Human Resource Development and Engineering Capabilities of Vietnamese SMEs in Hanoi

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Abstract

This paper aims to analyse the human resource development strategies and to evaluate the engineering capabilities of local Vietnamese SMEs in Hanoi, Vietnam. Vietnam, as a latecomer, started its economic development in the 2000s by Doi Moi policy, implemented in 1986 which reform and promote industrial development.

This paper focuses on the skill formation process in Vietnam through case studies of Vietnamese SMEs. Those cases will shed light on effective ways to develop key personnel with high levels of skills, technologies and capabilities to upgrade Vietnamese SMEs.

First, the background of Vietnamese SMEs, followed by the theoretical framework of this study are presented. Then, the empirical research on cases of technology accumulation in local SMEs are discussed. Ten firms from the manufacturing industry in Hanoi were surveyed by the author in October and November 2016.

KEY WORDS : Human resource development, SMEs, Vietnam, engineering capabilities

1. Introduction

The purpose of this paper is to analyse the human resource development strategies and to evaluate the engineering capabilities of local Vietnamese SMEs in Hanoi, Vietnam. Vietnam started its economic development in the 2000s as a latecomer to industrialization in the ASEAN. Vietnam's Doi Moi policy, implemented in 1986, started its economic reform and has promoted industrial development since then.

Foreign direct investment has accelerated since the 2000s, with the United States granting Vietnam most-favoured-nation status and the approval of the WTO. However, in Vietnam, as a latecomer that has just started to industrialize, human resource development to support manufacturing industry lags behind. The demand for skilled workers and engineers is increasing, but the human resource development of engineers in industry remains insufficient in numbers and quality.

This paper focuses on the skill formation process in Vietnam through case studies of Vietnamese SMEs. Those cases will shed light on effective ways to develop key personnel with high levels of skills, technologies and capabilities to upgrade Vietnamese SMEs.

The paper first presents the background of Vietnamese SMEs, followed by the theoretical framework of this study. The second part presents the empirical research on cases of technology accumulation in local SMEs. Ten firms from the manufacturing industry in Hanoi were surveyed by the author in October and November 2016. This paper examines the cases of Vietnamese SMEs operating in production machine making, metal mould manufacturing and supplying parts mainly for motorcycles in Hanoi and presents some findings based on the research.

2. Background of SMEs in Vietnam

In Vietnam, after the Doi Moi policy was implemented, real economic development started in the 2000s, especially after the United States granted Vietnam most-favoured-nation status and it gained the approval of the WTO. Table 1 shows the economic performance of Vietnam from 2005 to 2014. The GDP growth rate has stayed at around 6% in recent years. The GDP per capita reached US$2000 in 2014, and the unemployment rate remained low, around 3%. As shown in Table 2, the number of enterprises has increased steadily.

Table 3 shows the number of active enterprises by the size of the labour force. Micro-sized enterprises have continuously increased at the highest speed and with the largest share. Small enterprises have increased in numbers at the same rate as medium-sized and large enterprises. As shown here, micro-sized enterprises, which have ten or fewer employees, account for the largest portion of enterprises in Vietnam.

Table 1 Economic Information on Vietnam

Year	GDP growth rate %	GDP	GDP per capita	Consumer price index	Unemployment%
2005	7.6	52,917	700	8.3	5.3
2006	7.0	60,913	796	7.5	4.8
2007	7.1	71,016	919	8.3	4.6
2008	5.7	91,094	1,145	23.0	4.7
2009	5.4	97,180	1,160	6.9	4.6
2010	6.4	104,632	1,273	9.2	4.3
2011	6.2	122,104	1,517	18.6	3.6
2012	5.3	155,820	1,748	9.2	3.2
2013	5.4	170,387	1,907	6.6	3.6
2014	6.0	185,346	2,052	4.1	3.4

Source: JETRO (2017)

Table 2 Number of Registered Enterprises from 2008 to 2013

Year	Number of registered enterprises	Accumulation	Registered capital VNI billion
2008	65,319	331,060	–
2009	84,531	415,591	–
2010	83,685	499,276	–
2011	77,548	576,824	513,700
2012	69,874	646,698	467,265
2013	76,955	723,653	398,681

Source: Ministry of Planning and Investment Vietnam (2016)

Table 3 Number of Active Enterprises by Size of the Labour Force as of January 2013

Year	Total	Micro	Small	Medium	Large
2008	205,689	127,180	68,046	4,484	5,979
2009	248,842	162,785	74,658	5,010	6,389
2010	279,360	187,580	79,085	5,618	7,077
2011	324,691	216,732	93,356	6,853	7,750
2012	332,672	225,037	93,036	6,735	7,864

Source: Business performance of enterprises by Vietnamese standard industrial classification VSIC 2007, Statistical Yearbook 2012, General Statistics Office Vietnam

Table 4 shows the number of state-owned, non-state-owned and FDI-supported enterprises. There are 48,000 state-owned enterprises, 334,500 non-state-owned enterprises and 8,976 FDI-supported enterprises, respectively.

3. Theoretical Framework

Technology and knowledge have moved across enterprises and countries from the earliest days of productive activity (Lall 2001). In recent years there has been increased interest in the issue of technology accumulation and the international division of labour in many countries. Technology accumulation plays a central role in

Table 4 Number of Enterprises by Legal Form as of January 2013

	2008	2009	2010	2011	2012
Central state owned	1,651	1,806	1,779	1,797	1,792
Local state owed	1,656	1,554	1,502	1,468	1,447
State owned	3,307	3,360	3,281	3,265	3,239
Private	46,530	47,840	48,007	48,913	48,159
partnership	67	69	79	179	286,403
Limited Liability	103,091	134,407	163,978	193,281	
Joint-stock with state capital	1,812	1,738	1,710	1,751	
Joint-stock without state capital	31,746	42,622	55,057	68,292	
Non state	183,246	226,676	268,831	312,416	334,562
100% FDI	4,612	5,414	5,989	7,516	7,523
JV foreign domestic	1,014	1,134	1,259	1,494	1,453
FDI sector	5,626	6,548	7,248	9,010	8,976

Source: General Statistics Office of Viet Nam (2015)

economic development. Empirical research has drawn attention to two aspects of technology accumulation: technical change and the acquisition of technological capabilities (Lall 1993). Rasiah (1994, 1995) provided empirical evidence of the importance of technical external economies in the flow of technology from foreign sources to local firms, which has implications for the analysis of firms' economic performance in developing countries.

Recent theories have demonstrated that incremental technology accumulation can have a positive impact on firm-level efficiency and productivity (see Rasiah 1996; Kim 1997). Lall (2001, p. xii) described four levels of technological capabilities. The simplest operational level needed to run a technology efficiently involves basic manufacturing skills as well as some more demanding troubleshooting, quality control, maintenance and procurement skills. At the intermediate level, duplicative skills are also critical, including the investment capabilities needed to expand capacity and to purchase and integrate foreign technologies. Next are adaptive skills, whereby imported technologies are adapted and improved, and design skills for more complex engineering. Innovative skills are also important to absorb technologies creatively (see Kim 1997). The acquisition of skills and investment in human capital are seen by many economists as an engine of growth (Acemoglu and Pischke 1998; Sadoi 2008, 2009).

In this paper, as described above, the four levels of skills proposed by Lall along with innovative skill are used to evaluate technological capability, resulting in five levels of skills: the simplest operational level, the intermediate level, adaptive skills, design skills and innovative skills. Eight SMEs in the manufacturing industry in Hanoi were surveyed by the author in October and November 2016. These firms are 100% Japanese-owned firms and 100% Vietnamese-owned firms. This paper aims to evaluate the technological capabilities of their Vietnamese engineers and workers and evaluate and discuss the human resource development strategies based on the result.

The research question in this paper is that Japanese companies in Vietnam put more emphasis on the human resource development of Vietnamese employees than 100% Vietnamese-owned firms. Thus, the technological capability of the 100% Vietnamese-owned firms is lower than that of the 100% Japanese -owned firms.

4. Empirical Survey

To examine the hypothesis raised in the previous section, SMEs in Hanoi were surveyed by the author in November 2016. Five 100% Vietnamese-owned firms and two 100% Japanese-owned firms were surveyed during interviews and meetings on the production site with managing directors and the equivalent level of managers.

First, 100% Vietnamese-owned companies are examined. Among the companies surveyed are Quoc Dat

Company, a motorcycle parts maker, HP Tech, which makes metal moulds and stamping parts for motorcycles, and CNC VINA, a machine and equipment production firm.

4.1 The cases of 100% Vietnamese SMEs in Hanoi

Quoc Dat Mechanic and Service Co., LTD (Quoc Dat)[(1)]

Quoc Dat is a metal machining and assembly firm for Yamaha motorcycle brakes and gear parts. Currently 5 workers are employed by the factory. The owner of the firm is a 62-year-old engineer with a military background. In the military he worked as a mechanic and mastered production techniques at the Military Internal Training Centre, (ITM). Later, he was in charge of training at ITM.

He established the firm in 2007 to make spare parts for Yamaha motorcycles. He constructed simple production machines by himself using military scraps. The firm's major customers are Taiwanese, Japanese and Vietnamese local firms. The machines in the firm are general purpose machines from the 1970s or 1980s. Three press machines, an old type of Amada from Japan, one from Komiyama in Japan and one from China, one welding machine and five manual punch press machines are used for production. All five of the operators can use all the machines. All the machines are maintained and repaired by the operators and the owner themselves. Only in the case of electrical problems do they call electricians to repair them. Some of the machines were even produced by the owner himself.

Quoc Dat is small in scale but has production technique capability. Although the production skills and techniques are well maintained, the quality and precision of the products lag behind. On the production site, there is a sign indicating 5S. However, the sign is dirty and dusty, showing the condition of the firm itself.

HP Tech Vietnam Engineering & Mold JSC (HP Tech) [(2)]

HP Tech was established in 2012 and is a 100% Vietnamese firm for metal press mould production and manufacturing using the metal moulds produced. It has two factories, one for metal press mould making and one for manufacturing using the metal moulds. Altogether 90% of the metal moulds are for Honda and Yamaha in Vietnam and 10% are for exporting to Japan, to Osaka Osawa. Some metal moulds are for Panasonic washing machine parts.

The Managing Director (MD) and the head of the production plant graduated from a university in engineering. Then they worked on a joint venture with Honda (51%) and Vietnamese firm (49%) in charge of motorcycle body part production for 15 years and 10 years, respectively. They started their own company using their experience and know-how.

HP Tech produces metal moulds for Yamaha motorcycle parts. Currently, HP Tech is making metal moulds for lids on gasoline tanks to reduce six processes into one. For Honda HP Tech is making metal moulds for motorcycle flames. The material is imported mainly from Japan and some from Taiwan through a Vietnamese trading company. The machines for producing metal moulds are mostly imported from Taiwan. Two second-hand Mori Seiki CNC machines are used for production.

The work organization involves 4 engineers for metal mould designing, 15 engineers for metal mould making, 5 operators for assembly, 10 operators for finishing and 2 operators for testing. About 30% of the employees have a university engineering degree. All the employees are in their 20s and 30s. The operation is divided into 2 shifts of 8 hours. It takes 1 to 1.5 months to produce 1 metal mould.

Kaizen activities are in progress following a request from Honda. They are currently dealing with two targets: to reduce the NG products and to shorten the production cycle. These activities are performed during working hours with the MD as the leader.

This case shows that Vietnamese engineers with working experience in Japanese joint venture producing Honda parts established a metal mould company using their technological capabilities and their connection with Honda parts. At the top of the company is the entrepreneurial spirit to start their own company by maximizing their experience, skills, technology, knowhow and connections.

CNC VINA [(3)]

CNC VINA is a production machine maker that is 100% owned by a Vietnamese firm. CNC VINA has 10 years of production experience with 135 employees. It is owned 100% by Vietnamese owners and covers 3000m^2. Production machine manufacturing requires high levels of skills and knowledge and is largely used in manufacturing industries, such as automobiles and electronics. Production machines and automatic control devices are indispensable for all manufacturing processes. They vary for each production process in material, size and usage. The manufacturing of production machines requires R&D, designing, prototype making, machining,

assembly and testing.

CNC VINA was established in 2007 in Hanoi as a CNC and applied technology company. It started the production, modification and sales of production machines for manufacturing industries in Vietnam, such as electronics, automobiles and motorcycles, and robotics. CNC VINA is engaged in manufacturing production machines mainly for Japanese customers in Vietnam (95%) and Korean companies such as Samsung. The main customers are in the automobile and motorcycle industry: Yamaha, Honda, Showa, Denso, Piaggio, Toyota Boshoku, Tosuk and Tokai Rubber. In the electronics industry, the main customers are Panasonic, Canon, Kyocera, Hoya, R-Tech and Sumitomo Rubber. The production machinery and equipment at CNC VINA were imported from Germany and Japan

CNC VINA is a joint stock company of machine manufacturing and automatic control (Vinavico and Navicom). In 2008 it changed its name to CNC VINA and moved its office to Hanoi to meet the increasing demand for Japanese makers who started in Vietnam, such as Yamaha, Panasonic, MAP, Yamazen and Sumitomo Rubber.

The personnel structure consists of 40% employees with a university engineering degree, 24% with a college diploma, 15% with an intermediate school certificate, 12% with a vocational training certificate/diploma and 10% with a junior high school certificate. In total there are 135 employees as of 2016. The company started in 2007 with 10 employees. The number increased rapidly to 162 in 2013. However, it decreased and stabilized to the current situation, which is the most suitable number for the production volume and management. The job organization is 16% mechanical engineering, 7% electrical engineering, 3% services, 41% workshop and 33% office.

The majority of core engineers have working experience with Japanese makers in Vietnam. For example, the general manager worked for Yamaha for 7 years. At that time, he started as a worker in the production technology section. He learned production technology by on the job training (OJT) and off the job training (Off JT) at the Japanese company. He was asked to enter CNC VINA when the company started operation. He was eager to contribute his engineering experience and knowledge to the Vietnamese company.

The managers and staff at CNC VINA have many years of working experience in joint ventures with Japanese partners in the manufacturing industries. Those who had qualified techniques and been trained for the Japanese production system joined CNC VINA. Therefore, the team is fully qualified and capable of achieving CNC VINA's mission 'to develop the machine manufacturing industry with the expertise and intelligence of the Vietnamese people'. In 2010 CNC VINA implemented production management training, Kaizen and 5S activities with the support of JICA to upgrade its productivity. In 2011, to meet the increasing demand, CNC VINA moved its head office and production site to the centre for industrial zone development, Minh Khai Ward, Bac Tu Liem District.

The first product that CNC VINA produced was glue-dispensing machines, developed in 2007 and 2008. Then fork pipe washing machines were produced in 2009 and ultrasonic washing machines in 2010. These product machines were single machines for certain production processes. Subsequently CNC VINA developed auto lines from 2011, such as assembly lines for smartphone mobile speakers, robot integrated production lines in 2012 and chassis-turning machines in 2014. From 2015 CNC VINA started to export its production machines to India, the Philippines and Indonesia.

The production process is as listed below. First, after receiving the customer request, the company generates a quotation. Then, based on the initial product planning, engineers design the production machines or processes. After the design process is finished, the production processes of machining and assembly start. The assembly process is tested several times until the required production machines are completed. During the testing period, the customers are invited to check the product to determine whether all the required processes meet the target. After approval from the customers, the finished product will be delivered and installed on their production line. These processes takes 2.5 months on average.

Operational processes:

1. Clients' requirement: discussion with the clients regarding the requirements of their order.
2. Preliminary design for quotation: a quotation based on the preliminary design is presented to the clients.
3. Acceptance of order placing: following a discussion with the clients, the order is placed with the clients' acceptance.
4. Engineering design for manufacturing.
5. Machining.
6. Assembly.
7. Trial running.
8. Checking by clients: the clients visit CNC VINA to check the products and their quality.

9. Installation and handing over: CNC VINA delivers and installs the products at the clients' production site and hands over the production machines.
10. Warranty: CNC VINA is in charge of maintenance at the clients' site. Whenever problems arise, engineers visit the site to carry out repairs and maintenance.

To enable the process to run smoothly, each "project team"[4] is in charge of one built-to-order manufacturing product. Depending on the scale and complexity of the project, the number of project team members varies. Each project team consists of one team leader and four or five members on average. The project leader has approximately five years of working experience after graduating in engineering from a university. On the production site, each project team uses a project progress board to keep track of the project and visualize its progress.

In addition, Japanese production management systems have been introduced, such as 5S and visibility. CNC VINA applied the Japanese production management system by modifying it to the Vietnamese style. This means choosing the most important items and modifying the system to suit Vietnamese employees. For example, a one-project-one-whiteboard system was introduced. To control and maintain each project, all the processes and progress are shown simply using one board. This also helps in providing visibility to all the project members as well as the managers who control all the production projects.

Human resource management in CNC VINA is well controlled and visualized on the HR board. An organization chart with names and pictures of the employees is indicated in each section. All the employees' names are indicated in a matrix chart on the corridor of the main office. It controls the daily operational hours of human resources and shows who is participating in which project and who is absent on a particular day. The evaluation of all the employees is based on eight points . Operators and workers are graded on five levels. This evaluation system helps to motivate employees to achieve promotion.

One of the strong points of CNC VINA is the provision of high technology and quality of products at a much lower price than Japanese production machine makers. The low labour cost and low delivery cost compared with those of Japanese makers in Japan make it competitive. The other strong point is proximity and quick response times. Whenever its clients encounter problems with their production line, CNC VINA can send engineers immediately. To prove this strength, many leading Japanese companies in electronics, automobiles and motorcycles have been clients in recent years. In the case of Japanese makers in Japan, after they have received the call from the client, they send Japanese engineers from an office in Vietnam or even from Japan. This involves high labour and time costs.

CNC VINA has been increasing its orders from highly qualified Japanese customers and improving its competitiveness. In general, many Japanese companies operating in Vietnam complain about the low quality and reliability of local suppliers, however, CNC VINA is the exception and showing the possibilities and directions for other Vietnamese firms as role model of the success.

4.2 The cases of 100% Japanese-owned SMEs in Hanoi

Takase Molding System Vietnam Co., Ltd. (Takase) [5]

Takase was established in 1982 in Aichi, Japan, to design and produce metal moulds for plastic injection. In 2012 Takase Molding System Vietnam was established at a rental factory in Than Ron Industrial Zone in Hanoi. In 2016 it had one Japanese manager and fourteen Vietnamese employees, two male engineers, ten female operators and two staff members. As yet metal mould production has not started in Hanoi, although the necessary machines have already been installed. Except for the Japanese manager, no one has the skills and techniques to make metal moulds yet. Currently the production of simple-shaped plastic parts is the major operation.

Since 1998 a total of twenty Vietnamese trainees have been received in Japan for three to five years of training at the Aichi plant. The experience of accepting Vietnamese technical trainees resulted in the decision of Takase to open the Hanoi plant.

The same types of production machines are installed in Hanoi and Japan. The division of labour in Takase in Japan and in Hanoi is as follows. The Hanoi plant is in charge of parts that require machining and trimming after automated production and parts that require visual checks.

Takase has not yet started metal mould production or teaching metal mould production training to Vietnamese engineers. The Japanese General Director mentioned that he would like to start metal mould production soon and that the instruction on equipment and machines is complete and the company is ready to start. He is

planning how to carry out human resource development relying on the Technical Intern Training program[6] by OTIT(Organization for Technical Intern Training) in Japan. That trainee system is not conducted through Takase but through an HR agent. Therefore, Takase cannot transfer the trainees in Japan to Vietnam yet. In the near future, Takase wants to send its employees for training in Takase Japan. Those who finish the course will be ideal for Takase Hanoi to hire. Then the metal mould production process can start when the HRD system is complete.

Ihara Manufacturing Vietnam (Ihara) [7]

Ihara was established in 2012, 100% owned by Ihara Japan, and started the production of motorcycle parts in 2013. In 2014 it started to export motorcycle parts to Thailand. The production capacity is 1.2 million units of oil pumped per year and 0.45 million units of water piped per year. The material and subparts are all imported. No material or parts are purchased locally because of the low quality and reliability.

The official language in Ihara is Japanese. There are two Japanese experts and thirty-six Vietnamese employees. The number of local staff varies because of high absenteeism and quitting rates. Ihara introduced a good welfare system and incentives for employee upgrading. Operators can gain an extra allowance for upgrading their skills. Offering an allowance is the best way to motivate employees to upgrade their skills. In addition, introducing a grading system is an effective method in Ihara. The wage gap between the leader and the assistant manager is more than three times in total, including several allowances. The gap is even larger than that in Ihara in Thailand and Indonesia.

Quality control, small group meetings and Kaizen activities were introduced in Ihara from the beginning. The Kaizen submission rate is very low, even though Ihara offers a small allowance for submitting a Kaizen plan. Overall, Ihara introduced the Vietnamese method of human resource development through OJT with allowance incentives.

5. Discussion

In the previous section, 100% Vietnamese firms and 100% Japanese firms were examined regarding their human resource development processes and technological capabilities. Although the types of business and technological requirements vary, in these cases high technological capabilities in mould making and engineering were observed in Vietnamese firms. Especially, the case of CNC VINA showed the highest technological capability in products and engineers among all the cases.

Although during our research in SMEs in Hanoi, many Japanese managers mentioned the problems of local suppliers of parts and materials. For example, a Japanese motorcycle parts supplier for Yamaha and Honda in Hanoi purchased its subparts from Japanese suppliers in Indonesia, not from local suppliers, because of quality and reliability issues. It only purchases minor parts and materials, which do not directly affect their product quality, such as packing, from local Vietnamese suppliers. Japanese makers place a high priority on product quality.

How did CNC VINA achieve its technology and quality to meet the high requirements of the Japanese makers in Vietnam? Not only for the case of CNC VINA but also for the other cases, these reasons are examined in the four points below.

The first point is the strong challenging spirit of the core members. The established person and members had strong motivation to start as a ‘competitive Vietnamese company’. Based on this spirit, several core motivated and experienced members were created spontaneously. The spirit is shown in Quoc Dat and HP Tech founders in certain level. The spirit is shown in CNC VINA’s company slogan: ‘to develop the machine manufacturing industry with the expertise and intelligence of the Vietnamese people’. Despite interviewing many engineers, the same kinds of strong motivation and confidence were supported by their achievement in producing machines for their customers, many well-known leading Japanese companies.

Second is the working experience and OJT and Off-JT at Japanese makers. Many managers and engineers had nearly ten years of working experience at Japanese leading makers in Vietnam. As for HP Tech and CNC VINA, managing directors and core managers had working experiences in Japanese companies in Vietnam.

Those large Japanese companies, which started operation at the earlier stage of industrial development, had a strong in-house human resource development system (Sadoi 2003). Honda and Yamaha in Hanoi provided OJT and several kinds of Off-JT in house and were active in developing local engineers’ technological capabilities and the Japanese style of production management system. Although they represent a big loss for Honda and Yamaha, those who obtained technology and know-how

in house left their companies, and Japanese companies pointed out that this loss is the negative point of human resource development in Vietnam while they had contributed to building the technological capabilities of Vietnamese people.

The third point is the motivation of Vietnamese employees. As indicated in the first point, core managers and engineers who have work experience in major Japanese makers in Vietnam have strong motivation to develop Vietnamese people. They act as an important role model for others. Especially, they are Vietnamese role models for Vietnamese people. As seen in CNC VINA, the confidence to produce and develop production machines for Yamaha and Honda will stimulate Vietnamese employees and Vietnamese SMEs.

Fourth, the role of the Japan Vietnam Human Resources Cooperation Center (JVCC) for management and technological training courses for Vietnamese SMEs is indispensable for further development.[8] The JVCC started in 2009 and provided management courses for manufacturing industries. As of 2016, the JVCC had trained 214 managers of Vietnamese manufacturing SMEs. Among the introduced cases, some, but not all, use JVCC courses for engineers' training. CNC VINA and HP Tech use JVCC for training courses.

The JVCC plays an important role in accumulating and creating Vietnamese SMEs' networking in their business. Alumni associations of the JVCC have been started spontaneously and the members hold regular study meetings.

Nguyen (2016) pointed out that the problem of SMEs in Vietnam is the lack of business associations for networking and information sharing.[9] As previously mentioned, in Vietnam the majority of enterprises are micro enterprises. For those companies the owner engineer is the only one to provide technology and HRD for the employees, as in the case of Dung Quo in this paper. JVCC courses and alumni associations must be effective for those micro enterprises' and SMEs' development.

6. Conclusions

This paper aimed to analyse the human resource development strategy and evaluate the engineering capabilities of local Vietnamese SMEs in Hanoi, Vietnam. In the first section, the background of SMEs in Vietnam was introduced and the increasing and large percentage of micro enterprises as well as small enterprises was pointed out. The key issue in building capability in Vietnam is the development of micro and small enterprises.

The second part studied the theoretical framework and raised the hypothesis that the Japanese SMEs in Vietnam put more emphasis on the human resource development of Vietnamese employees. Therefore, the technological capability of 100% Vietnamese-owned SMEs might be lower than that of 100% Japanese-owned SMEs in Vietnam.

To test the research question hypothesis, the third section examined case studies. To investigate the technological capabilities of Vietnamese SMEs, the cases were raised based on the author's on-site surveys and interviews with managers and engineers. Three Vietnamese cases and two Japanese cases were introduced.

As a result, among these case studies showed opposite result. The Vietnamese SMEs in Vietnam put as same as or even more emphasis on the human resource development of Vietnamese employees than Japanese SMEs in Vietnam. Moreover, one case showed the technological capability of 100% Vietnamese-owned SMEs might be equal or even higher than that of 100% Japanese-owned SMEs in Vietnam.

Overall, there are three major findings in vietnamese SMEs. The first point is the strong challenging spirit of the core members. The established person and members had strong motivation to start up a 'competitive Vietnamese company'. Their strong motivation and confidence were supported by their achievement in producing machines for their customers, which include many well-known leading Japanese companies.

The second finding concerns the working experience and OJT and Off-JT at Japanese manufacturers. Many managers and engineers had nearly ten years of working experience at leading Japanese manufacturers in Vietnam. This time, large corporations were not surveyed, but they had contributed to building the technological capabilities of Vietnamese people. Indirectly, their efforts contributed to the technological capability of Vietnamese SMEs.

The third finding relates to the motivation of Vietnamese employees. Core managers and engineers who have work experience in major Japanese manufacturers in Vietnam have strong motivation to develop Vietnamese people. They act as an important role model for others.

The fourth point is the role of the JVCC. The JVCC plays an important role in accumulating and creating Vietnamese SME networking in their business.

The cases introduced in this paper are limited in num-

ber. Samples were selected as SMEs capable of engineering and mould production at this time. Although the samples are limited, these cases shed light on directions to improve Vietnamese SMEs by upgrading their technologies.

Notes

(1) The author visited Quoc Dat Company on 2 November 2016 and interviewed Mr Vuong Van Dau, Director.

(2) The author visited HP Tech on 2 November 2016 and interviewed Mr Ngyen Quang Huy, Deputy Director and Engineering Department Manager.

(3) The author visited CNC VINA on 30 October 2016 and interviewed Mr Ha Thanh Hai, Director, and Mr Dao Anh Van, Vice Director.

(4) CNC VINA called 'project team' for built- to-order production product.

(5) The author visited Takase Molding System Vietnam Co., Ltd on 1 November 2016 and interviewed Mr Kazutaka Hirano, General Director.

(6) Technical Intern Training by OTIT is a legal entity approved the Minister of Justice and the Minister of Health, Labour and Welfare, aiming to promote international cooperation by transferring skills, technologies, or knowledge in Japanese industries to developing countries through human resource development.

(7) The author visited Ihara Manufacturing Vietnam on 4 November 2016, and interviewed Mr Hideitsu Matsui, General Director.

(8) The author's interview at the JVCC on 3 November 2016.

(9) Nguyen (2016) discussed the points at the international workshop organized by HUBT and Meijo University on 'The subcontracting system in the Japanese automobile industry and emerging issues of the Vietnamese companies to join with the value chain' at Hanoi University of Business and Technology, Hanoi, 30 October 2016.

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