety, but in smaller quantities. Small- and medium-scale enterprises had to respond to these changes, and laws had to be formulated simultaneously to cope with these changes (as shown in Table 2–4).

Financial and fiscal measures

There are four government-supported financial institutions for SMEs in Japan: the Shoko Chukin Bank (SCB, the central bank for commercial and industrial cooperatives), the People's Finance Corporation (PFC), the Small Business Finance Corporation (SBFC), and the Environmental Sanitation Business Finance Corporation (ESBFC). SCB is a bank set up in 1936; it offers overall banking services for SMEs. PFC, established in 1949, specializes in financing micro and small-scale enterprises. SBFC, which was set up in 1953, provides long-term loans for machinery and equipment, as well as working capital. PFC and SBFC also provide special loans at preferential conditions for specified programs, such as modernization, anti-pollution, energy conservation, and structural adjustments.[8] ESBFC, established in 1967, specializes in financing hygienic and environmental improvement activities for small retailers and service related shops.

To help SMEs borrow from commercial banks, the government set up the Credit Guarantee Association in 1963. The weak credibility of SMEs, as well as lack of collateral, were always considered bottlenecks. Thus, the association was empowered to guarantee SME liabilities when borrowed from commercial banks, and this was immensely beneficial. Fifty-two associations were established throughout Japan (see Figure 2–2).

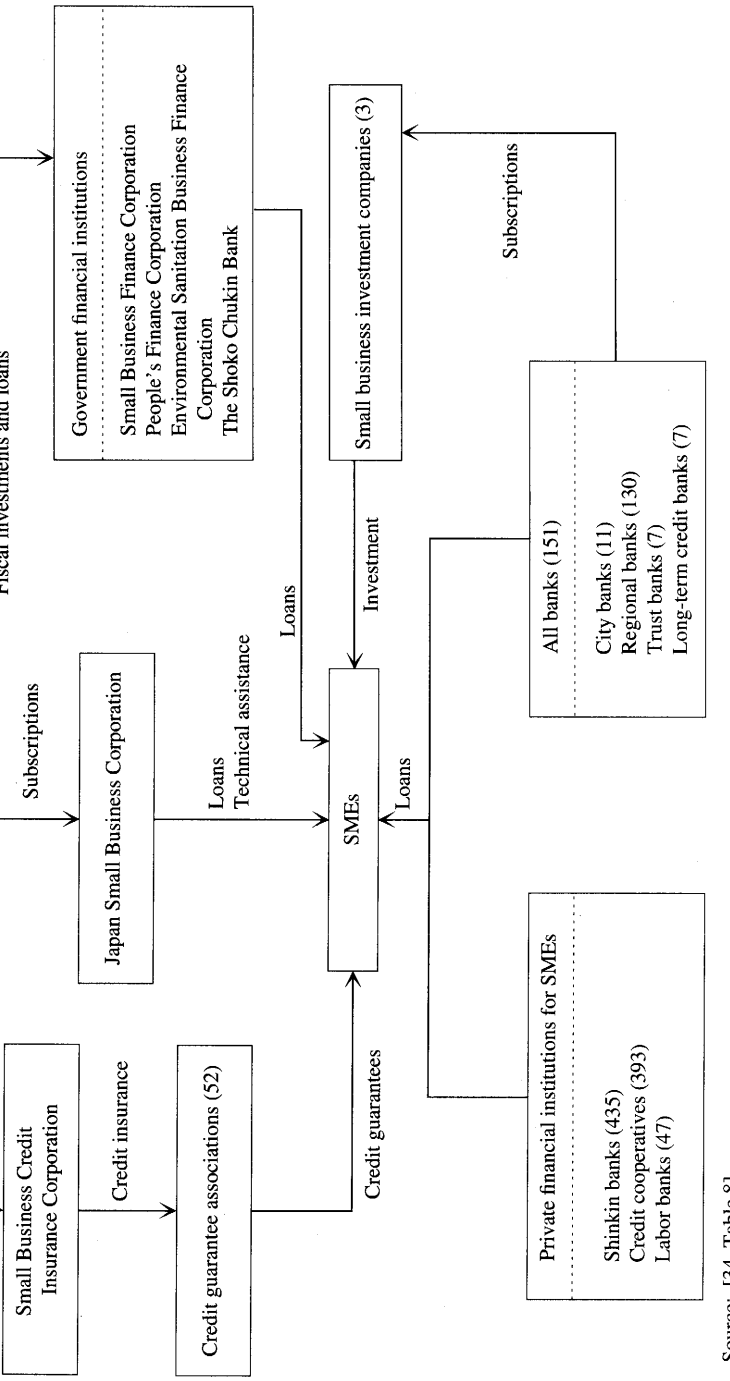
Regarding tax incentives, SMEs enjoy relief measures such as a reduced income tax rate, an income tax deduction, a special reserve allowance, as well as special depreciation, depending on the assistance programs.

Technology development measures

National and local governments provide four types of assistance to SMEs involved in technology: human resource development, orientation and diffusion, basic technology development, and incentives for technology development.

Human resource development is assisted through eight college-level schools run

Fig. 2-2. Financing Schemes for SMEs: Japan



Source: [34, Table 8]
Note: Figures in parentheses indicate the number of such institutions as of October 31, 1992.

by the Japan Small Business Corporation (JSBC). These provide enrichment instruction for SME engineers and technicians as well as training for SME technical instructors. In addition, each prefectural government has middle-level vocational schools. Technology orientation and diffusion is addressed by public research centers and local technology demonstration centers; both offer technical expertise and consultation to SMEs. Of these centers, ninety-five provide testing facilities. Because it is not cost-effective, SMEs are reluctant to purchase this equipment themselves.

Sixteen national research institutes and JSBC are engaged in research and development (R&D) of basic industrial technology. The knowledge gained is then passed on to SMEs. Lastly, the Law on Extraordinary Measures for Promotion of Technological Development by Small and Medium Enterprises, enacted in 1985, gives SMEs financial and fiscal incentives to research and develop new technologies.

Subcontracting System

Japan has developed an elaborate subcontracting system that consists of multitiered SMEs. A pyramid-shape hierarchy, with a prime assembly firm at the top, sometimes reaches as far down as a fifth-tier of subcontractors and can involve more than thirty thousand firms. These relationships between the LE and SMEs are now considered one of the most efficient production systems in the world. During the 1950s and 1960s, however, these relationships were severely criticized as an exploiting system in which the LE made use of the SMEs' low wages while accumulating its own capital. This was the dual structure argument, but this argument gradually disappeared as the Japanese economy achieved a sustained, high rate of growth. In particular, evidence was produced that showed that the ratio of profit over capital was actually higher in SMEs than in LEs.

The dual structure

The subcontracting system grew out of Japan's wartime experience during the 1940s. In order for small-scale industries to participate efficiently and quickly in weaponry production, the government introduced a "designated factory" system in 1940. In this system, the prime firm placed a long-term order with the designated subcontractors; technical assistance was provided as well. The designated subcontractors, on the other hand, were prohibited from trade with other firms. The system did not work well because of its rigidity, but some associations formed and *keiretsu*—the formation of industry groups—fermented. According to Ueda [64], several examples—such as the Matsushita Electric Co.[9] and the Osaka Metalwork—can be traced through an old *Kinki-chiku hacchū-kojō oyobi kyōryoku-kōjō meibo* [Osaka directory of association factories].

The dual structure argument unfolded from the coexistence of modern and traditional industries in Japan during the 1950s. Small-scale enterprises which mainly belonged to the traditional sectors were experiencing low productivity and low wages with old traditional technology, while LEs were enjoying high productivity and high wages with modern technology. There was a gap between LEs and SEs, and as a result, a dual structure formed. Leftists at the time argued that LEs made use of the

TABLE 2–5

PROFIT RATIO OF INCORPORATED ENTERPRISES IN THE MANUFACTURING INDUSTRY: JAPAN

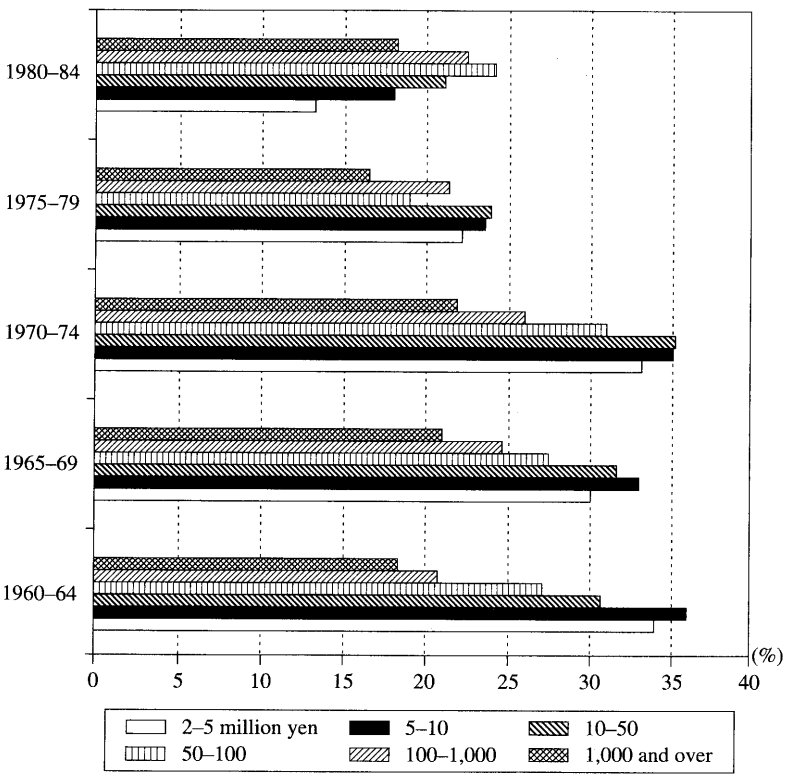
(%)

Size in Capital (Yen Million)	Profits before Tax / Net Worth[a]					
	1953–59	1960–64	1965–69	1970–74	1975–79	1980–84
2–5	23.5	34.0	30.1	33.3	22.3	13.4
5–10	20.4	36.0	33.1	35.2	23.7	18.2
10–50	22.4	30.7	31.8	35.3	24.2	21.4
50–100	19.2	27.2	27.6	31.1	19.1	24.5
100–1,000	17.0	20.9	24.7	26.2	21.5	22.8
1,000 and over		18.3	21.2	22.0	16.8	18.5

Source: [46, p. 15]

[a] Period average.

Fig. 2–3. Profit Ratio of Enterprises: Japan (Profits before Tax / Net Worth)



Source: Table 2–5.

subcontracting system to exploit SEs by compressing the SEs' profits. Large-scale enterprises became bigger and bigger by absorbing this rent and by forming monopolies, while the SEs were left behind.

This argument disappeared gradually as income grew and nearly full employment achieved. Still some wage difference remained between firms of different sizes. As macroeconomic as well as external conditions turned favorable for Japan, SEs gradually modernized their structure, and the number of MEs increased. Furthermore, SEs and MEs were further integrated into the LEs' production systems.

Komiya [37] altered the existing image of SMEs when he showed that the profit ratio (calculated as profits before tax divided by net worth) was higher for SEs than LEs in terms of capital size. This was also observed by Miwa [46], as shown in Table 2–5 (see also Figure 2–3). From 1960 to 1979 the largest-sized enterprises (1,000 million yen and over in capital) showed the lowest profit ratio, while enterprises of 2–50 million yen showed very high profit ratios (although the situation differed in the 1980s). In terms of persons engaged, Kiyonari [36, p. 111] calculated the same ratio from 1961 to 1974. He showed that the profit ratio of enterprises with 50–299 persons always exceeded that of enterprises with 300–999 and 1000+ persons.

TABLE 2–6
NUMBER OF SUBCONTRACTING ENTERPRISES IN THE MANUFACTURING INDUSTRY BY SUBSECTOR IN 1987: JAPAN

	Small- and Medium-Scale Enterprises (1)		Subcontracting Enterprises (2)		Ratio (2)/(1)
	No.	%	No.	%	%
Food products	74,892	11.1	6,121	1.6	8.2
Textiles	82,457	12.2	65,734	17.4	79.7
Apparel	46,372	6.9	36,650	9.7	79.0
Leather products	12,307	1.8	7,960	2.1	64.7
Wood products	33,143	4.9	7,199	1.9	21.7
Furniture, fixtures	40,953	6.1	15,762	4.2	38.5
Pulp, paper products	14,467	2.1	5,976	1.6	41.3
Printing, publishing	43,772	6.5	18,389	4.9	42.0
Industrial chemicals	4,732	0.7	1,065	0.3	22.5
Petroleum, coal products	743	0.1	137	0.0	18.4
Plastic products	24,319	3.6	16,699	4.4	68.7
Rubber products	7,964	1.2	5,224	1.4	65.6
Pottery, china, etc.	28,392	4.2	10,075	2.7	35.5
Iron and steel	7,340	1.1	3,863	1.0	52.6
Nonferrous metals	5,109	0.8	3,184	0.8	62.3
Metal products	81,082	12.0	57,525	15.2	70.9
General machinery	66,294	9.8	49,571	13.1	74.8
Electrical machinery	35,318	5.2	28,281	7.5	80.1
Transport equipment	18,812	2.8	15,036	4.0	79.9
Precision machinery	10,491	1.6	7,381	2.0	70.4
Other industries	37,264	5.5	16,213	4.3	43.5
Manufacturing	676,223	100.0	378,046	100.0	55.9

Source: [29].

TABLE 2–7
NUMBER OF SUBCONTRACTING ENTERPRISES IN THE MANUFACTURING INDUSTRY BY PERSONS ENGAGED IN 1987: JAPAN

Persons	Small- and Medium-Scale Enterprises (1)		Subcontracting Enterprises (2)		Ratio (2)/(1)
	No.	%	No.	%	%
1–3	299,402	44.3	184,790	48.9	61.7
4–9	221,947	32.8	119,109	31.5	53.7
10–19	75,675	11.2	36,845	9.7	48.7
20–29	36,092	5.3	17,116	4.5	47.4
30–49	18,812	2.8	8,967	2.4	47.7
50–99	14,419	2.1	6,805	1.8	47.2
100–199	7,489	1.1	3,425	0.9	45.7
200–299	2,387	0.4	990	0.3	41.5
1–19	597,024	88.3	340,744	90.1	57.1
20–299	79,199	11.7	37,303	9.9	47.1
Total	676,223	100.0	378,046	100.0	55.9

Source: The same as Table 2–6.

These facts show that SMEs are more flexible, dynamic, and even more profitable than was initially believed. This suggests that the development of SMEs is vitally important to developing countries.

Subcontracting establishments

The number of SME establishments in the manufacturing sector that were engaged in subcontracting[10] reached 378,046 in 1987, accounting for 56 per cent of the total SME establishments surveyed (Table 2–6). Subsectors such as electrical machinery (80.1 per cent), transport equipment (79.9 per cent), textiles (79.7 per cent), apparel (79.0 per cent), and general machinery (74.8 per cent) were most likely to practice subcontracting. Generally light industry subsectors were less engaged in subcontracting, except for the textiles and apparel industries. Intermediate goods industries such as petroleum, chemicals, and steel, which need large-scale plants, were not likely to be deeply involved in subcontracting either, because of the internal verticalization of the LE itself. Enterprises producing products that required several production processes or a large number of parts and components to be assembled, tended to be involved with subcontracting.

By measuring an enterprise's size by persons engaged, the smaller the enterprise, the more likely it was involved with subcontracting. In 1987 the subcontracting ratio for SEs (1–19 persons) was 10 points higher than for MEs (20–299 persons) (see Table 2–7).

4. Policy Directions

The Japanese style of management or FEM was first applied in the Western world in 1983 when GM and Toyota embarked on a joint venture, forming New United Motor

Manufacturing Incorporated (NUMMI) in California. Jobs for hourly workers were separated into three categories, down from more than 200, and a no-layoff agreement between the management and labor union was enacted. Workers were organized into small groups of seven members; job rotation was introduced, as was the just-in-time method. The venture's tremendous success triggered the adoption of FEM, or at least part of it, by other U.S. auto industries such as Ford with its very successful Taurus model, and quite recently, Chrysler with its LH cars.[11] Other industries such as steel, electronics, business machines, and precision machines are applying FEM methods.

In Latin America, the Ford assembly plant at Hermosillo, Mexico, in which FEM was introduced by Mazda, is almost legendary. It was recognized as the highest quality auto factory in the world by a 1990 MIT study [72]. Applications of FEM by Japanese companies in Mexico to other industries, particularly *maquiladora* industries, have had mixed results (see, for example, [14] [24] [57]). It is too early to judge FEM's applicability to Latin America, but it can be noted that at this moment FEM is universal and is neither unique nor dependent on culture.[12]

As shown by Japan's example, the role government plays in SME policy is important. The market mechanism and the opening up of the national economy is also necessary, but sudden changes or a discontinuing of previously implemented policies should be avoided. Gradual modification of policies, with directions clearly indicated, is necessary.

The Japanese experience illustrates that promotional policies for SMEs, as well as financial and tax incentives through public institutions, were quite effective. However, as the profitability of SMEs was higher than what was originally thought, protection should be limited to the start-up period and should not be prolonged.

A very rapid cycle of technological innovation is a common phenomenon today. Since knowledge has a public goods nature and requires enormous investment, government involvement in the basic development of science and technology is fundamental. An efficient diffusion system providing basic knowledge to SMEs is also needed.

To form efficient assembler-supplier relations, several conditions are required, particularly with regard to developing countries:

(a) Unless parts-and-component firms—or what is called "supporting industries"—exist, there is no way to establish the supply chain system. With direct foreign investment, multinational enterprises bring supporting firms together in host countries. The creation of SMEs is fundamental. As local parts-and-component firms grow, the system forms gradually.

(b) Standardization, uniformity, and synchronization of production are critical to the subcontracting system's formation. Each parts-and-component firm has to improve and meet the required level of quality, price, delivery, and other services.

(c) Information sharing is another important factor. A centralized information structure or an information monopolizing mentality needs to be changed, and company directors must forget about short-term returns. "Putting quality first" through cooperation and trust between managers and workers as well as between prime and subcontracting firms, will produce low-cost, long-term returns.

(d) Some prerequisites required to form this kind of industrial system include macroeconomic stability, adequate infrastructure, and a supportive government role. If inflation is high (for example, 20 per cent per month), contracts have to be changed every month. When the macroeconomy is unstable, the system cannot maintain the stable long-term relationships necessary to prosper. Similarly, unless good transportation and/or communication infrastructure exists, the system will not function. Therefore, the role of government—maintaining a sound macroeconomic policy, investing in infrastructure, and providing assistance to SMEs at the initial stage—is extremely important.

Notes

1 In Japan the most prestigious prize is the "Deming prize," named after Dr. W. Edwards Deming, the first to introduce quality control concepts to Japan at the beginning of the 1950s. See, for example, [1].

2 For a more precise discussion, see [19].

3 Kanban literally means wooden signboards which show a shop's name.

4 Arrow [5] pointed out that "Trust is an important lubricant of a social system. It is extremely efficient; it saves a lot of trouble to have a fair degree of reliance on other people's word . . . . They [trust and similar values, loyalty or truthtelling] increase the efficiency of the system, enable you to produce more goods or more of whatever values you hold in high esteem" [5, p. 23].

5 Recently, this tight gentleman's agreement has eroded, and parts makers now sell their products everywhere regardless of their group ties due to the recession and the rapid advance of technology. As a result, weaker assembly makers need high-tech parts from other *keiretsu* families.

6 The basic law was promulgated in 1963. Using the exchange rate of that time, U.S.$1 = 360 yen, the size of capital is equivalent to U.S.$278,000 (100 million yen), U.S.$83,000 (30 million yen), and U.S.$28,000 (10 million yen) respectively.

7 This law was severely criticized by the United States in the structural impediment initiative (SII) negotiations during the Bush administration. Toys R Us Inc. opened its first store in Japan in 1991 after the law was amended.

8 According to the government's white paper [28], the outstanding of disbursements for SMEs up to 1990 amounted to 288,215 billion yen (approximately U.S.$1,441 billion), of which the three institutions (SCB, PFC, and SBFC) contributed only 8.6 per cent. The bulk of credits came from commercial banks. Credit associations also played an important role, contributing 15 per cent.

9 Matsushita Electric Co. had 213 subcontractors; of these, 36 were designated factories in 1943.

10 A subcontracting firm or subcontractor is a firm with 300 or fewer persons engaged, or with ¥100 million or less paid-in capital, which has a contractual relation with a larger firm (the prime firm) for supplying a part, a processed product, or material, or involved with repair work.

11 The *Wall Street Journal*, October 1, 1992, "Detroit's New Strategy to Beat Back Japanese Is to Copy Their Ideas."

12 Job hopping is quite common in ASEAN as well as Latin American countries. This gives factory owners disincentives for training workers. However, in-house measures to improve productivity such as "total quality control" (TQC), continuous improvement, horizontal information flows, and just-in-time methods have their own grounds no matter how different the culture is.