Chapter 4

Development of Regional Production and Logistic Networks in East Asia-Vietnam Upgrading of Firms in Vietnam through Linkages with Customers and Suppliers

Truong Chi Binh
Institute for Industry Policy and Strategy (IPSI), Vietnam

March 2009

This chapter should be cited as
Truong, C. B. (2009), 'Development of Regional Production and Logistic Networks in East Asia-Vietnam, Upgrading of Firms in Vietnam through Linkages with Customers and Suppliers', in Limskul, K. (ed.), *Development of Regional Production and Logistic Networks in East Asia*. ERIA Research Project Report 2008-4-1, pp.215-260. Jakarta: ERIA.

4

Development of Regional Production and Logistic Networks in East Asia-Vietnam

Upgrading of Firms in Vietnam through Linkages with Customers and Suppliers

Truong Chi Binh

Abstract

Hanoi has the most innovative research and education system with a high-quality human resource. However, the R&D capacity does not meet the demand of manufacturing firms. This research focuses on the business linkages among manufacturing firms in Hanoi, particularly between domestic and foreign direct investment (FDI) firms; the development of R&D and upgrading activities of firms and the different motivations for innovation of FDI and domestic firms; and the connection of business linkage with R&D and upgrading. This paper shall identify the motivations, resources and information sources from which firms base their decisions to implement regular innovation and upgrading. From these results, the research will propose a design for linking Vietnam's innovation system to the demand of industrial sectors or firms. Although the respondent firms in this study are of medium size, their assets are rather large and their technological capacity is not so outdated unlike the firms in the previous survey. However, firms have not realized the benefits of innovation and upgrading.

They seemed to have no motivation for linkage thus the poor business linkage. Linkage between firms and research institutions has not been formed. The activities of these government agencies have not met the firm's demand. The government has not proposed incentive policies for R&D and upgrading activities of firms. In addition, the market providing R&D activities in Vietnam has not been developed yet.

1. INTRODUCTION OF RESEARCH AREA

1.1. Advantages of Hanoi over other Cities/Provinces

According to the Department of Planning and Investment, Hanoi has eight advantages over other localities:

- Capital, cultural and trade center of the nation
- Political stability and safe business environment
- High-quality human resources
- Huge market potential
- Improved infrastructure
- Social service cost and real estate cost lower than in other locations
- Many industrial parks
- Convenient administrative procedures

1.2. Industrial Development

At present, Hanoi has one high-tech park, 18 industrial parks, 45 small and medium clusters and 171 other industrial areas. Major fields invested in industrial parks are electricity-electronics, information technology (IT), mechanics, textile and garment, and food processing. These industrial parks and clusters have contributed significantly to the city's industrial development. The industrial production value of Hanoi has

increased from year to year. The table below indicates the industrial production value index of Hanoi in January 2009.

Table 1. Industrial Areas in Hanoi

Ord.	Type	No.	Area
1	High Tech Park	01	1.586 ha
2	Industrial Park	18	6.846 ha
3	Small and medium industrial cluster	45	2.400 ha
4	Industrial area	171	1265 ha

Table 2. Industrial Production Value Index of Hanoi

	January 2009 compared to December 2008	January 2009 compared to January 2008
Hanoi	42,8	93,6
State owned	69,1	96,9
Non-State owned	75,2	102,5
FDI	24,3	83,5

Source: General Statistics Office.

In addition to industrial growth, Hanoi possesses a synchronized and developed infrastructure. Industrial parks, export-processing zones and the Noi Bay airport are situated 40 km away from the city center. The two biggest ports in North, Hai Phong and Cai Lan, are 120 km away from Hanoi. Hanoi also serves as an excellent transport connection in the North given its improved railway and highway.

1.3. Human Resources

After its expansion, Hanoi stands as the second biggest city in Vietnam with a

population of 6.233 million people. More than 3 million people are of working age. A major proportion of the labor force in Hanoi comes from the surrounding provinces in the North.

Low labor cost is one of the factors attracting foreign firms to invest in Hanoi. Most of the employees working in foreign firms are highly skilled and able to absorb new technologies. More than 62% of the scientific and management staff have either a PhD or a master's degree.

1.4. Science &Technology (S&T) System

The Vietnamese S&T system is dominated by public research institutes. Only a few State-owned enterprises (SOEs) have their own laboratories because of the legacies of the erstwhile planned economy. In the past, the government took the responsibilities for technical change and industrial modernization. About 85% of the total R&D finance was from the state budget (UNIDO, 2000) and the share of government budget has decreased to around 70% of the total R&D investment in Vietnam. Government R&D investment decreased dramatically in the 1990s since the *Doi moi* reform and recovered from between 50 and 60 million USD in 1997 to 270 million USD in 2005.The small government R&D fund was divided among the various research projects in every research institute and university.

Table 3. Number of Registered R&D Organization (2005)

State owned	694 (34.5%)
Ministerial	484 (24%)
Academia	147 (7.3%)
SOE Company	63 (3.1%)
Private and Public. collective owned	626 (31.1%)
Total	2014 (100%)

Source: VISTEC-Vietnam S&T Evaluation Center (2007).

The government research institutes consist of the Vietnamese Academy of Science and Technology (VAST), the Vietnam Academy of Social Sciences (VASS), ministry-line research institutes and local government research centers. Vietnam's goal for these institutes is to enhance their contribution to economic development and to promote the commercialization of their research outcomes. Towards this end, Decree 115 was passed, requiring government research institutes to be self-financed and to be S&T-based enterprises. As of 2004, Vietnam has a total of 40,000 researchers, 14,000 of them with PhD and 16,000 of them MSc degree holders.

As one of the two biggest education centers in the country, Hanoi has more than 50 universities and several colleges. However, R&D activities at universities have been poorly promoted. The education system also requires further development to support the setting up of an S&T system by way of producing qualified researchers and engineers.

Shortcomings of innovation system and recommendations

National priority programs

In 2006, the identified technology priorities consisted of information and communication technology (ICT), biotechnology, new and advanced materials, automation and machinery, energy, food and foodstuff and aero plane. However, the national priority program is ineffective because of the limited involvement of R&D institutes, private and public enterprises and foreign high-tech firms. Moreover, the weak linkage among ministerial laboratories, national institutes, local laboratories and universities results in the poor performance of the national priority program.

Figure 1. Weak Linkage among R&D Bodies

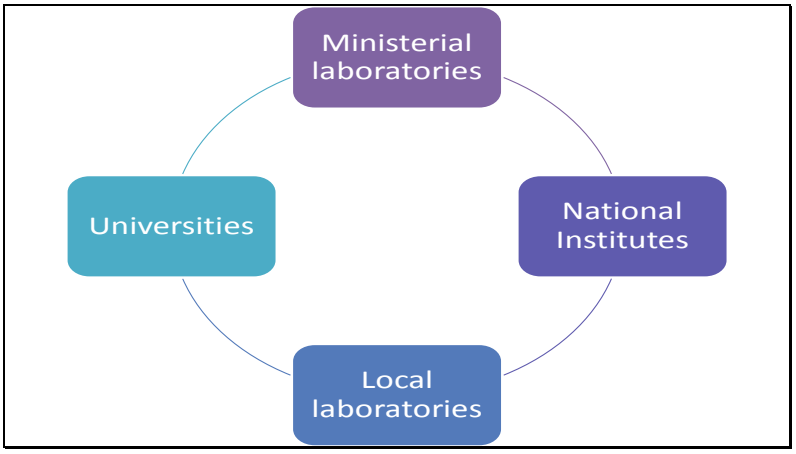
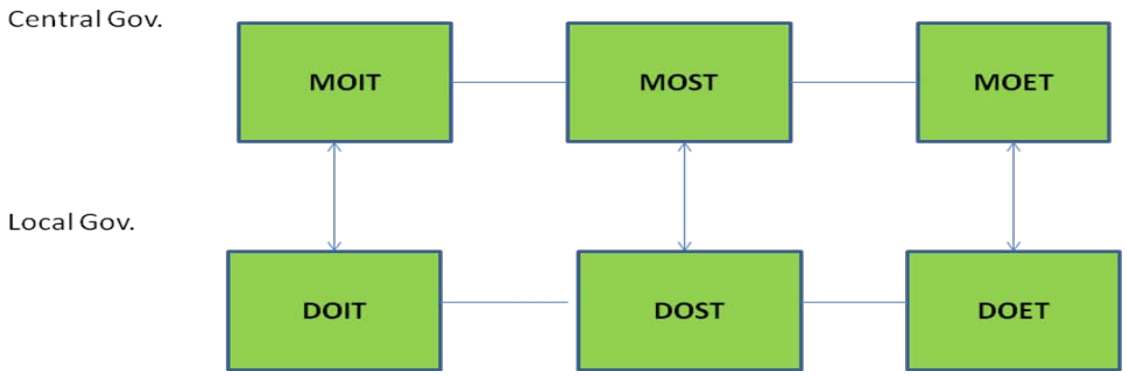


Figure 2. Local and Central Government



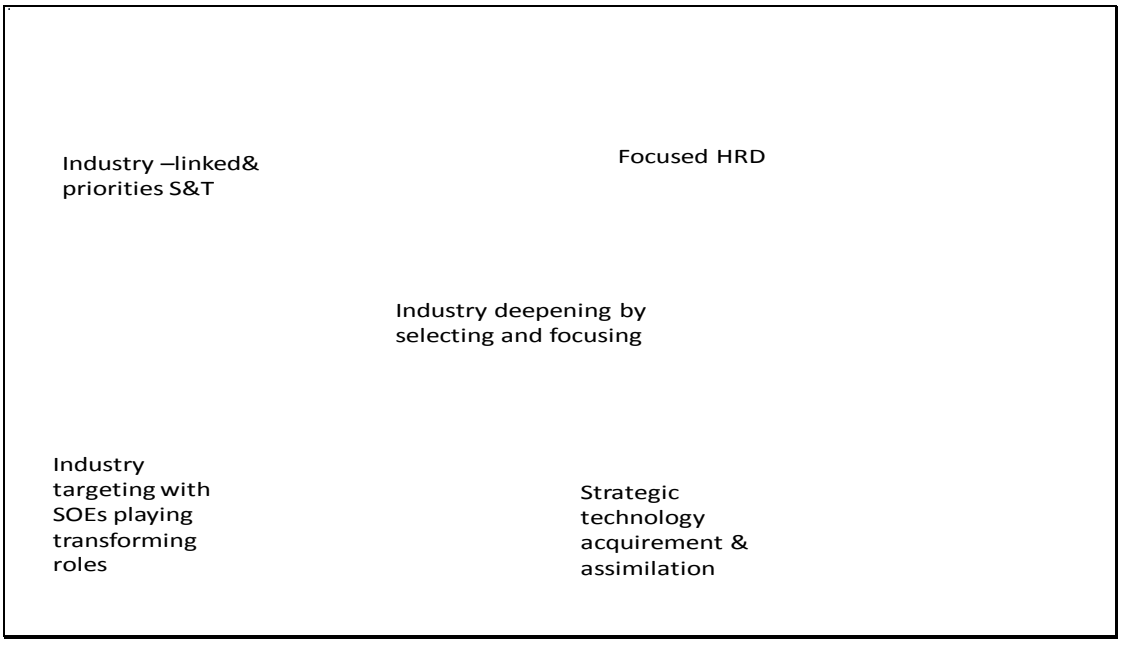
In general, the poor linkage of these entities is a problem in Vietnam. There is weak vertical and horizontal coordination between local government and central government in strategy building and priority setting.

Overall, the S&T systems have shortcomings that need to be fixed. For instance, the FDIs are not strategically and efficiently utilized for acquiring new technologies towards domestic capacity building and the SOEs also need to take a leadership role in promoting strategic industries. Besides, the government does not play a guiding role in S&T for industrialization due to lack of strategies, coordination or sufficient funding. In addition, the educational system does not provide appropriately trained workers for the industry and qualified researchers and engineers for the S&T system.

Designing a comprehensive policy framework for industry targeting, prioritized S&T, focused human resource development (HRD) and strategic technology transfer is recommended for Vietnam in general and Hanoi in particular. The key point in strategy setting is to select and focus. The success of building and maintaining a strategy will

depend more on how determined the government is about its strategy and not so much on the technological details.

Figure 3. Policy Strategy



1.5. Supporting Industry (SI) Development

After more than 20 years since Vietnam initiated the *Doi moi*, the Vietnamese industry has gained remarkable achievements, integrating with the regional and global economies and contributing significantly to rapid economic growth. However, value added in industrial production (VA/GO) tends to go down. From a VA/GO of 42.5% in 1995, it decreased to 38.45% in 2000, 29.63% in 2005 and further down to 26.3% in 2007. The lowest percentage (13.81%) came from the electronics and IT technology industry. This low value added in industrial products results from the poor performance

of SI.

The Ministry of Industry approved Decision 34/2007/QD-BCN on “Project on supporting industry development by 2010, vision to 2020”. Accordingly, the SI will focus on textile and garment, leather footwear, electronics and information technology, automobile assembly and manufacturing and mechanics. For this development, the project recommends to formulate industrial clusters producing parts, components and materials. In addition, SME development contributes significantly to material and products manufacturing and supply. The project encourages FDI firms to implement technology transfer and participate in training human resources for SI development.

The Vietnamese government is deeply aware of and highly values the role of SI development in the economy. The terminology “SI” came from some Japanese experts a few years ago and has now become an urgent issue in the national industry. Much attention has been paid on SI development as evidenced by the significant support of the government through the Ministry of Industry and Trade. SI development was also an important point agreed upon by Vietnam and Japan as stated in their economic partnership agreement signed in December 2008. The Ministry of Industry and Trade developed the Japan-Vietnam cooperative program on SI development in Vietnam, with Japan as a key partner for this development.

Hanoi has the advantage of developing SI in mechanics due to the large downstream market size including FDI and domestic firms. Hanoi also has the biggest advantage in mechanics given its experienced and skilled workers and engineers in the state-owned mechanics enterprises. The motorcycle industry itself used to get a favorable policy from the government, especially in terms of the regulation of local

content. Thanks to these advantages, the Vietnamese motorcycle industry in general and Hanoi in particular have the most developed SI through which domestic firms could supply basic components and parts to FDI firms. Compared to the SI of electronics or automobile, that of the motorcycle industry requires lower investment capital and technology, which is an advantage of the motorcycle industry. According to 2006 statistics, there were 79 firms involved in the manufacture and assembly of motorcycle parts and accessories plus some 100 household-type ventures engaged in the manufacture of simple motorcycle parts. Aided by Vietnam's favorable investment climate, many FDI firms have invested in the country such as Honda, Yamaha and VMEP, to name a few. Overall, the local content of motorcycle has reached 91%. However, the competitiveness of SI domestic firms is still low due to lack of linkage, division and specialization among supporting operations. Moreover, the linkage among suppliers and between FDI and domestic firms is limited and domestic firms seem to be passive in this relationship.

Vietnam's economic environment has been unsuccessful in facilitating the economic sectors to make specialized investment in long-term SI manufacturing. Sharing of market information and manufacturing linkage among different firms are limited. The associations have not taken a lead role.

The following are some of the things that need to be done to promote SI development in Hanoi and Vietnam:

- Develop database on SI

Most of the existing databases (by the Vietnam Chamber of Commerce and

Industry, associations, Department of Investment and Planning, business directories) just state the enterprise's name, business form, products, and sales with no information at all about manufacturing capacity, human resources, manufacturing and marketing. This prevents FDI firms from considering to tap supporting firms in Vietnam. The results of a survey conducted by the Institute for Industrial Policies and Strategies (IPSI) show that most of the firms from both the supply and assembly sides are willing to provide and update information regularly for the SI databases.

- Building SI Zones

These SI zones specialize in SI development and have favorable policies to encourage FDI suppliers to invest. Since suppliers normally have small-to-medium scale operation within a smaller manufacturing area than those of the assemblers, it is necessary to set up specific criteria for suppliers to attract investors. The building of SI zones is needed for Hanoi as SI in metal parts manufacturing is considered an advantage of Hanoi. This may be considered in the plans for Hanoi's expansion. In the survey of JETRO in 2005, more than 70% of Vietnam-based Japanese firms said they plan of increasing the local content of their components and parts. Only a few enterprises had the intention to import parts from China. Although ASEAN was a big competitor of Vietnam (with more than 60% of Japanese firm interested in the ASEAN), up to 73% of Japanese firms were interested to expand the supply chain in Vietnam.

- Product diversification

Since the typical feature of SI is semi-product, the target customer of SI manufacturer is limited to some assemblers. This relationship will gradually evolve into a mutual dependence. Motorcycle parts manufacturers in Hanoi could expand their manufacturing activities by investing in modern technology to attain higher productivity, accuracy and quality so they could to supply not only to motorcycle assemblers but also to the automobile and electronics industry, especially to the manufacturers of electric, plastics and metal parts.

2. THE SURVEY IN HANOI

2.1. Background and Objective

Following the 2008 mail survey on factors of industrial agglomeration in Hanoi, which was funded and supported by BRC/IDE, the Research Group (RG) of IPSI/MOIT Vietnam continued to implement the mail survey on Hanoi-based firms. The mail survey focused on forward and backward business linkages among manufacturing firms in Hanoi, particularly between domestic and FDI firms, the development of R&D and upgrading activities of firms and the different motivations for innovation of FDI and domestic firms. The connection of business linkage with R&D and upgrading is also an objective of this research. Apart from this, the research will identify the motivations, resources and information sources from which firms (FDI and domestic) base their decisions to implement regular innovation and upgrading. From these results, the research will propose a design for linking Vietnam's innovation system to the demand

of industrial sectors or firms.

In Vietnam, Hanoi has the most innovative research and education system with a high-quality human resource. However, results from past surveys show the very weak linkage between manufacturing demand and R&D capacity results in the demand of manufacturing firms not being met. There have been some R&D activities in Hanoi but these were done mostly by SOEs. These R&D activities are implemented only to fulfill the requirements of S&T organizations but not to meet the real demand. There are few R&D and upgrading activities in private and FDI firms but these have not been considered yet as important by public research institutes.

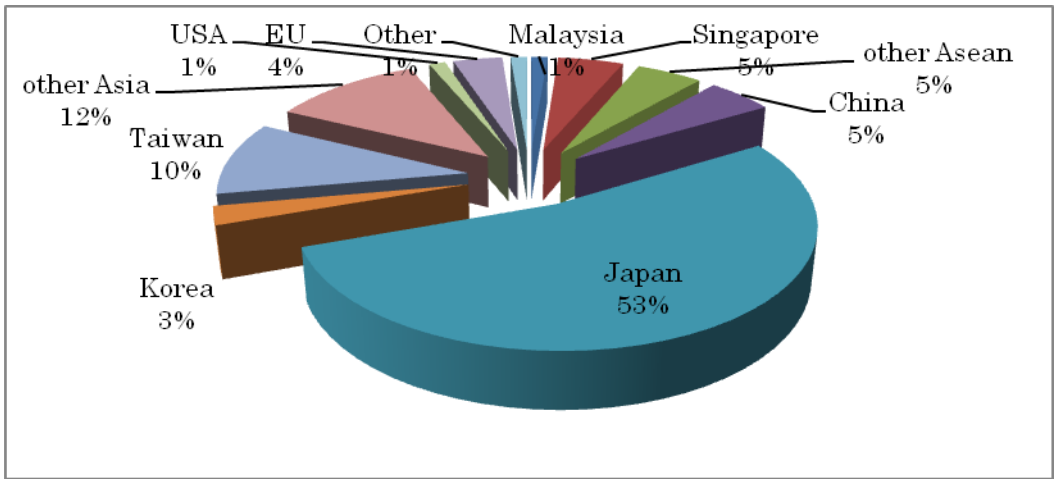
2.2. The Questionnaire Survey

Since the content of the questionnaire is quite complicated, RG conducted pilot interviews from 30 November to 10 December. The main survey was implemented from 12 December to 5 January. The target groups were manufacturing firms including FDI and SME and those in the industrial parks. With the assistance of the managing board of industrial parks in Hanoi, we sent out questionnaires to 600 manufacturing firms by mail and email. Face-to-face and phone interviews were also conducted. A total of 138 questionnaires (or 23% of the total) were received. There were, however, many missing data because of too many subquestions. Thus, RG had to contact again the respondents concerned to complete their questionnaires.

2.2.1. The feature of firms

Domestic firms accounted for 41% of the respondents; FDI and JV firms (only 3%) made up the rest. Among FDI firms, there were 53% from Japan, 10% from Taiwan, 5% from China, 5% from Singapore and 4% from the European Union (figure 4).

Figure 4. Enterprise's Nationality



The manufacturing firms interviewed were larger compared to those in the 2008 survey. About 63% of the firms have employees from 50 to 300. Firms possessing assets from 1 to 9.9 million USD accounted for nearly 50% in which majority of them have more than 10 million USD (32%) (Table 4). About 85% of the FDI and joint venture (JV) firms have under 300 employees but possess large assets. In particular, 34 of the 77 FDI firms have capital from 1 to 9.9 million USD and a similar number of JV firms possess more than 10 million USD. Among 43 Japanese firms, medium-sized firms made up the majority. Firms with 50-99 employees totaled 16 and those with 100-299 employees totaled 18. However, there were 19 firms having assets from 1 to 9.9

million USD and 19 others possessing capital of more than 10 million USD.

Table 4. Firm Size

Employment	**Amount**	**%**	**Capital**	**Amount**	**%**
1-19	9	7%	< 10.000	1	1%
20-49	21	15%	10.000-24.999	2	2%
50-99	**47**	**34%**	25.000-49.999	2	2%
100-199	**21**	**15%**	**50.000-74.999**	**7**	**5%**
200-299	**19**	**14%**	75.000-99.999	1	1%
300-399	5	4%	100.000-499.999	5	4%
400-499	3	2%	500.000-999.999	9	7%
500-999	3	2%	**1-4.9Mil**	**35**	**27%**
1000-1499	2	1%	**5-9.9Mil**	**26**	**20%**
1500-1999	1	1%	**> 10Mil**	**41**	**32%**
> 2000	**7**	**5%**			
Total	138	100%	Total	129	100%

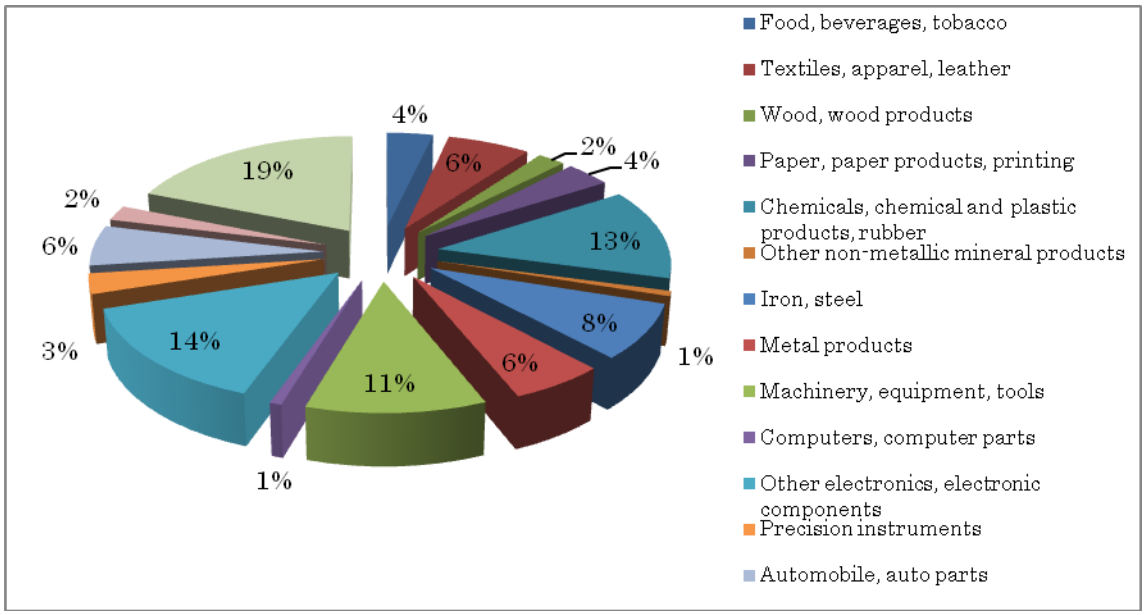
Table 4.1. Firm Size by Employment and Capital Structure

Fulltime employees	Capital structure			Total
	100% Local owned	100% foreign owned	Joint venture	
1-19	6	4	0	10
20-49	11	10	0	21
50-99	16	30	1	47
100-199	5	16	0	21
200-299	4	15	0	19
300-399	3	1	1	5
400-499	3	0	0	3
500-999	2	0	1	3
1000-1499	1	0	0	1
1500-1999	1	0	0	1
above 2000	4	3	0	7
Total	56	79	3	138

Table 4.2. Firm Size by Total Assets and Capital Structure

Total assets (USD)	Capital structure			Total
	100% domestic	100% FDI	Joint venture	
below 10.000	1	0	0	1
10.000-24.999	1	1	0	2
25.000-49.999	2	0	0	2
50.000-74.999	7	0	0	7
75.000-99.999	1	1	0	2
100.000-499.999	3	2	0	5
500.000-999.999	4	5	0	9
1-4.9 Mil	20	13	1	34
5-9.9 Mil	4	21	1	26
above 1 Mil	6	34	1	41
Total	49	77	3	129

Figure 5. Main Business Activities



There were some clusters by industries (figure 5). Although SI in Vietnam has not developed yet, the presence of these industry clusters indicate the manufacturing of parts and components to meet the demand of the assembling industry.

- Group 1 or the firms related to the manufacture of metal and mechanics parts includes 42 firms: iron, steel (11); metal products (8); machinery, equipment, tools (15); and automobile, auto parts (8). As earlier emphasized, Hanoi has an advantage of developing a supporting industry in mechanics such as motorcycle assembly and more likely automobile assembly in the future.
- Group 2 consists of more than 20 firms engaged in the manufacture of electronics and electronic components;
- Group 3 has 18 firms involved in chemicals, chemical and plastic products and rubber, in which plastic and rubber are dominant

The target market of these firms is the domestic region with an equal proportion (50%) for Hanoi and for Ho Chi Minh City (Table 5). Japan is also a big market with 44%, followed by China and Europe. However, the main material source of firms is China (for 745 respondent firms). Ho Chi Minh City ranks as second largest supplier accounting for 34% while Hanoi just accounts for 23%. Japan is the third largest supplier at 33%, followed by Taiwan (30%) and Singapore (22%). Europe accounts for only 4% of the supply source.

Table 5. Target Markets and Origins of Raw Materials of Respondents

Country/Region	Target market	%	Main raw material	%
Vietnam (Hanoi region)	67	48.9	29	23.2
Vietnam (Ho Chi Minh region)	60	43.80	16	12.8
Vietnam (Central area/ other region)	70	51.09	43	34.4
China	35	25.55	92	73.6
Japan	60	43.80	41	32.8
United State	21	15.33	2	1.6
Europe	35	25.55	5	4
Taiwan	11	8.03	37	29.6
Singapore	5	3.64	27	21.6

Firms in Hanoi concentrate on manufacturing final products (71%), followed by raw material processing (49%) and parts and components manufacture (only 21%). Up to 98% of firms implement marketing activities in Hanoi which indicates the interest of firm to cater to the domestic market. Seventeen of 56 domestic firms and 16 of 79 FDI firms (Japanese firms account for 50%) replied affirmatively to part and component manufacturing (Table 5.1 and 5.1.1). Most of the firms manufacture final products (table 5.2).

Table 5.1. Components and Parts Producing Firms

Components and parts producing firms	Q7.1_2		Total
	yes	no	
100% local owned	17	39	56
100% foreign owned	16	63	79
Joint venture	0	3	3
Total	33	105	138

Table 5.1.1. Components and Parts Producing Firms by Nationality

Components and parts producing firms	Q7.1_2		Total
	yes	no	
Malaysia	0	1	1
Singapore	0	4	4
other Asean	2	2	4
China	0	5	5
Japan	8	35	43
Korea	1	2	3
Taiwan	2	6	8
Other Asia	3	6	9
US	0	1	1
Europe	0	3	3
Others	0	1	1
Total	16	66	82

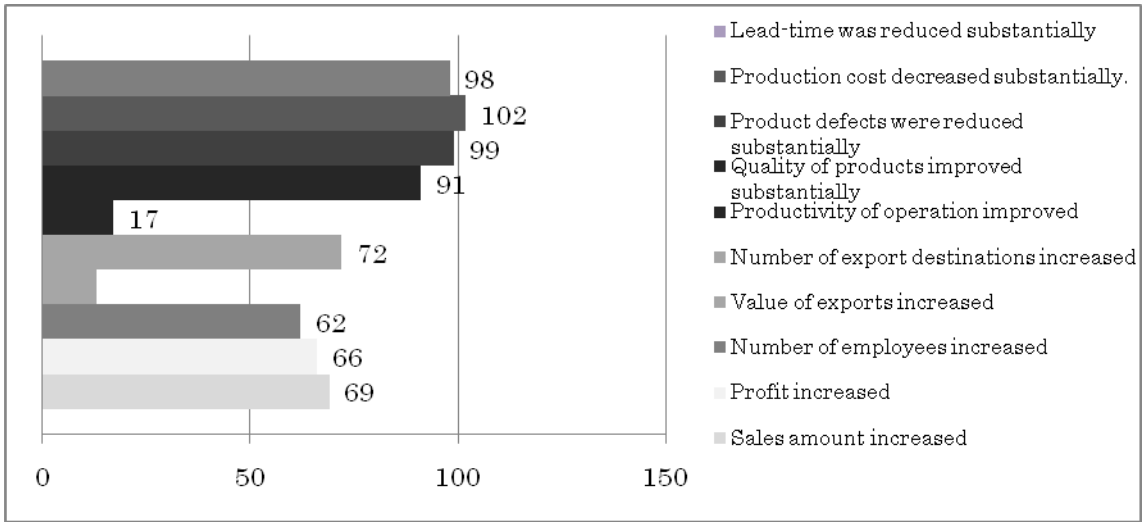
Table 5.2. Final Product Producing Firms

Final product producing firms	Q7.1_3		Total
	yes	no	
100% local owned	42	14	56
100% foreign owned	63	16	79
Joint venture	1	2	3
Total	106	32	138

2.2.2. Firm operations

Compared to the survey results in 2007, firms pay attention to reducing production cost, lead-time and product defects as well as increasing product quality. Although the number of export destinations increased, the value of exports did not increase significantly. Productivity of operation has also not improved much (figure 6).

Figure 6. Current Business Performance in Comparison with that of 2007



R&D capacity was assumed by only 16 of 122 firms (13%) including six firms who own R&D departments. There were 11 out of 16 firms that answered they have been conducting these activities since 2005. Firms did not provide answers to the more detailed questions. Five out of nine firms have percentage of R&D expenditure to total sales lower than 1% (table 6).

Table 6. Human Resources and Expenditure for R&D Activities

Employment		**R&D expenditure**	
0	1	No expenditure	1
1-5	6	0.00-0.5%	3
6-10	1	0.51-1.0%	1
16-20	3	1.01-1.5%	2
21-25	2	1.51-2.0%	1
		2.01-2.5%	1
Total	**13**	**Total**	**9**

Among 16 firms conducting R&D activities, there were only two FDI firms; the rest were local firms.

On new product and service, 40 out of 138 firms (29%) said they used new technology (Q9.2-figure 7). Regarding the technology method, 55 out of 138 firms bought or improved their machines and facilities while only 34 firms introduced new know-how on production methods (figure 8).

Table 6.1. Firms with R&D Activities in Hanoi

	R&D implemented in Hanoi presently		Total
	yes	no	
100% local owned	14	42	56
100% foreign owned	2	77	79
Joint venture	0	3	3
Total	16	122	138

Figure 7. Innovative Activities for Businesses Upgrading in the Recent Three Years

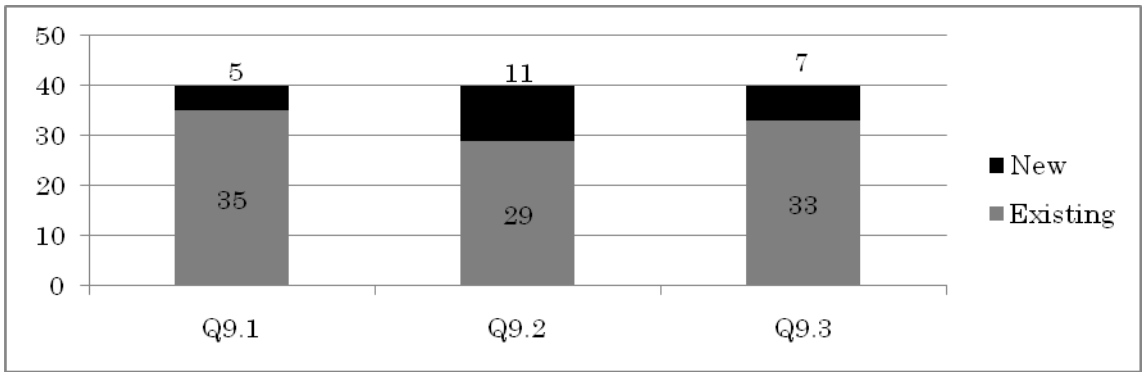
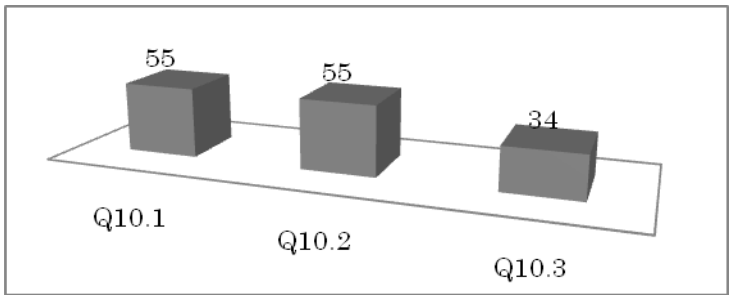


Figure 8. New Production Method in the Recent 3 years



The change of supply is more obvious (figure 9). The selection of securing a new local supplier (100% local capital) in Hanoi is dominant (11.1). Moreover, suppliers from Ho Chi Minh City and East Asian countries have been secured by firms in the last three years.

New customers in Hanoi and Ho Chi Minh City have been rapidly increasing (figure 10). In particular, firms are interested in raising the number of multinational companies (MNCs) in Hanoi (12.3) as well as in East Asia. However, MNCs outside of Hanoi have not been paid much attention to (12.4). To improve business process, firms mostly adopted international standard or introduced internal activities (70%); only 33% of firms introduced ICT.

Regarding logistics, the Haiphong port and Noi Bai airport were widely used by the respondent firms (114 out of 116 firms for the Haiphong port and 108 out of 109 firms for the Noi Bai airport). This is expected considering that these two are in close proximity to the firms.

Figure 9. Supplies in the Recent 3 years

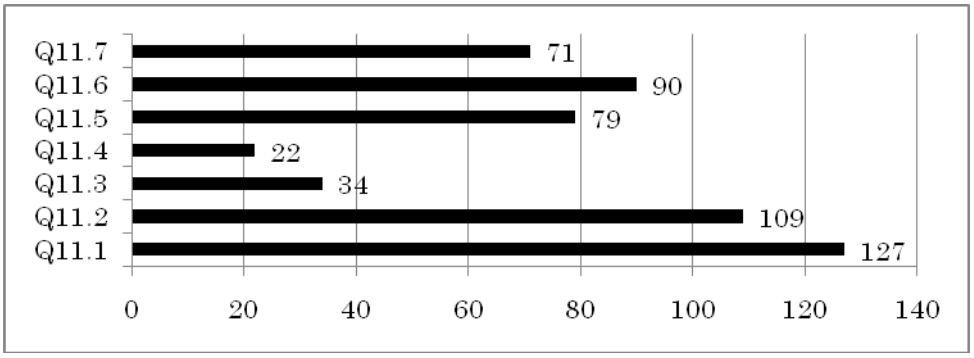
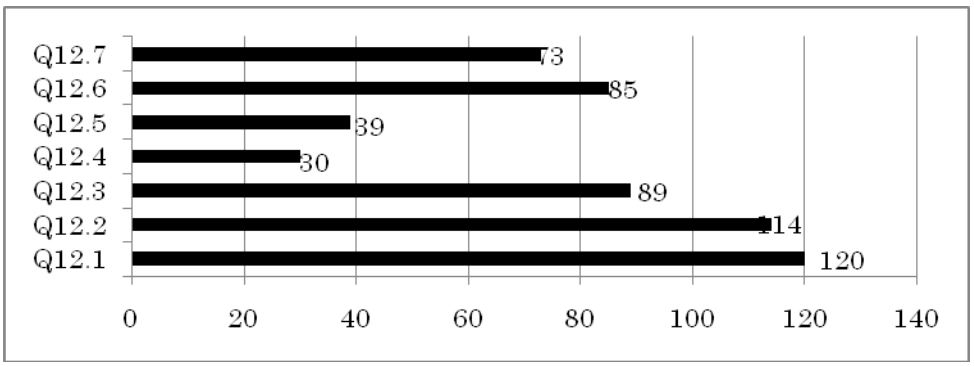


Figure 10. New Customer in the Recent 3 Years



2.2.3. Business linkage among firms

The business activities of customers and suppliers are quite similar to those of the firms as reflected by 100 out of 138 customers and 91 out of 136 suppliers that answered affirmatively. For 94% of respondents, the main products were mostly customized. Another 10% of respondents revealed the main product of suppliers is standard (figure 11). In general, the standard system especially for parts and components has not worked properly thus most of supporting production contracts rely

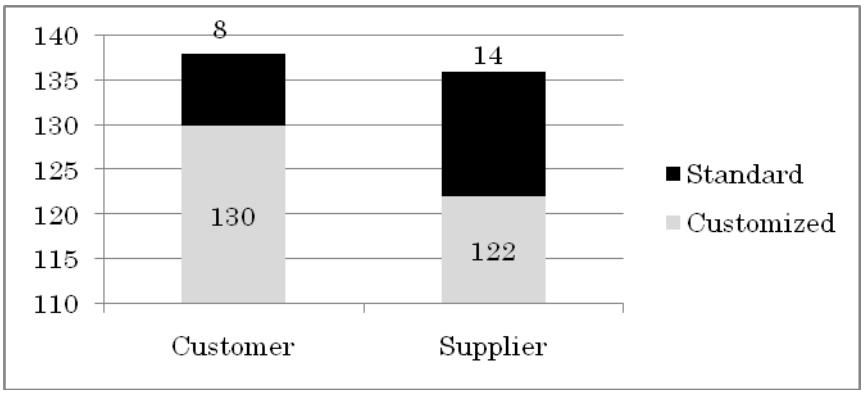
on customer's specific requirements and supplier's experience.

Almost all firms have no capital tie-up with both customers and suppliers. Only 12 out of 134 firms have tie-up with suppliers and 15 out of 138 firms with customers. These firms are mainly domestic ones.

Table 7. Business Activities of Customers and Suppliers are Same as Operation

Customer	100	72.46%
Supplier	91	65.94%
Total	138	100%

Figure 11. Main Products are Customized/Standard



Among 82 respondents, 57% of them (Japanese, Korea, Taiwan and other ASEAN firms are dominant) revealed their relationship with supplier normally lasts from 1 to 6 years. Nearly 40% of firms have established a relationship below one year and the same percentage of Japanese investors in Vietnam confirmed this (table 8.1). For local firms (8.2), they have sustainable relationship with customers; 13 out of 56 local firms have sustained relationship with customer for more than seven years. Moreover, more than

50% of local firms have built this relationship in the past three years. This was the time when the concept of supporting industry has started to become popular in Vietnam.

Table 8.1. Duration of Relationship with Customers by Nationality

Nationality	Duration of relationship with supplier (Q14.11_s)					Total
	Below 1 year	1-3 years	4-6 years	7-9 years	above10 years	
Malaysia	0	0	0	0	1	1
Singapore	2	1	1	0	0	4
Other ASEAN	1	1	2	0	0	4
China	2	3	0	0	0	5
Japan	17	9	15	1	1	43
Korea	0	2	1	0	0	3
Taiwan	2	4	2	0	0	8
Other Asian	5	2	2	0	0	9
US	1	0	0	0	0	1
Europe	0	1	1	0	1	3
Others	1	0	0	0	0	1
Total	31	23	24	1	3	82

Table 8.2. Duration of Relationship with Customers by Capital Structure

firm capital structure	Duration of relationship with customers Q14.11_c					Total
	Below 1 year	1-3 years	4-6 years	7-9 years	above10 years	
100% local owned	6	31	6	3	10	56
100% foreign owned	25	18	31	2	3	79
Joint venture	1	1	1	0	0	3
Total	32	50	38	5	13	138

In terms of relationship with customer and supplier, firms have varied answers. Overall, SMEs are a popular form. Large firms are more common among customer firms than among supplier firms.

FDI and joint venture supplier firms rarely use the “just-in-time” system (table 9). Only three customer firms implemented this while 27 out of 131 supplier firms have no

plan to implement it. Basically, on-time delivery is the most serious obstacle of Vietnamese firms when dealing with FDI firms and MNCs.

Figure 12. Customer and Supplier Size

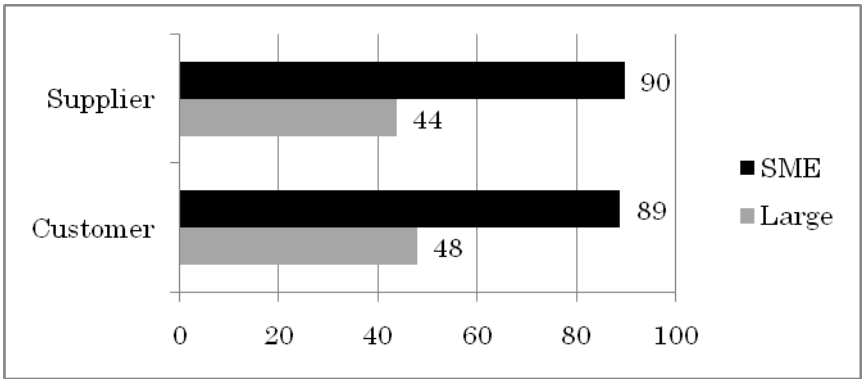


Table 9. Suppliers Adopt "Just-in-time"

Firm capital structure	Suppliers adopt "just-in-time" Q14.8_s				Total
	implemented	planning	No plan	No need	
100% local owned	5	17	19	9	50
100% foreign owned	3	26	35	14	78
Joint venture	0	1	1	1	3
Total	8	44	55	24	131

Firms also support each other in term of human resources (table 9). Of 79 FDI firms, 70 received engineers from their customers whereas only more than a half of local firms (32 out of 56) did. Table 10.1 shows the receipt of engineers from customers classified according to firm size: firms belonging to groups of 50 to 299 employees received the most number of engineers. These firms likely produce supplies.

Table 10.1 Engineer Reversing

Firm capital structure	Receiving engineers from customers Q14.12_c		Total
	yes	no	
100% local owned	32	24	56
100% foreign owned	70	9	79
Joint venture	1	2	3
Total	103	35	138

Table 10.2. Engineer Reversing by Size

firm size	Receiving engineers from customers Q14.12_c		Total
	yes	no	
1-19	5	5	10
20-49	11	10	21
50-99	38	9	47
100-199	20	1	21
200-299	16	3	19
300-399	3	2	5
400-499	1	2	3
500-999	2	1	3
1000-1499	0	1	1
1500-1999	1	0	1
above 2000	6	1	7
Total	103	35	138

Regarding the evaluation of the effects of customers and suppliers to innovation and upgrading, customers generally have the greater impact (figure 13). For 42 of 56 local firms, customer impacts are supposed to be more important (75%) while it is very important for 51 of the 79 (65%) FDI firms. However, FDI firms evaluate the role of suppliers in their innovation higher than local firms do (table 11) as 50 out of 64 FDI firms consider it “very important”. Local firms evaluate the importance at level 2 higher than FDI firms do; therefore, the impact of suppliers on FDI firms seems to be greater than on local firms.

Figure 13. Overall Evaluation on Impacts of Customers and Suppliers to Firm's Innovation and upgrading Activities

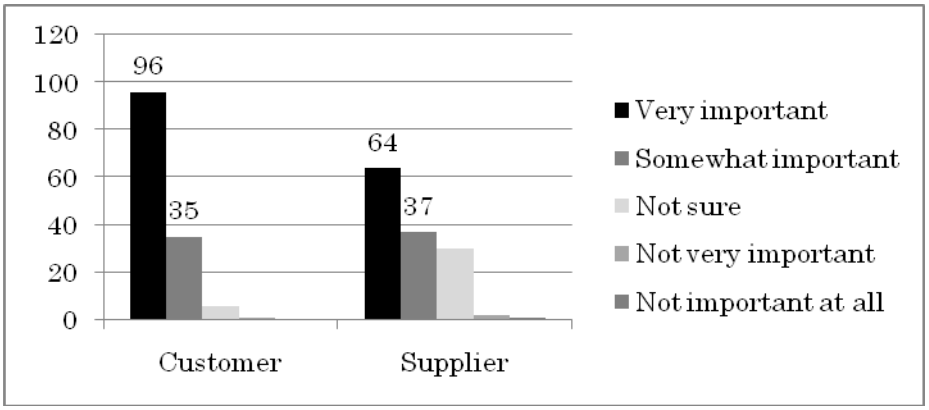


Table 11. Evaluation on Impacts of Customers and Suppliers to Firm's Innovation and Upgrading Activities

Capital structure	Customer Q14.14_c		Supplier Q14.14_s	
	Very important	Somewhat important	Very important	Somewhat important
100% local owned	42	9	13	33
100% foreign owned	51	26	50	3
Joint venture	2	1	1	1
Total	95	36	64	37

2.2.4. Resources for innovation and upgrading

Figure 14 indicates firms do not highly evaluate the importance of having their "own R&D department" (16.1.1) as internal forces for innovation. However, since firms are aware of the role of R&D activities, they rate quite highly the second important level. At present, the "sales department or sales agent (16.1.2), production or manufacturing department (16.1.3)" are supposed to be the main forces for innovation activities. About one-third of the firms find "technological agreement with the headquarters or affiliated

firm" as an important force. It is noticeable that all 138 respondents implemented these agreements (table 12).

Figure 14. Source of Internal Information and R&D

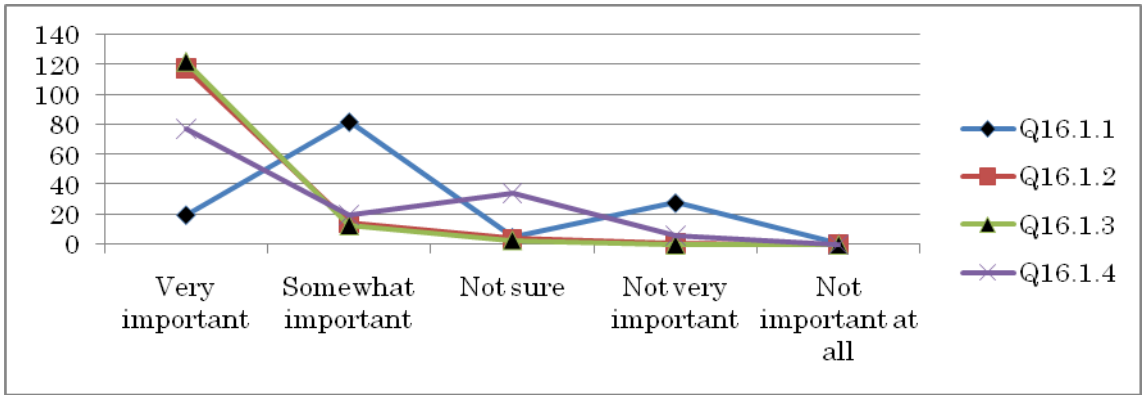


Table 12. Technological Agreement

	Technological agreement Q16.1_4p	Total
	yes, practicing	
100% local owned	56	56
100% foreign owned	79	79
Joint venture	3	3
Total	138	138

Cooperation with local firms is not considered as an upgrading source (figure 15). Accordingly, only "joint venture established by your establishment with other local firms (16.2.1)" is supposed to be "somewhat important". "Local supplier or customer, local competitor local firm in the different business and "Local consultant" are not considered sources of innovation and upgrading. On the other hand, 54 out of 82 FDI firms, especially Japanese ones, affirm they built linkage with Vietnamese firms (table

13). Only 33 out of 56 Vietnamese firms (59%) assume the linkage with local customers. None of respondents firm has linkage or cooperation with local competitors. To sum it up, the linkage ratio is still low.

Figure 15. Technology Transfer from Local Firms/Cooperation with Local Firms

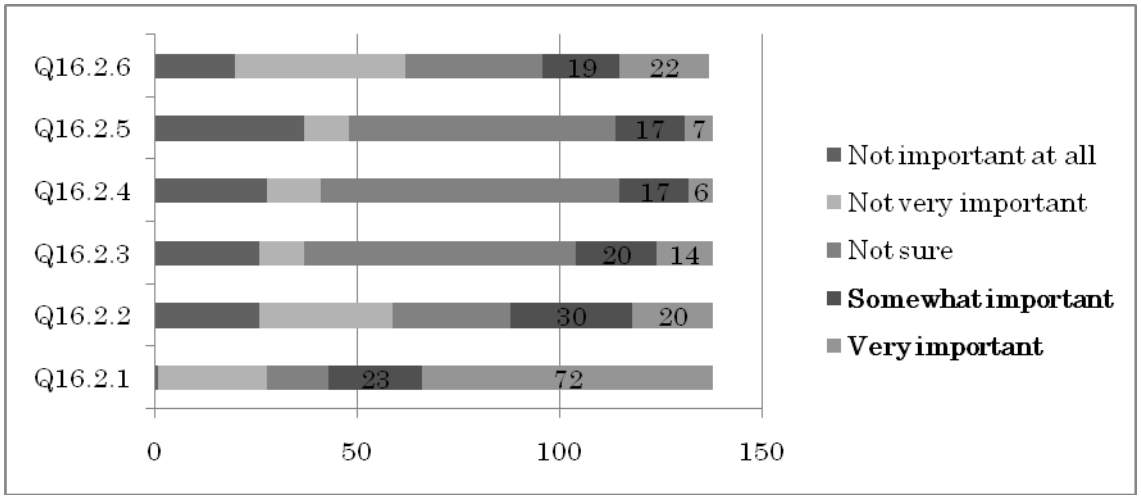


Table 13. Technology Transfer/Cooperation with Local Firms

	Technology Transfer/Cooperation with Local Firms Q16.2_2p		Total
	yes, practicing	no	
Malaysia	0	1	1
Singapore	3	1	4
Other ASEAN	3	1	4
China	1	4	5
Japan	33	10	43
Korea	2	1	3
Taiwan	6	2	8
Other Asia	5	4	9
US	0	1	1
Europe	1	2	3
Other	0	1	1
100% domestic	**33**	**23**	**56**

"Technology transfer from multinational companies (MNCs) or cooperation with

MNCs" is also not considered as a source of innovation (figure 16) whereas "joint venture established by your firm with other foreign-owned firms (16.3.1)" is evaluated very important" by 50% of the firms. As can be seen from table 14, despite the low evaluation on innovative sources from MNCs, local firms (56 in all) cooperated closely with foreign customer firms. Thirty-one firms also indicated cooperating closely with foreign competitor firms.

Figure 16. Technology Transfer from Multinational Companies (MNCs) or Cooperation with MNCs

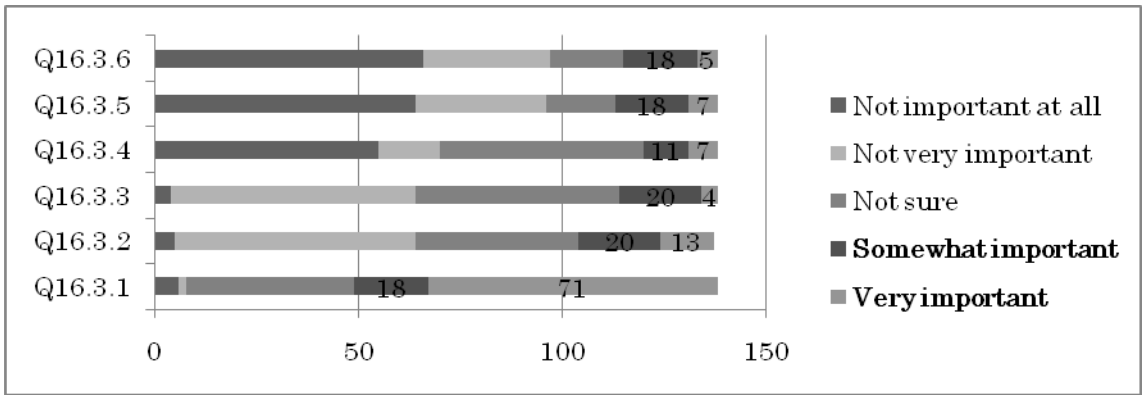


Table 14. Technology Transfer/Cooperation from/with Foreign-own Companies

	yes, practicing	
	Foreign-owned supplier/customer Q16.3_2p	Foreign-owned competitor Q16.3_3p
100% local owned	**56**	**31**
100% foreign owned	79	46
Joint venture	3	2
Total	138	79

"Technical assistances by local support organizations (16.4)" is evaluated "not

very important" (figure 17). Only "technical assistance financed/provided by local business organization (16.4.2)" was practiced by 22 out of 137 firms including 9 local and 13 FDI firms (table 15).

Figure 17. Technical Assistances by Local Support Organizations

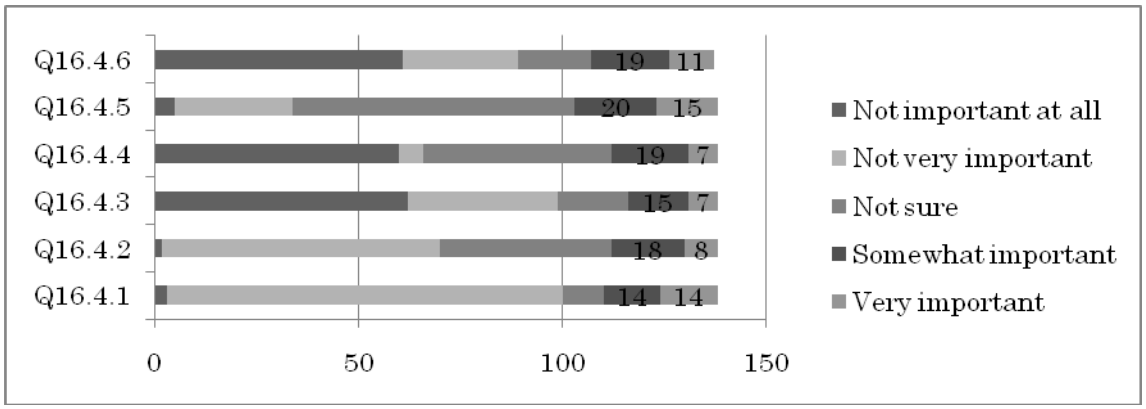
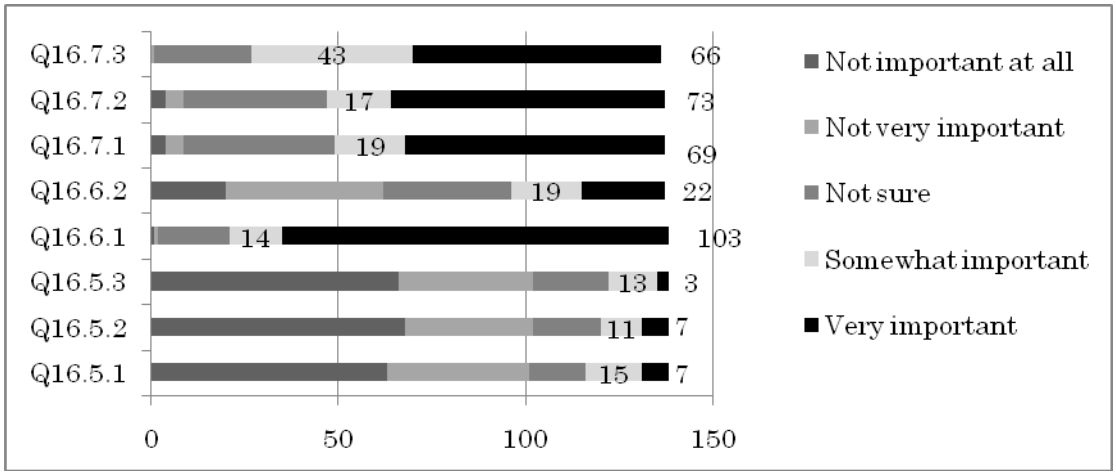


Table 15. Technical Assistance Financed/Provided by Local Business Organization

	Technical assistance financed/provided by local business organization Q16.4_2p		Total
	yes, practicing	no	
100% local owned	9	47	56
100% foreign owned	12	66	78
Joint venture	1	2	3
Total	22	115	137

From Figure 18, it can be seen that although there are large research institutes and universities in Hanoi, firms evaluated this "not very important at all" (16.5). Even "technical cooperation with (or assistance from) foreign university or R&D institute and academic society (16.5.2) and academic journal (16.5.3)" is also seen "not very important at all" to their innovation and upgrading.

Figure 18. Linkages with Universities, R&D Institutes and Academic Societies; Human Resources; and Other Sources of Information and Technologies



Human resources play a very significant role for upgrading. There is a serious lack of mid-class personnel in Vietnam as indicated by 117 out of 138 (85%) respondents that considered "recruitment of mid-class personnel" to be important. Almost all firms (124 out of 138) practiced this recruitment (table 16). As a result, mid-class personnel actually contribute to firm's innovation and upgrading activities. As to local human resources, firms hardly used personnel retired from MNCs and large firms (16.6.2). Firms also evaluate it as not important for innovation and upgrading.

Table 16. Recruitment of Mid-class Personnel

	Recruitment of mid-class personnel Q16.6_1p		Total
	yes, practicing	no	
100% local owned	53	3	56
100% foreign owned	68	11	79
Joint venture	3	0	3
Total	124	14	138

"Other sources of information and technologies" is considered important for innovation (figure 18). "Reverse engineering (16.7.3)" is considered important and very important by 103 out of 138 firms. Additionally, "Technical information obtainable from patents" and "introduction of 'foreign-made' equipment and software" are highly evaluated as sources of innovation. Accordingly, all firms practiced "introduction of 'foreign-made' equipment and software' while 54 out of 138 firms practiced "Reverse engineering".

2.2.5. Important Partner for Innovation and Upgrading

Figure 19 indicates the two most important partners for innovation and upgrading assumed by firms. "Own department, headquarters, affiliates" was evaluated by 58 firms as the most important and by 37 firms as the second most important. "Local firm (customer or supplier)" is the second most important partner. "Other local firms" are mentioned as not very important partner. MNCs or JVs (customer or supplier) are the third most important partner of firms. In addition, "Government, public agencies and local business organizations" are also stated as partner for innovation and upgrading despite the low ratio. Research institutions are not considered as partners of firms in innovation and upgrading.

The most important partners are located far from firms with more than 50% of firms situated "above 200 km" (figure 20). Firms have set up the relationship with these

partners for over three years (figure 21).

Figure 19. Important Partners for Innovation and Upgrading

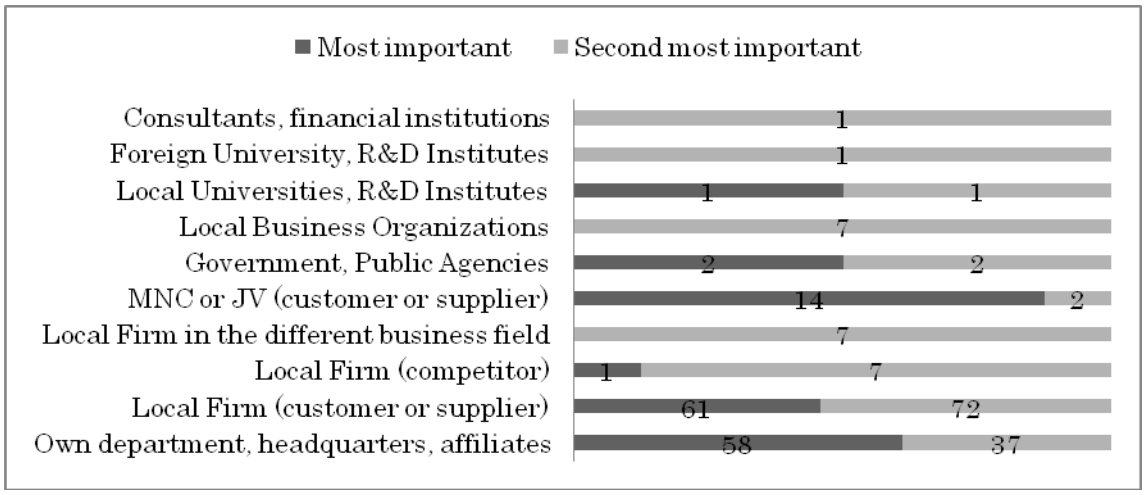


Figure 20. Distance to the Two Most Important Partners

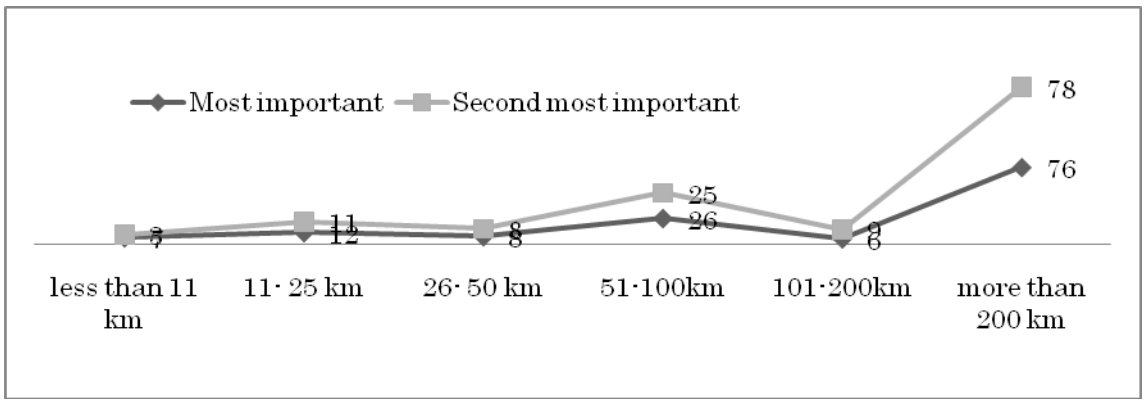
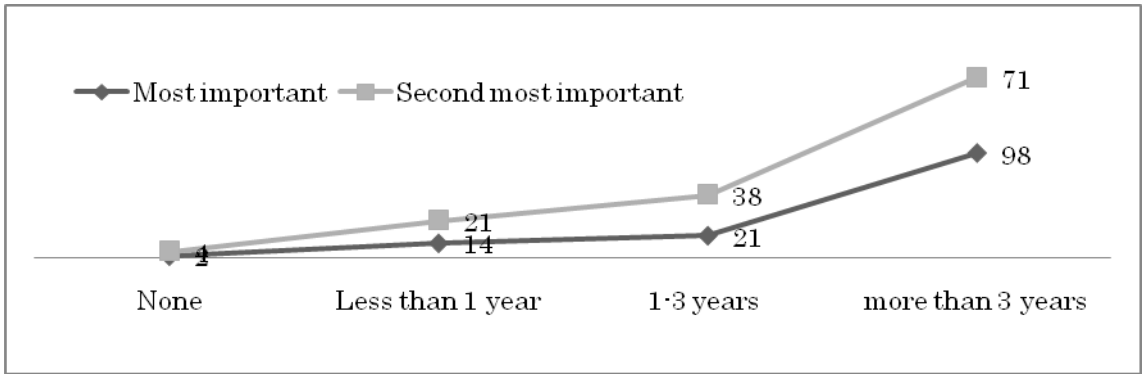


Figure 21. Duration of the Relationship with the Two Most Important Partners



The most serious obstacles for innovation and upgrading related to tax are "high tariffs on equipment and materials necessary for innovation (18.7) and "no tax break or accelerated depreciation system (18.8)" (figure 22).

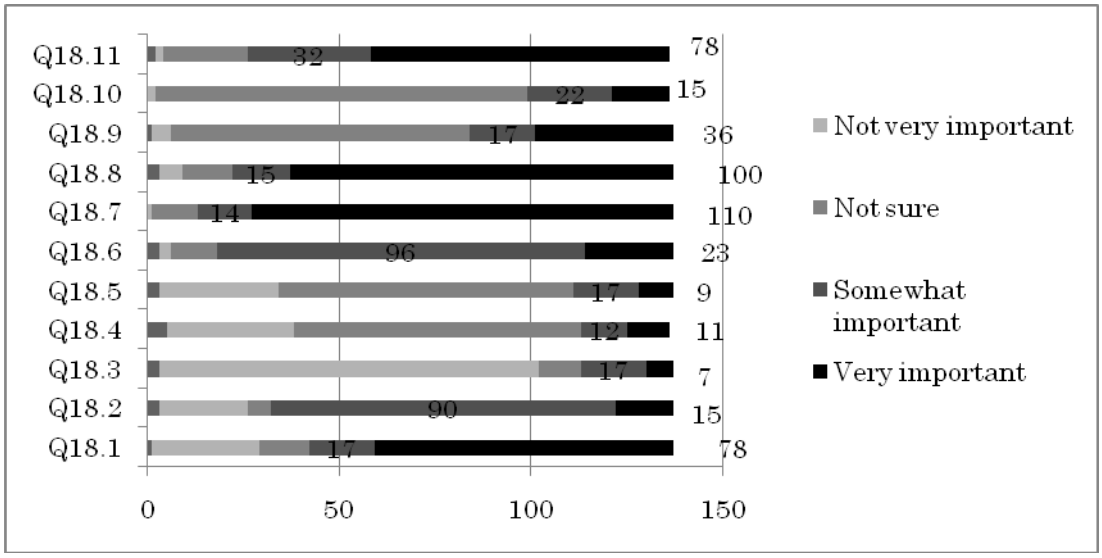
The second most serious obstacles related to R&D capacity and human resources are 'No R&D supporting industry such as consulting, financing (18.1) and "labor mobility is too rigid for workers to bring with them technologies acquired from previous employer or from previous training" (18.11).

The third most serious obstacle indicated by firms is "protection of intellectual property right (IPR) is not sufficient (18.6)". While laws on these issues existed in Vietnam, violations greatly impact on firm's initiatives to pursue innovation and upgrading.

Issues regarding capacity of research institution (18.3, 18.4, services for R&D development (18.2, 18.5, 18.9, 18.10) do not prevent firms from innovation and upgrading. It is understandable as this capacity of Hanoi is highly evaluated in Vietnam

as well as in the region.

Figure 22. Obstacles for Innovation and Upgrading



These obstacles are confirmed by firms in Question 3 with the most serious obstacles for innovation and upgrading (table 17).

Table 17. Obstacles for Innovation and Upgrading

Obstacles for Innovation and Upgrading	Most serious	2nd serious	3rd serious
1. No R&D supporting industry such as consulting, financing.	9	3	5
2. Price of R&D support services is high.	8	7	1
3. No university or public institute in the neighborhood.	0	0	3
4. Technological capabilities of universities or public institutes located in the neighborhood are too weak to collaborate.	0	4	2
5. No business organization or chamber of commerce which can provide training courses, seminar or testing facilities in the neighborhood.	2	2	6
6. Protection of intellectual property right (IPR) is not sufficient.	3	12	13
7. High tariffs on equipments and materials necessary for innovation.	83	29	8
8. No tax break or accelerated depreciation system.	2	62	28
9. My establishment is not familiar with public support programs and procedures to apply for support measures.	1	7	18
10. Public support programs are not designed appropriately for innovation	3	1	3
11. Labor Mobility is too rigid for workers to bring with them technologies acquired from previous employer or from previous training.	26	10	50

2.3. Conclusion

The survey focuses on firms whose capacity and size are supposed to be good in industrial parks. Although firms in the survey are of medium size, their assets are rather large and their technological capacity is not so outdated unlike firms in the previous survey. The limitation of target firms and the use of too detailed subquestions have led to obvious results.

(i) Firm linkage

Some industrial clusters that supply to production firms in Hanoi can be found in

the field of mechanics, electronic and plastic.

(ii) Innovation and upgrading of production firms in Hanoi

Overall, firms are not fully aware of the importance of innovation and upgrading for their development. R&D activities have not developed in Hanoi-based firms. While many firms think highly of innovation, they see it as something that cannot be achieved.

Upgrading activities are more popular and specific compared to those in the 2008 survey. Many firms conduct upgrading spontaneously (as need for development arises) without any proper strategy and plan for these activities. At present, upgrading activities of firms are mainly based on the demand of customers and suppliers mostly in Hanoi in which MNC/FDI firms play as key partners.

Firms implement innovation and upgrading by using mainly their internal capacity. External forces are local firms (customers and suppliers), MNC and FDI firms. Other sources of information are rarely used or used in an inefficient way. Although R&D sources in Hanoi are quite strong (according to Part 1 of the reports and evaluation from interviewed firms), firms have not realized the benefits they could get when integrating into the national/local innovation system. This results from the fact that government agencies and supporting organizations have not delivered the necessary activities to enterprises. This also proves that R&D products from the Vietnamese innovation system have not been used to respond to the needs of firms or have not been fully utilized to bring the intended benefits to them, which only leads to waste of national resources. Information and technology for innovation of firms basically comes from outside the country or through the demand of customer MNC/FDI.

Human resources play an important role in innovation and upgrading activities but do not draw much attention of firms. For most firms, the most serious obstacle for innovation and upgrading seems to be the high rigidity of labor mobility for workers constraining them to bring the technologies they acquired from previous employer or from previous training.

(iii) Main empirical findings

From the mail survey, we come to following findings:

- Firms have not realized the benefits of innovation and upgrading. There is lack of full awareness of the necessity for innovation and upgrading in business operations. In addition, firms have not realized the motivation for linkage causing the poor business linkage.
- Linkage between and among firms and research institutions has not been formed. The activities of these government agencies have not met the firm's demand.
- The government has not proposed incentive policies for R&D and upgrading activities of firms. In addition, the market providing R&D services in Vietnam has not been developed yet.
- The impact of production linkage on upgrading is small and almost all sources of information/technology are external.

2.4. Recommendations

2.4.1. National recommendation

- Raise awareness
  - Raise awareness of linkage and innovation in production using a systemic way such as by supporting and implementing training programs for local firms.
  - Make enterprises recognize the benefits of innovation for firm's development
  - Improve knowledge about standard quality of product/production (JIT, 5S…) and
  - IPR
- Build business linkage
  - Support the linkage among local firms, between local and MNC/FDI firms, MNC and domestic firms through sectoral programs for supporting industry (parts and components of mechanics, plastic and electronics).
  - Connect firms with research institutions by promoting the research results of institutes and universities to firms.
- Develop state policies on innovative activities
  - Come up with state policies related to innovative activities such as tax and relevant cost reduction.
  - Develop market providing R&D activities.
- Provide finance for innovation

- Spend budget for S&T to deploy research works in companies; import and transfer technology to production firms, etc.
- Raise public funds for innovative firms.
- Promote venture capital funds.

- Build human resources for innovation
  - Develop human resources for firm's innovation such as employment for management, engineers, skilled workers, etc.
  - Enhance educational and vocational training system.
  - Take advantage of "silver consultant program."[i]

- Develop supporting industry
  - Support the development of supporting industry by building a system of part and semi-product quality standard.
  - Construct centers for evaluating and testing the quality of supporting products.
  - Attract MNC/FDI production firms to Vietnam as well as develop their linkage with local firms.
  - Assist in building linkages among local firms to enhance their production capacity (cluster formulation).
  - Develop projects on supporting industries; connect firms in the same industry from different nations to share experiences in production; form production linkage; link to MNCs as well as to innovation and upgrading.

- Call for the participation and assistance of large Japanese assembling groups and suppliers to invest in late-coming countries in the region where labor and transportation are advantages.
- Construct a regional database on the processes and systems of firms that produce parts and semi-products in fundamental supporting industries such as mechanics, plastic or electronics.

2.4.2. Objective and actions

- Objective

+Utilize the regional production network for market-based innovations of firms

+ Exchange human resources (HR) within countries

+Create information resources for the R&D activities of firms

+ Improve the effectiveness of regional research organizations

- Actions needed to achieve these objectives

+ Utilize the regional production network for market-based innovations of firms

- Develop supporting industries such as automotive, electronics, garments and food processing.
- Encourage Japanese assembling groups and suppliers to invest in ASEAN.
- Build regional standard systems on products/semi-products.
- Maintain regional databases on production networks.

+ Exchange HR within countries

- Exchange HR among similar culture and language.
- Find HR with lower cost but with higher skills level than China.
- Provide “regional labor license” for high-skilled workers.
- Promote free movement of high-skilled workers in core industries within the region.
- Link to the “silver consultant program” in Japan.

+Create information resources for the R&D activities of firms

- Conduct research on technological demand of (sectoral) firms in the region.
- Build programs on transferring appropriate technologies from preceding countries to latecomers in the region.
- Declare a regional IPR policy.

+ Improve the effectiveness of regional research organizations

- Conduct an evaluation of the capacity of research organizations in the region.
- Create inter-cooperation of research organizations in each country to meet the R&D demands of firms.

NOTES

[i] Japan's Silver Human Resource Center (SHRC) program provides retiree as part-time, paid employment for developing countries.