

Minutes of Discussion

Session 1

Presentation 1—“Architecture-based Comparative Advantage in Japan and Asia”

Prof. Takahiro Fujimoto (University of Tokyo)

Industrial design can be classified into two types: (i) modular (*kumiawase*) architecture, in which functions and parts have one-to-one correspondence, and (ii) integral (*suriawase*) architecture, in which correspondence between functions and parts is complex. Each country has a different organizational capability derived from history. Japan is a country of integral products with high integrating capability. The EU excels in integral products with superior capability in creative expression. The United States produces modular products supported by its creative combination capability. Korea produces capital-intensive modular products, driven by the power of concentration. China can mobilize a large amount of human resources to produce labor-intensive modular goods. ASEAN should be producing labor-intensive integral products, but this remains a potentiality at present. Business architecture theory can identify the strengths and shortcomings of each economy and suggest ways to improve their global positioning strategies.

Presentation 2—“Vietnam’s Industrial Policy Formulation: To Become a Reliable Partner in Integral Manufacturing”

Prof. Kenichi Ohno (GRIPS)

The author has studied Vietnam’s policies for eleven years, and established the Vietnam Development Forum (VDF) in Hanoi in 2004. Vietnam has a high-quality labor force, but its policies remain poor. In supporting the Ministry of Industry in drafting industrial master plans, the author urges Vietnam,

based on Professor Fujimoto's theory, to become a valued *monozukuri* partner of Japan in order to compete with China and to break through the glass ceiling to achieve high-level industrialization. This advice is also intended to solve Japan's 2007 problem; highly skilled old workers will begin to retire in droves in 2007. Thailand and Vietnam have high potential to become developing country partners of integral manufacturing. For this, industrial human resources and supporting industries are essential. Japan has supported Vietnam in strengthening these, but more concentrated effort should be made. In addition, Vietnam should clearly announce this as a national goal.

1. Business architecture theory and ASEAN's organizational capability

Mr. Hisaaki Mitsui (International Development Center of Japan)

I have questions for Prof. Fujimoto concerning the architecture theory. First, can ASEAN really become a partner of Japan's integral manufacturing? As we observe, supporting industries and industrial human resources in Thailand and Malaysia have not reached sufficiently high levels yet, even though they have tried for several decades.

The second question is regarding the architecture of the automobile industry. Although automobile production is classified as closed-integral, auto parts are mutually supplied among Asian countries. In addition, part suppliers are not bound by the *keiretsu* system anymore and do business with more than one assembler. Does this mean that the automobile industry has become open-modular?

Prof. Takahiro Fujimoto (University of Tokyo)

Characteristics of ASEAN countries are perhaps too diverse to generalize. And it is true that integral manufacturing in ASEAN still remains a potential. However, if we look at China, its labor force has very high mobility, just like in the US. China has a huge supply of good single-skilled workers but few multi-skilled workers. Compared with China, ASEAN workers tend to stay longer at one factory (subject to overall business conditions), which points to the possibility of training many multi-skilled workers. For example, one Japan-

ese company we visited in Hanoi had twenty excellent CAD operators, all of whom were graduates of the Hanoi University of Technology. When we visited the factory for the second time, the CAD operators had increased in number to fifty, and only a few of the original ones had quit. I have never heard such a low job turnover in China.

As for the second question, business architecture should be understood in terms of design, not in terms of transactions. Liberalization of business transactions, a situation where part suppliers produce for many assemblers beyond the *keiretsu* system, is a different matter from industrial design. Even though business transactions are open, Japanese companies still produce closed-integral products, and the design of each automobile component remains unique to each assembler. In transaction, few suppliers now depend on the conventional keiretsu system and deal with only one assembler. Most part suppliers have two or three assemblers on average.

Prof. Kenichi Ohno (GRIPS)

Each country has a unique national character that cannot be explained by logic. Job hopping also exists in Vietnam, but the degree varies from company to company. Job turnover is extremely low in some companies. Workers' mobility can be reduced by appropriate employment policy. In China, in contrast, it is much more difficult to curb mobility because Chinese fundamentally like to move. For this reason, I think there is a higher chance that ASEAN will master integral manufacturing. If ASEAN countries do not take advantage of their character and engage only in simple labor-intensive production, they can hardly compete with China, which has an inexhaustible supply of low-wage labor.

2. Matching demand and business architecture

Prof. Junjiro Shintaku (University of Tokyo)

The architecture theory remains incomplete without incorporating the demand side. Vietnam needs a market for integral-type products, if it wants to develop integral manufacturing skills following the proposal of Prof. Ohno. China has an advantage because it has a large number of domestic consumers

who prefer modular products. Domestic demand in Vietnam and Thailand may be more oriented toward integral products. For example, consumers in these countries seem to prefer integral-type Japanese motorbikes over modular-type Chinese motorbikes.

Prof. Takahiro Fujimoto (University of Tokyo)

Japanese firms make high-quality integral products, but they are not good at marketing to sell these products. Consumers who prefer modular products consider Japanese products as “excessively” high-quality. However, *Otaku*, a kind of user who enthusiastically welcomes high-quality and minute details, is a very important concept for integral product marketing. To enlarge the market of integral products, there should be a mechanism to continuously reproduce *otaku* consumers who prefer integral products.

Mr. Hisaaki Mitsui (International Development Center of Japan)

Could you explain more about the characteristics of markets that prefer integral products? And what factors create such a market?

Prof. Takahiro Fujimoto (University of Tokyo)

A market is likely to prefer integral products when a large number of consumers seek extremely high performance or delicate balance in products. In contrast, a market tends to prefer modular products when the majority of consumers enjoy low prices and continuous changes in exterior design but do not want high performance. However, it is hard to explain how these market features are formed. Much depends on history. For instance, modular-type Chinese motorbikes once flooded into Vietnam but Vietnamese consumers later returned to integral-type Japanese motorbikes. Most likely, the unique way of using motorbikes in Vietnam has created an integral-type market over time. Many urban Vietnamese ride motorbikes for commuting, while Chinese people consider motorbikes mostly as a means of cargo transportation in rural areas. Difference in usage naturally leads to different market features.

Even after studying many countries, it is quite difficult to find a formula for predicting market types. For example, Chinese motorbikes are very popular in Laos, Cambodia, Bangladesh and Pakistan, but they are unpopular in

Thailand and India.

3. Dynamics of business architecture

Prof. Yukio Sugano (GRIPS)

I have some questions about architecture theory. First, how long do you think Japanese industries can maintain their advantage in integral manufacturing? China and ASEAN may not have reached the Japanese level yet, but is it not possible for Korean companies, such as POSCO (steel) and Hyundai (automobiles) to overtake Japan in integral manufacturing in the near future?

My second question is whether it is appropriate to say that the US and EU do not have advantages in integral manufacturing. For example, they have dominated the aircraft and space industries, which are highly integral. If they seriously concentrate resources on integral manufacturing, can they not become even stronger than Japan in this area?

Prof. Takahiro Fujimoto (University of Tokyo)

Whether a country is modular or integral should be decided on a relative scale, and we should also remember that a country's character can shift over time as it accumulates new organizational capability. In the short run, however, a country's character does not change very much. POSCO has caught up with Japan in the production of general-purpose steel, which is modular, but it has a long way to go in mastering high-quality steel production, which is integral. Since the 1980s, this situation has not changed. Korea, based on modularization strategy, combines the latest equipment from all over the world, but it still cannot produce high-quality special steel such as galvanized iron sheets used in the exterior of automobiles. This is because such products require high-level integral skills in addition to equipment.

If concentrated national effort is made in R&D, any country can produce highly integral products. National flagship industries such as aircraft and space industries are often promoted at any cost, with ample subsidies. That explains why even China, a modular country, can launch space rockets, which are highly integral. But these are exceptions. We should study more general cases to determine the comparative advantages of each country. Then we must

conclude, as I showed in my table, that Korea is a fairly modular country. I am also suggesting to Korea that it should transform itself to be a more integral country. Some Korean firms, such as Hyundai Motor Company, can now produce integral products after studying integral manufacturing for thirty years.

4. Supporting industries, industrial human resources, and business architecture

Prof. Shigeru Ishikawa (Hitotsubashi University)

According to Prof. Ohno, Thailand and Malaysia are stuck below a glass ceiling and cannot develop supporting industries or high-quality industrial human resources. But this picture may be too pessimistic. When I visited Thailand in 1970, the domestic car market had reached about 400,000 units per year and the spare part market had started to develop. Local staff, who had education only through elementary school, somehow managed to produce spare parts by copying Japanese products. However, when I visited Thailand's Eastern Seaboard Industrial Zone several years ago, there were some excellent parts factories that employed engineers with university degrees. Thus, I think breaking the glass ceiling is possible if the country patiently improves the quality of human resources over several decades.

Prof. Kenichi Ohno (GRIPS)

I intentionally exaggerated the weaknesses of Thailand and Malaysia in order to encourage Vietnam. In reality, Thailand's supporting industries have reached a certain level. However, when compared with East Asian high performers such as Korea and Taiwan, I do not feel that Thailand and Malaysia have achieved sufficient development commensurate with the time they have spent and the effort they have made in the past few decades. It is very questionable whether Thailand's supporting industries, without FDI help, can produce all the core components of automobiles. After all, Thailand remains a "potential" partner of Japan's integral manufacturing system.

Prof. Takashi Oshika (University of Tokyo)

In the last several years, I have visited local suppliers in Thailand and Indonesia with the missions of the Association for Overseas Technical Scholarship (AOTS). We have found that Indonesian motorbike part suppliers are developing rapidly. Some people argue that human resource development should be left to private enterprises in ASEAN and that assistance by public organizations such as AOTS is unnecessary. Do you think that AOTS should play an active role in developing industrial human resources in Vietnam?

Professor Kenichi Ohno (GRIPS)

VDF also cooperates with AOTS Vietnam. Vietnam needs technical training support by public organizations like AOTS. In Vietnam, the motorbike market has reached the level of two million units per year, and its supporting industries have begun to grow faster than those of other industries, such as automobile or electronics. However, a large number of local firms do not know how to approach Japanese firms, why their products are rejected by Japanese companies, and what “5S” means. Under such circumstances, I think that public sector assistance can act as a catalyst to promote supporting industries. To begin with, AOTS should make efforts to make its activities known to local firms, because many of them still do not know of the existence of AOTS programs.

Prof. Nozomu Kawabata (Tohoku University)

Industrial human resources and supporting industries are very important, as Prof. Ohno emphasized. However, they are always needed, whether business architecture is integral or modular. Thus, difference in business architecture will become an issue after industrial human resources and supporting industries have developed. First, high-quality managers or engineers who can make proper production plans are required. Multi-skill workers are also necessary, but they are needed only after managers have appreciated and begun to pursue integral manufacturing.

FDI assemblers will surely come to Vietnam. Nonetheless, Vietnam cannot fully utilize its potential for integral manufacturing as long as it does only final assembly and continues to import all parts from Japan or other countries. In order to break through the glass ceiling, Vietnam should acquire metal

processing technology such as welding, boring, pressing and machining. Whether a country has such processing technology depends not only on national character but, significantly, also on history. According to Jiro Takabayashi, a business consultant, countries that have experienced capital goods production are generally equipped with processing technology. In addition, processing technology can be acquired through various activities, such as spare part production and machine maintenance.

Professor Kenichi Ohno (GRIPS):

In my opinion, difference in business architecture matters very much in the way industrial human resources and supporting industries are developed. In Vietnam, where technology improvements by domestic effort alone are hardly sufficient, local firms should rely heavily on relationships with foreign firms to scale up. To establish relations with Japanese firms, local suppliers must spend at least a few years in working with Japanese, being persistent even if their samples are rejected repeatedly. This type of learning is unlikely to occur if they supply parts to modular-type assemblers. By going through such an intensive trial-and-error process, local firms will grow up to become high-quality integral suppliers.

Session 2

**Presentation 3—“Competitive Strategy of Global Firms and Industrial Clusters: Case Study on the Hard Disk Drive (HDD) Industry”
Prof. Tomofumi Amano (Hosei University and University of Tokyo)**

Latecomer countries want to internalize the industrialization process and attract long-lasting investments under the pressure of global competition. Meanwhile, multinational corporations (MNCs) must maximize locational advantages of production sites in different countries to maintain competitiveness. Both needs are satisfied if they cooperate in concentrated action to create industrial clusters. In the hard disk industry, whose final products are modular but whose components are integral, clusters were formed in ASEAN and have been difficult to shift to China; this is different to other computer's accessory industries. In these clusters, strategic alliance between US assemblers and Japanese part makers is observed. MNCs have promoted the growth of hard disk clusters through human resource development and linkage with local firms. Simultaneously, the Government of Singapore, for example, introduced measures such as the country-wide bonded warehouse system and efficient investment licensing to strategically target the formation of a hard disk cluster.

**Presentation 4—“Strategy for Cluster-based Industrial Development in Developing Countries”
Prof. Keijiro Otsuka and Prof. Tetsushi Sonobe (GRIPS)**

We have conducted many case studies on relatively low-tech clusters in Asia and Africa. According to our model of endogenous industrial development, industries in developing countries follow three common phases: (i) the start-up phase, in which foreign technology is copied, (ii) the quantitative

expansion phase, in which copies of the copy multiply, and (iii) the qualitative improvement phase, which achieves multi-faceted innovation. Moreover, each phase is driven by certain required types of entrepreneurs, ability, innovation and imitation. Public policy and ODA should be mobilized to accelerate transition from one phase to another, especially from the second to the third phase. To help developing countries to achieve multi-faceted innovation (“new combination”) that is realistic in each country, small and medium enterprises in the informal sector should be selectively targeted and given assistance to enhance their ability of innovation in the areas of management, technology and distribution. In addition to conducting case studies, we are now designing support programs for this purpose.

1. Theoretical foundation of the endogenous development theory

Prof. Shigeru Ishikawa (Hitotsubashi University)

The Lewis model, the Todaro model, and the Myint model are among the most popular models of economic growth in developing countries, and each has clear theoretical assumptions about sector division and so on. Your endogenous development model also seems to study the mechanism of industrialization but its assumptions on institutions, behavioral patterns, etc. are not clear to me. Can you explain? Am I right to understand that industrial agglomeration is one component of the endogenous development model? Please also explain why you are conducting empirical studies in pair-wise comparison.

Prof. Keijiro Otsuka (GRIPS)

Empirical tools to test development theories did not exist in the 1950s and 60s when the Lewis model and the Todaro model were formulated. We are now empirically demonstrating the mechanism of sectoral migration associated with industrialization. We consider industrial clusters to be a device to activate the market mechanism.

Our endogenous development model, featuring three phases—start-up, quantitative expansion and qualitative improvement—was not derived from the-

ory but was suggested by striking similarities found in many empirical studies.

A pair-wise comparison was conducted to show that successful industries followed very similar development patterns, as with shoes industries in Shanghai and Ethiopia, despite the fact that they are in different political, institutional and historical conditions. I think we have already conducted a sufficient number of case studies, and we are now planning practical training courses aimed at promoting innovations in small enterprises. We have started to discuss the curriculum of such a training program.

2. Using aid to strengthen competitiveness

Prof. Yukio Sugano (GRIPS)

There is a problem in providing ODA for training programs proposed by Prof. Otsuka and Prof. Sonobe, from the viewpoint of aid operation. General vocational training can be supported by ODA, but ODA is not generally used to help private companies to improve competitiveness, which is required for transition from the quantitative expansion phase to the qualitative improvement phase of industrial agglomeration. This should be done by self-effort or cooperation among private firms.

For instance, UNDP sets up a technical assistance center to support technical improvement in a shoes industrial cluster in the western part of New Delhi. However, the technicians and firms in this cluster have relatively low technical levels; we cannot find a firm that has reached a certain technical level, especially one that is competitive in exports. In other words, the technical assistance center does not help to improve technical levels in the cluster but only brings about an increase in the number of new entries, which is the quantitative expansion phase. The technical level in the cluster that includes firms who are competitive in export is still relatively low in comparison to those in Europe, America and Japan. In order to achieve qualitative improvement, these firms need to improve not only technical level but also design, marketing, brand-name and so on. Is it possible to use aid for these improvements? Is it adaptable to ODA?

Mr. Tsuyoshi Kikuchi (Japan Development Service)

It should be possible to execute projects for strengthening competitiveness in the ODA framework. In fact, we are currently engaged in an ODA project to draft a master plan for improving quality and productivity in the food processing industry and the electrical and electronics industry in Tunisia.

Mr. Toshio Tsunozaki (FASID)

JICA has established human resource development centers (usually called the “Japan Center”) in many former socialist countries, including Vietnam. These centers offer management courses to promote the development of small and medium enterprises. Several international organizations offer similar programs for competitiveness.

Prof. Tetsushi Sonobe (GRIPS)

Our proposal is based on the idea of market failure. In many cases, industrial development stagnates without support from the government or ODA. For example, firms have no incentive to innovate if new products are quickly copied by many competitors and cannot make sufficient profits to justify introducing new technology. This is a kind of market failure. Some people may claim that aid programs for micro enterprises benefit only a limited number of entrepreneurs. However, in reality, beneficiaries will induce many other firms to imitate their innovations, leading to industrial development in the region. Scared by business risks, many small enterprises do not even try imitative innovations by themselves. These enterprises should be guided toward imitative innovations, which are actually very basic technology and management knowledge from the viewpoint of developed countries.

Prof. Kenichi Ohno (GRIPS)

ODA is not the only way to support industrial development. We should also mobilize other resources, such as foreign businesses and NPOs. If the procedure to obtain ODA funds is too slow or cumbersome, other methods should be sought. In Vietnam, VDF, a non-ODA academic cooperation unit, supports strategic policy formulation, while a Japanese trading company is developing an industrial park database and other Japanese firms are interested

in expediting logistic services. Appropriate actors should be selectively called in to perform various tasks.

3. Digital technology may impede transition to qualitative improvement phase

Prof. Takahiro Fujimoto (University of Tokyo)

The wall between the quantitative expansion phase and the qualitative improvement phase is getting higher. The reason, ironically, is rapid progress in digital technology. In the past, copying someone's product while retaining reasonable quality was not so easy because it required certain skills, such as design copy and functional revival. When imitation was tantamount to reverse engineering (dismantling a product to analyze its structure for producing a copy), a decent level of R&D was a must. At present, however, advancement in digital technology such as CAD and CAM allows anyone to easily draw copied designs. Reverse engineering is no longer necessary. Even amateurs who cannot draw a blueprint can manufacture copy products automatically. Worse, copies of CAD/CAM software, needed to copy products, are sold in the market, which dramatically reduces the cost of imitation. As a result, imitation is no longer reverse engineering that linked to R&D but simple copy that can be done at low cost, thus, prices of reverse engineering are set to low level. Therefore, Chinese products and the like are put into a dilemma of focusing on copied designs instead of promotion of innovation.