

PART I JAPAN TEAM

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Summary of the Japan Team

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1. ECONOMIC DEVELOPMENT AND TRANSFORMATION THROUGH INDUSTRIAL AGGLOMERATION

The Japanese economy has been suffering from a long recession resulting from the bursting of the bubble economy as well as recent deflation, a situation which has not occurred for more than half a century. Since then, countless measures to revitalize the industrial sector have been implemented by all levels of government, from central to local. A significant amount of tax money has been invested in various sectors to promote new technology as well as new businesses, and regulations which prohibit collaboration among universities and business firms have been lifted. Thus far, such policy measures to promote revitalization have not been shown to function well. The lesson learned from these experiences has led to recognizing the need to take industrial agglomeration into account by understanding that new industries or new businesses do not emerge alone, isolated from the regional economy. Because of the development of spatial economics, industrial agglomeration or cluster has been the subject of focus in recent research.

From the viewpoint of globalization, the economic development of East Asia reflects it being the center of world economic growth. Many regions have created industrial agglomerations, particularly in China such as the Yangtze River Delta and the Pearl River Delta. These areas have been attracting not only multinational but also local Chinese corporations, which are referred to as the 'factory of the world.' Other developing countries

are also making the effort to attract firms by constructing industrial zones and export processing zones, which have become the core of agglomeration.

By taking these domestic as well as global circumstances into consideration, the Japan Team's focus of study is why firms agglomerate in particular regions, and the reasons behind it. These are rather fundamental issues, but we also make an attempt to examine how the traditional theory of industrial agglomeration or cluster can be expanded by introducing IT (Information Technology) or ICT (Information and Communications Technology), which is new to this field. Based on this theoretical and empirical research, the Japan Team also studies policy implementation for regional development, and presents a number of interesting case studies which have made an actual contribution to specific regions. The Japan Team presents eight papers, and chapters 4 and 7 include theoretical as well as empirical studies on the relation between IT (ICT) and industrial agglomeration. Chapters 2, 3, 5, and 8 then present how regions with traditional industrial agglomeration have been making the effort to restructure their regions by IT and other new technology. These chapters also provide lessons learned from Japan. The case studies regarding developing countries such as Vietnam and China are discussed in chapters 6 and 8 by focusing on economic development through industrial agglomeration. These studies of the Japan Team are comprehensive, yet also specific for particular issues, and therefore surely provide valuable guidance for developing countries.

2. THE RELATIONSHIP BETWEEN TOYOTA AND ITS PARTS SUPPLIERS IN THE AGE OF INFORMATION AND GLOBALIZATION: CONCENTRATION VS. DISPERSION

In manufacturing one automobile, approximately 30,000 to 40,000 parts are required, therefore, it is essential for the automobile assembler to integrate and efficiently manage its parts manufacturers. Toyota and its parts suppliers show a heavy concentration or localization in Aichi Prefecture, particularly in the Nishi-Mikawa district. Toyota has 14 factories in Japan and 11 are located in Aichi Prefecture. Factories of the Toyota Group are dispersed in the cities of Toyota and Kariya. As for the location of factories of the member companies of Kyohokai, which are subcontractors of Toyota and the Toyota Group, whose headquarters are situated in Aichi Prefecture, 80 percent are located in Aichi Prefecture and 55 percent are located in the

Nishi-Mikawa district, in particular. Moreover, nearly half are found in Toyota City.

The author explains this heavy concentration of Toyota and its parts suppliers as follows. The reason behind the largest concentration of automobile industries in Aichi Prefecture is path dependency, that is, Toyota has based its headquarters there. Furthermore, the *Kanban* method (Just-in-Time system) and other collaborative activities with Toyota such as joint R&D and QM (Quality Management) influenced its subcontractors to locate close to Toyota plants so as to save cost and time for delivering parts to Toyota factories. In this sense, the *Kanban* method is an essential factor for the heavy concentration of Toyota parts suppliers in locations close to Toyota plants. This implies that the purpose of heavy concentration is to exploit the economies of scale by concentrating production within a limited number of companies.

An economic explanation of the Toyota production structure, which is referred to as the hierarchical production structure, is also provided in the paper. The relationship of the parts suppliers with Toyota can be explained by the long-term implicit contract. Once Toyota begins a business relationship with a certain parts supplier, this implies that Toyota will make purchases from that parts supplier over an extended period. This long-term relationship can save costs of transaction and information. Parts suppliers can invest in specific equipment for the production of Toyota parts only. In addition to this, the efficiency of the hierarchical production structure can be explained by the 'principal-agent model.' Toyota is the principal and its parts suppliers are agents. It is not necessarily efficient for Toyota to produce various types of parts on its own. It is more efficient to hire certain firms as agents and to contract them for parts production, since such firms have more information on manufacturing-related parts than the principal. Subcontracting is commonly adopted in industries such as construction, since subcontracting improves the efficiency of a large organization.

Since the 1990s, the transformation of the Japanese economy has resulted in IT and globalization penetrating into every Japanese industry, to the extent that the Japanese automotive industry is not able to exploit the above economies by concentration any longer. The above transformation is quite new to the Japanese economy, and may not suit the Japanese economic system with its long-term contractual relationships among firms. IT, for instance, is a key technology for collecting real-time information, and it can reduce the time and costs for seeking out the most suitable partner in trade. In this sense, IT helps the market mechanism work better. One ex-

ample of this is ANX (American Automobile Network Exchange), which interconnects all automobile assemblers and parts suppliers. This network functions like an e-marketplace, and helps to find the best partner for trade instantly according to price as well as quality desired. Toyota also makes the effort to use IT in all segments of its activities, and the new *Kanban* method is referred to as *e-Kanban*. It is still at an experimental stage.

Another new application of IT is 'concurrent engineering,' which is the system of sharing information with different sections of the automobile assembler. Chrysler made use of this information system in the development of Neon in the early 1990s by connecting all sections related to its development, especially the design, research and development (R&D), and prototype sections. This made the period and costs of development shorter and smaller. Chrysler's development period was approximately 31 months, which was apparently shorter than that of Toyota at the time. Toyota and its group companies still proceed with the development of new models in the traditional way.

At the early stage of globalization in the 1980s, the general outlook was pessimistic, that is, it was believed that all Japanese automobile assemblers and parts suppliers would not be able to survive severe international competition. This expectation is partly true, since Nissan and Mazda encountered difficulties and they restructured nearly one-third of their parts suppliers. On the other hand, Toyota still maintains its hierarchical structure almost intact. One major change is found in its 'wide extension,' whereby Toyota recommends its parts suppliers to supply parts to other automobile assemblers as well. Toyota was formerly reluctant to have its parts suppliers supply to other assemblers, since there would be a drain of technology and know-how. These days, however, such business helps its parts suppliers to secure sales and to decrease costs due to the larger amount of production, and this is ultimately beneficial to Toyota.

The paper concludes that even in the age of information and globalization, Toyota still maintains its strength by the strong relationship with its parts suppliers through their concentration around Toyota plants.

3. IRON TOWN CLUSTER: YAWATA, ITS GLORY, DECLINE AND REBIRTH

This paper poses basic questions as to why a particular location is attractive to some firms and not to others, and why firms form industrial agglomera-

tions. It tries to answer these questions by taking regions and traditional heavy industries as examples. The iron and steel industry played a substantial role in the industrialization process in developed countries. Japan also established one of the first state-owned steel mills at Yawata in Kyushu Island in 1901. Since then, Yawata City (currently part of Kitakyushu City) and the mill (Yawata Works) together shared in the experience of rise, glory, fall, and rebirth. By observing this process, this paper attempts to extract factors appertaining to industrial cluster formation and coping with industrial transformation. It also provides interesting similarities as well as differences by making a comparison with Pittsburgh and the US Steel Corporation, which was established in the same year as Yawata Works.

The question was raised as to why certain locations attract firms and why firms agglomerate. In the case of Yawata City and Yawata Works, the paper at first points out the following factors: (a) availability of raw materials. The iron and steel industry needs coal and iron ore, so mills are built near these resources; (b) well-organized infrastructure such as railways, canals, highways, and ports. As the iron and steel industry needs to import foreign materials, a suitable port is necessary. This is also true for the shipping of products. In addition, stable supplies of electricity, gas, and water are also indispensable; and (c) a large pool of qualified labor.

Second, the paper examines why the Yawata City area has initiated by Yawata Works to form an industrial cluster which is sometimes referred to as '*jokamachi*' or an industrial castle town where the presence of a lord attracts many people to live around his castle. Forward linkages is a main factor. Steel products are used as an input for other industries such as chemicals, metals, and machinery industries so that a heavy industry agglomeration can be formed. Many well-known companies such as Yaskawa Electric Co. (electronic products), TOTO Ltd. (bath, kitchen, wash, and restroom products), and Mitsui Hightech (plastic molds) found their locations here. Nissan Motor Co. and Hitachi Metals also have their roots here. Thus, this area attracted a population of more than 1 million at its peak in 1979, and Yawata Works recorded peak production of 9,166 thousand tons in 1967.

Such prosperity was terminated by the following factors: (a) demand shift caused by oil price hikes, the so-called oil shocks; (b) trade friction due to Japan's over-presence in international markets; and (c) environmental destruction because of heavy and quick industrialization. Thus, the region lost its vitality, namely, steel production gradually decreased and reached its lowest level, i.e., 2,738 thousand tons in 1989. This is about

one-fourth the peak level. Yawata Works employed 43,666 at its peak but the number decreased drastically falling to 3,873 in 2000. The region also lost 5% of its population from its peak.

Thus, the Kitakyushu region had to seek out a way to reform its industrial structure particularly from the 1980s on. This was undertaken from three directions: (a) knowledge-intensive industries; (b) pollution-free ecological approaches; and (c) international distribution center. Factors which made this revitalization possible are accumulated industrial and managerial knowledge from agglomeration such as steel making and pollution controls. These were utilized for creating new ideas and businesses. During this realization process, the Kitakyushu City government played an essential role in taking the initiative through the realization that R&D activities were essential. It emphasized R&D, and technical assistance, and invited universities as well as research institutes from private companies to locate there. In addition, the local government provided tax and financial incentives and supplied infrastructure. Successful examples of this policy were found in the establishment of the Kitakyushu International Techno-cooperative Association (KITA) in 1980, Techno-parks and the Technocenter in 1990, and the plan for the development of the Kitakyushu Academic Research Promotion City in 1996.

An interesting comparison of revitalization was found with Pittsburgh. While Pittsburgh, which faced exactly the same industrial transformation at the same time, changed to become more service-oriented, Kitakyushu City extended *monodukuri* (manufacturing goods) value chains including high-technology and recycling along the lines of accumulated manufacturing. Another difference is the participation of NPOs in the decision-making processes of the region. In Pittsburgh, NPOs played a vital role in the redevelopment stage as an actor in collaborating with local governments, private firms, and universities. The same can be said in the case of Silicon Valley in California, where NPOs such as Smart Valley, Inc. was a key actor. In this context, Japan lags far behind.

4. INFORMATION TECHNOLOGY AND ECONOMIC GROWTH: DISCOVERING THE INFORMATIONAL ROLE OF DENSITY

This article overviews the current situation of urban concentration in Japan, and makes an attempt to explain two paradoxes that have accompanied the IT revolution, namely, its potential impact on productivity improvement

which is referred to as 'productivity paradox,' and on decentralization termed as 'accumulation paradox.' By focusing on the latter, the paper tries to answer why economic activities in rural areas has not been progressing, even if a substantial amount of budget is used for IT investment in those areas. Every region still faces difficulty in halting the outflow of population or economic activities. Only the Tokyo Metropolitan area has been attracting IT investment almost autonomously in terms of funds as well as skilled experts.

To evaluate factors of the accumulation paradox, this paper emphasized the importance of face-to-face interactions facilitated by the urban environment which become even more important in the knowledge economy. In addition, the IT revolution is likely to function as a complement to this shift. Economics dictates that the accumulation of knowledge incorporating high externalities serves as the driving force of economic growth. A variety of empirical studies confirm that the initial conditions of knowledge accumulation in a region represented by educational level, etc., significantly influence economic growth later on. This externality can be explained by two sides of the information diffusion process: (a) disembodied information; and (b) embodied information. The former is described information such as documents, and is easily saved and shared. The latter is stocked in individuals as experience, know-how, etc., which is rather difficult to be transferred and shared. Disembodied information, once disclosed, becomes available to anyone homogeneously and uniformly. It is therefore useful to utilize IT in the form of mass media and the Internet in order to share the same information among a large number of people. Embodied information, on the other hand, is highly relation-specific and differentiated or heterogeneous. Therefore, face-to-face contact is indispensable transferring this type of information. It is the embodied information that plays the most important role in creating knowledge.

In this context, urban areas can function better as an information base that offers face-to-face exchange at a low cost, which is required by embodied information in order to be transferred and diffused. Urban areas can internalize this process by sharing this embodied information, and the probability of receiving benefits from externalities can be increased by being located in an urban center. This mechanism becomes increasingly important under the knowledge economy enhanced by IT.

The author classifies communication methods into one-way and two-way technologies. Examples of the former are television, and newspapers

which provide extract information in such a way that its flow goes in only one direction, while the latter such as telephone and mail facilitate the interactive exchange of information. One-way technologies allow mass distribution of homogeneous information, but two-way technologies require a peer-to-peer network since the information transmission will be private or relation-specific. The information transmitted through the two-way system is then differentiated by place and person of origin. This heterogeneity in information content is likely to require search costs to obtain the designated information, and the matching of communication partners are conditioned by spatial proximity or pre-existing ties. Therefore, resulting informational transactions through a two-way system can be geographically localized in high-density regions.

Considering these distinctions between one-way and two-way technologies, the paper presents the following hypothesis; "*The use of two-way communication is associated with cities, while that of one-way communication is not.*" Using Japanese communication data, the paper rigorously proves the hypothesis by the panel data analysis. The assertion is intrusively supported by the simple facts such that 58% by mail, 82% by telephone call, 79% by cellular call, and 91% by face-to-face meetings are made within the same prefecture. Especially, approximately 80% of telephone calls do not cross the prefecture border.

The paper also examines another factor to understand this 'accumulation paradox' by examining the interdependence between meeting face-to-face and electronic exchange using IT. The issue is whether IT replaces (substitutes) or supports (complements) a face-to-face meeting.

By utilizing data related to telecommunications and transportation, the paper shows empirically that even though substitution of visits by phone usage increases with the distance between communication partners, complementary effects always exceed substitution effects so that phone usage and transportation are net complements. In other words, if telecommunications usage becomes active along with the progress of IT, face-to-face interactions would also show an increase.

5. RECOVERY OF CLUSTERS IN THE KANSAI AREA: A CASE STUDY OF SHINSAIBASHI AND HIGASHI OSAKA

Since the bubble burst in 1991, the Japanese economy has been suffering a long recession extending more than ten years. During this decade referred

to as the 'lost 10 years,' all regions have been losing their vitality, and among them, the Kansai area including Osaka, Kyoto, Hyogo, Shiga, and Wakayama have shown a remarkable decline. Big enterprises that used to locate their headquarters there have moved to Tokyo, and the industrial agglomeration accumulated by various industries has diminished due to the fact that factories left for other Asian countries. The same transformation has been occurring in traditional clusters of small- and medium-sized firms such as the Higashi-Osaka area. In addition to the long recession, the advancing aging society makes it difficult to find sons to succeed in businesses. Thus, the number of offices and factories has sharply declined.

This paper presents some "seeds" for the Kansai area which may promote future economic activities by making use of ICT. As is widely recognized, the Tokyo Metropolitan area takes the lead in ICT, and small businesses and qualified experts related to ICT have been out-migrating to that area from all parts of Japan. The concentration of ICT there is much greater than any other industry. This paper, however, claims that the Kansai area does not lag behind the Tokyo area in terms of the number of FTTH (Fiber To The Home) users, although the latter has an advantage in the broadband network in general such as ADSL (Asymmetric Digital Subscriber Line) and cable modem. This is due to K-opticom, an affiliated company of the Kansai Electric Power Company, which has been actively engaged in the marketing of FTTH, and achieves almost the same share as the market giant NTT West. It charges a lower rate than the latter. The Kansai area thus has the potentiality for future broadband utilization of its infrastructure.

In addition to this, the author finds other seeds of ICT in the Kansai area, which are the new digital and software companies which have been localizing there, namely, Shinsaibashi and Higashi-Osaka in Osaka Prefecture. And, that they may grow into an IT cluster. Especially, the author claims that the former has greater potential to be an IT cluster, since it is located downtown and attracts the younger generation just like 'Bit Valley' in Shibuya, Tokyo. Another reason is found in the collaboration of community, local government, and business circles. They have been jointly proceeding with the so-called Digital City project. The paper represents several projects which apply broadband related to this project. This includes 'Love-tv.' station, for instance, which broadcasts motion pictures made by local digital programmers and artists. This project is expected to expand to cover wider areas of the Kansai area.

The paper also presents how Higashi-Osaka is attempting to transform itself by ICT. Since this area is a traditional cluster of the manufacturing industry, there are many small- and medium-sized firms with accumulated skills and technologies. They are too small however to engage in marketing activities for their products. The Higashi-Osaka Chamber of Commerce and Industry has taken the initiative to build a 'business mall,' the largest (316,965 members) matching site in Japan. In addition to this, it has also set up a portal named "Kinboshi" (meaning gold star), which aims to establish the Higashi-Osaka brand for high quality products.

Under industrial transformation, traditional clusters begin lag behind if there is an absence of effort by all entities of the community to make use of new technology. The paper believes that in the future these areas will make a recovery and be revitalized.

6. AGGLOMERATION OF EXPORTING FIRMS IN INDUSTRIAL ZONES IN NORTHERN VIETNAM: PLAYERS AND INSTITUTIONS

There is no doubt that foreign direct investment (FDI) has contributed to enhancing economic development in Asia countries. It is commonly seen in East Asia that recipient countries prepare industrial zones (IZs) to agglomerate multinational corporations (MNCs). The essential role of IZs is to provide infrastructure and institutions required for foreign investors such as electricity, roads, telecommunications, water supply and sewerage, etc. This role is exactly the same as that of government which provide those public goods for economic growth. By applying the theory of endogenous growth with quasi-public goods, the paper shows the positive role of IZs in the process of economic growth.

Followed by a theoretical analysis, the paper examines types of IZs and their functions. There are three types of agents who construct IZs: namely, (a) public sector such as government; (b) quasi-public sector; and (c) private enterprise. The paper presents the development of IZs in Thailand and Malaysia by (a) public sector and (b) quasi-public sector. The Industrial Estate Authority of Thailand is an example of the former, while state corporations such as the State Economic Development Corporation in Malaysia is of the latter. In Malaysia, such agents constructed nearly 200 IZs in the early 1990s which contributed greatly to economic development.

The paper presents the development of IZs by the private sector in Thailand, Indonesia, and the Philippines. The author discusses the role of

Japanese trading corporations (*Sogoshosha*) such as six leading Japanese trading corporations; Itochu Corporation, Marubeni Corporation, Mitsubishi Corporation, Mitsui & Co. Ltd., Nissho Iwai Corporation and Sumitomo Corporation as major agents for developing IZs in Asian countries, which are utilizing Japanese Official Development Assistance (ODA) to construct infrastructure in IZs. The reason why these countries for allowed the private sector to participate was to introduce more funds to construct IZs and supply additional support to attract Japanese manufacturing firms to IZs.

In the final section, the paper discusses the Vietnam case by focusing on the role in IZs of the quasi-public as well as private sector. Five leading Japanese trading corporations except Marubeni either planned or actually established IZs in 1996. The development of many IZs in Vietnam began in 1994 and those at Noi Bai and Lon Bing also constructed export-processing zones (EPZs). The development site at Tan Tuan, for which Mitsui acted as a marketing agent, was an EPZ. Other sites at Tang Lon (Sumitomo), Haiphong (Nomura Group), Amata (Itochu) and VSIP (Mitsubishi) were constructed as IZs. The author discusses two industrial parks, Thang Long Industrial Park (TLIP) and Nomura Haiphong Industrial Zone (NHIZ) along Highway Route 5. The former located in Hanoi was established by Sumitomo Corporation, and the latter, in Haiphong, by Nomura Security Company. The advantages of these two are summarized as follows: (a) favorable location; (b) high educational level of labor; (c) abundant cheap labor; (d) infrastructure; (f) existing supporting industries; and (g) easy access to administrative procedure.

The paper summarizes the decisive factors of Vietnam to attract foreign investors as follows: (a) human resources; (b) infrastructure; (c) living conditions; and (d) administration. Vietnam engaged in human resource development projects by establishing the Hanoi Institute of Technology and the Haiphong Hi-tech Skill Training School, for example. Vietnam has also constructed infrastructure such as national highway Route 5 and Haiphong port to promote the forming of industrial agglomeration. One-stop service of administration in IZs helps largely in streamlining investment and export procedures. The paper concludes that these factors will contribute toward agglomerating foreign firms and promote economic growth in northern Vietnam.

7. INDUSTRIAL AGGLOMERATION AND REGIONAL GROWTH IN KOREA: FOCUSING ON THE SOFTWARE AND ICT SERVICE SECTOR

Recently, many countries have begun shifting their policy priorities to knowledge-based industries such as ICT. Observing that universities play important roles in the formation and development of ICT clusters, governments began implementing policies for the promotion of knowledge transfers from universities and research institutions. This paper focuses on the Korean ICT sector during 1998 and 2000 in order to analyze factors that promote the formation of ICT clusters.

In Korea, business activities are highly concentrated in Seoul, in which about one-quarter of all companies and workers are located. By adding Gyeonggi, which neighbors Seoul, the total exceeds 40%. The level of concentration increased between 1998 and 2000. During this period, the number of workers employed in the software sector doubled, which is more than twice that of the hardware sector. The R&D and education sectors also increased their number of establishments and workers. The uneven geographical distribution of locations was also observed in the ICT sector. Seoul secured more than 80% of software workers, and venture businesses related to software are concentrated around the so-called 'Teheran Valley' in the southern area of Seoul. The hardware sector formed industrial agglomerations in Gyeonggi with more than half of the total workers. Although the R&D strategy of the government of Korea was not as strong as its industrial policies, it has provided incentive programs for R&D promotion and supports the establishment of research consortia and national research laboratories. An example is found in Daedeok Science Town in Daejeon. Recently, the government of Daejeon has started promoting venture businesses. Research institutes and universities are closely involved in this policy, especially in the field of human resource training.

At the national level, two approaches were introduced to promote venture businesses. One was the establishment of venture incubation. This policy went into full swing after the 1997 financial crisis. The Small and Medium Business Administration (SMBA) and the Ministry of Information and Communication (MIC) implemented this policy. MIC's incubation efforts focus on the ICT sector, which include the establishment of incubation facilities in large cities throughout the nation, and the founding of i-Park in order to develop foreign ICT markets. The second approach was the promotion of venture capital, for which a policy was formed in the early 1980s. The launch

of KOSDAQ in 1996 opened up opportunities for investment. The number of venture companies listed on KOSDAQ increased from 52 in 1996 to 353 in 2001, 30% of which were related to ICT. The government encouraged venture capital by forming new investment funds and reducing the income and capital gains tax.

In the empirical study, the paper attempts to build an econometric model to examine the factors of growth of the Korean ICT industry. The model includes the number of employees in a region in a particular industry as the explained variable and indices for competition, non-diversity, and specialty as explanatory variables. According to the theory, it hypothesizes a positive coefficient of competition and a negative one of non-diversity. Concerning specialty, the coefficient would be negative if a higher specialty resulted in lower regional growth. The results of the regression analyses did not deny the hypothesis that a more competitive and diversified, and less specialized region would tend to achieve higher growth.

Effects of penetration of telecommunications on regional growth can be positive to the growth of peripheries if long-distance calls substituted for face-to-face communication, and negative if local calls and data communications complemented face-to-face communication. To test its effect, tele-density was added to the basic model. The result was that the effect of tele-density was negatively significant.

Seoul has specialized in the software sector, which is reflected in the knowledge-spillover-related data of the software industry. A dummy variable for the software sector was introduced into the basic model. The result indicates that, by considering the coefficients with dummy variables, signs of the specialty's coefficient changed in the software sector, and the negative sign of tele-density became larger than that of other sectors. This implies that the development policy specializing in the software sector would seem to be justified in periphery economies. In order to confirm the relation between educational and R&D institutions and the development of the ICT sector, their numbers in 1998 as initial conditions and dummy variables were added to the model. The results of the regression analyses did not show significant positive relations of the two with the growth of the software sector. In the case of the hardware sector, a significant positive relationship with R&D was observed.

Regarding the differences in input-output structures between the hardware and software sectors, the software sector does not have a close relationship with the ICT sector, and its output's users are more dispersed. Regarding the relationship with the R&D and education sectors, the hard-

ware sector has a much closer relationship with the R&D sector than does the software sector. However, neither sector has a close relationship with school education. On the other hand, it is very important for software companies to secure a source for skilled human resources, which can be confirmed from the larger compensation for employees in the software sector as compared to the hardware sector.

Analyses conducted in the paper are summarized as follows: (a) local competition had positive impact on regional growth; (b) high specialization in the software sector promoted its own growth; and (c) locations in the software sector may not be limited to high tele-density areas. These results support industrial policies focusing on the software sector implemented by local governments over the short term. On the other hand, many venture businesses are concentrated in Seoul, which is considered a result of the economy of agglomeration. In addition, there is the possibility that the direct knowledge spillover effects from educational and R&D institutions on development of the software sector will be limited in the short term.

8. INDUSTRIAL EXCHANGES BETWEEN CLUSTERS ACROSS COUNTRIES

This paper discusses how traditional regional industries cope with crises arising from challenges presented by other Asian countries such as China, Taiwan, and Korea by collaborating with other foreign industrial clusters which are subject to the same problem. The author takes the textile industry in Fukui Prefecture as a case study. Fukui was previously the synthetic fiber textile center of the world, and has developed new technologies and new products over the past twenty years in the fields of polyester differentiated textiles, new synthetic fiber textiles, and new composite textiles. Fukui Prefecture has a cluster of about 2,200 companies in related industries and styles itself as 'Fukui, the Textile Mecca,' and is famed as one of the major textile-producing areas in Japan.

In recent years, however, the Fukui textile industry has been in decline due to competition from China, Taiwan, and Korea. The main reasons why Fukui lost its competitiveness are as follows: (a) no clearly-defined specialties in the context of international competitiveness; and (b) weak financial basis since they are mainly small in size.

Under these circumstances, JETRO is implementing the so-called Region-to-Region Initiatives Program. The aim of this program is to seek ways

to revitalize local industry in Japan through collaboration with specific foreign regions within the same industry. The program has embarked on a total of 197 projects since it was initiated in 1996. Specifically, the program supports industrial exchange between industrial regions by conducting overseas market surveys, dispatching experts and missions to other countries, inviting experts from other countries to give seminars and symposiums in Japan, and holding conferences with participation by influential corporations for the purpose of encouraging business meetings. Therefore, the purpose of this program ranges from exchanges on highly technical subjects for the purpose of establishing a new industry to expansion of marketing networks so as to vitalize the local industry.

Thus, JETRO found Lyon, France as a partner. The textile industry in Lyon has suffered similar pressure from such industries in Asia, and has shifted the sector to high-quality garments and industrial materials. Like Fukui in Japan, Lyon prospered historically as a textile-producing city, and even today it is a leader in the transition to industrial materials. The Lyon area is now a major production center with some 2,500 companies that make it the largest concentration of industrial textile manufacturers in the world. These include such major, world-class firms as Porcher Industrie, Hexcel, and Chomarat, as well as smaller companies. There is also a cluster of textile-related research facilities and specialized educational institutions. The entire Lyon production area is engaged together in technical innovation and efforts to reinforce their international competitiveness.

With the help of the program, Fukui sent several missions to Lyon, and it resulted in concluding a technological exchange agreement between the IFTH (French Institute for Textiles and Clothing) and the Industrial Technology Center of Fukui Prefecture, for example. The agreement promised that the two organizations would strengthen their cooperative relationship with each other by promoting the following activities: (a) exchanging information on new technologies, products, and testing methods; (b) exchanging researchers and students between the two organizations, related companies, and universities; and (c) conducting joint R&D activities between the two organizations, related companies, and universities.

As an academic exchange, a company in Fukui Prefecture accepted one student from Lyon as a training intern. The student studied the technology of water repellents and flame-proofing of textiles. In addition, Fukui University reached an agreement with ITECH (Textile and Chemical Institute of Lyon) to establish an academic exchange program between the two insti-

tutions.

The most important exchange between the two production areas is exchange between business companies such as business matching. The paper introduces several examples of this matching. For example, Fukui-based companies presented exhibitions at the JEC Composites Show held in Paris in April 2002, and they also received large numbers of business inquiries, some of which are expected to yield contracts. In turn, the Fukui-based companies have much to learn from the ability of Lyon-based companies to develop products that are accurately matched to market needs. If the needs on both sides match, the import and export of products and formation of alliances can be expected.

The continuation of exchange will lead to building up a mutually complementary relationship, and both areas will be able to receive their respective advantages and benefits. By sharing mutually their experiences, these two traditional industrial regions have been restructuring their accumulated competitiveness in the global era.

9. CHINA'S REGIONAL INDUSTRIAL DISPARITY FROM THE VIEWPOINT OF INDUSTRIAL AGGLOMERATION

The economic development of China has been attracting the world's interest, and its average growth rate has been 9.4% for the period from 1979 to 2001. This paper attempts to analyze its development in terms of industrial agglomeration, namely, a spatial unevenness of economic activities by making use of recent results of research in spatial economics. The first subject the paper discusses is a rather methodological issue, that is, the index of measuring Chinese regional industrial disparity. The author adopts the Gini coefficient as such an index. According to this index composed by statistical data, disparity in terms of production declined from the time of the nation's foundation to the latter half of the 1980s; since then, the degree of disparity started rising to the present time. This is the fundamental fact which the paper will examine.

Due to international political affairs such as the Korean War and a falling out with the USSR, resulting strategy considerations for national defense and/or industries were rearranged to turn toward the inland area. The inland area includes Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, and Ningxia. This policy automatically brought about a more balanced industrial location and a decrease in regional disparities.

The situation drastically changed after economic reform and the result-

ing open door policy at the end of the 1970s. Special economic zones set up in the south and other coastal areas drove Chinese economic growth. Especially, the Southern Tour Lectures in 1992 by Deng Xiaoping brought about high growth in those areas by inviting foreign direct investment. This was the turning point where the industrial disparity index began to show an increase. According to statistical data, the Yangtze River Delta (Shanghai area), Shandong, and the Pearl River Delta (Guangdong area) are typical of the industrial agglomeration developed in this period.

In the third section of the paper, the author analyzes the causes and mechanism of industrial agglomeration in the eastern area by taking its machinery industry as a case study, since this industry which has shown a concentration since 1994, is characterized by the fact that its industrial disparity index is 0.6768, which is greater than that of manufacturing (0.5952). Originally, the government introduced foreign firms to this area, but an examination should be made as to whether there is an incentive for Chinese firms to agglomerate there or not. The economic theory demonstrates that the characteristics of the region such as infrastructure, quality and quantity of labor, knowledge spillover, and existence of supporting and related firms attract firms to the area. The author focuses on the trend of intermediate goods transactions. That is, the increase in transactions of intermediate goods in a particular area implies that the area offers benefits of agglomeration. In order to show the increases in intra-regional transactions of intermediate goods in the eastern area, China's inter-regional Input-Output Table is utilized. Particularly Table 9.6, which shows an increase ratio of intra-regional transaction between 1987 and 1997, indicates that only the ratios of the eastern area (machinery 9.68, and electric and electronic 13.05) exceeded all ratios of total supply (9.07 and 11.86) and total demand (8.96 and 10.83) for all of China. Therefore, shares of intra-regional transaction among firms in the eastern area have increased.

In the remaining section, this paper discusses the possibility of developing the inland area, especially the western area. The government acknowledges the importance of the latter from the viewpoint of rectifying the regional disparities between the coastal and inland areas. In the 10th Five-Year Plan which covers the period 2001 to 2005, weight is given to western infrastructure, scientific technique and education, ecological environment, ethnic minorities, natural resources, agriculture, etc. This kind of policy is based on the big-push theory, which is aimed to produce intra-industry linkages (both forward and backward) artificially. However, the author claims

that the relation between the coastal and inland areas is the core-periphery structure in the context of agglomeration. Namely, the problem facing the western area is in some respects a structural one. It is difficult to escape from the state of underdevelopment of the periphery. That is, even if certain people and/or areas become affluent first, achieving this end becomes more difficult due to the so-called lock-in effect. This is because even if the present periphery becomes a center of production, the existing core will then become the new periphery. Therefore, the structural problem will still remain. Thus, the paper claims that the only policy available for developing the western area is to promote pillar industries in each province in the eastern area. They are not industries related to agriculture, food processing, tourism, and Chinese medicine, as the 10th Five-Year Plan has recommended.

A good example for fostering pillar industries is found, for instance, in the project presented by the Shaanxi Provincial Development Planning Commission which focuses on the electronic and telecommunications industry, aviation, and so on so as to further raise Xi'an's status as a high technology development zone. The provincial plan also aims to further boost the Xi'an Software Park and Xinjianguang Electronic Industrial District in the Xi'an National High-Tech Industrial Development Zone. Balanced growth in China crucially depends on the success of establishing pillar industries in the inland area.