

Vietnam

Leveraging of Japanese Private Sector Resources to Achieve Development Goals and Designing Financial Assistance Schemes

Final Report

July 2011

The Japan International Cooperation Agency (JICA)

Nomura Research Institute, Ltd.

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Table of Abbreviations

Abbreviation	Formal Name/English Name
ABIC	Action for a Better International Community
ADB	Asian Development Bank
AFTA	ASEAN Free Trade Agreement
ASEAN	Association of Southeast Asian Nations
BDS	Business Development Services
BOP	Base of the Pyramid
BPO	Business Process Outsourcing
CAD	Computer Aided Design (system)
CAMEL	Capital adequacy, Asset quality, Management efficiency, Earnings performance, Liquidity position
CDM	Clean Development Mechanism
CSR	Corporate Social Responsibility
e.g.	exempli gratia / (for example)
EVN	Electricity of Vietnam
FDI	Foreign Direct Investment
FI	Financial Institution
FRP	Glass fiber reinforced plastics
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GP	General Partner
GSO	General Statistic Office
IPP	Independent Power Producers
IT	Information Technology
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JITCO	Japan International Training Cooperation Organization
JOCV	Japan Overseas Cooperation Volunteers
JODC	Japan Overseas Development Corporation
METI	Ministry of Economy, Trade and Industry
MOET	Ministry of Education and Training
MOIT	Ministry Of Industry and Trade
MOLISA	Ministry of Labor and Invalids and Social Affairs
MPI	Ministry of Planning and Investment
NGO	Non-Governmental Organizations
NRI	Nomura Research Institute, Ltd.
ODA	Official Development Assistance
OJT	On-the-Job Training
PARTNER	Participatory Network for Expert Recruitment
PCB	Printed-Circuit Board
PE	Private Equity
PP	Polypropylene
PPP	Public Private Partnership
PPS	Polyphenylenesulfide
PVC	Polyvinyl chloride
RO	reverse osmosis membrane
SBV	State Bank of Vietnam
SCIC	State Capital Investment Corporation

Abbreviation	Formal Name / English Name
SI	Supporting Industries
SME	Small and Medium Enterprises
SMRJ	Organization for Small & Medium Enterprises and Regional Innovation, JAPAN
SNV	Stichting Nederlandse Vrijwilligers /(Netherlands Development Organization)
SOE	State Owned Enterprise
SV	Senior Volunteer
TF	Task Force
TIG	Tungsten Inert Gas
TSL	Two Steps Loan
TWh	terawatt hours
VDB	Vietnam Development Bank
YAG	yttrium aluminium garnet

Outline of the Study

1) Background

(1) Government policies to strengthen public-private partnerships

The private sector has contributed to the economic growth of developing countries and made direct impacts on major development within the developing countries, such as providing employment opportunities, technology transfer and promoting private sector trade and investment, which ODA alone could not achieve. The private sector has also contributed to improvement of the standard living and livelihood among the poor through some products and services provided to the poor segment as business activity. Against these background, JICA has been engaged in further strengthening public-private partnerships in its development cooperation programme.

(2) ODA policies to promote small business administration through the overseas aid

The current Democratic Party administration has launched its “Manifesto 2009” in July 2009. It stated that they will "make a government-wide effort to address the small business enterprise (SME) issues in order to revitalize the SMEs which are the foundation of Japan's economy." and the Democratic Party also announced at the same time in its “INDEX 2009” that in order to support the international operations of SMEs, the utilization of SMEs shall be actively promoted in the overseas operations of official development assistance (ODA).

(3) JICA’s stance on using private sector resources to promote economic and social development in developing countries

JICA is recognizing the importance of cooperation with the private sector from the perspective of necessary resource to achieve development challenges, and is now working on BOP business, PPP infrastructure project formation, as well as institutional development of overseas investment projects (currently, the resumption is under institutional design). In addition, JICA is considering the leverage of private sector resources to contribute to various development challenges facing developing countries.

Among the private sector, SMEs play an important role in the Japanese economy, and have accumulated world-class technological know-how such as production technology in manufacturing, water, environment, and energy (renewable energy, energy efficiency), etc. It is highly possible that their technology accumulation can be used effectively to tackle JICA’s economic and social development challenges in developing countries.

2) The purpose of the Study

Based on the above-mentioned recognition, this study aims to identify the needs that JICA can help improve Vietnam's development issues by utilizing the resources of Japanese SMEs

and put together the financial support scheme options necessary to promote the use of such resources.

3) Scope of the Study

(1) Countries

The Socialist Republic of Viet Nam, which has generated a great deal of attention among Japanese SMEs as a candidate for their new overseas operation and which has a high potential to utilize such private sector resources to improve the development challenges, shall be the target country to be studied.

(2) Development Issues

- Area 1: Improving Public Service
 - Address the development challenges of improving the standard and means of living in Vietnam through improved public services such as water, environment, and sustainable energy.
- Area 2: Private Sector Development and Supporting Industries
 - Address the development challenges of private sector development and development of the supporting industries (SI) within Vietnam, which is ongoing under the "Japan-Vietnam Joint Initiative on Strengthening International Competitiveness".

4) Study Topics (Overview)

This study shall address the following issues, within the development issues, such as MDGs, facing developing countries,

1. Identification of development issues that Japanese SMEs could address (such as technology and service)
2. Identification of resources that Japanese SMEs could leverage (to address the issues highlighted in Study 1)
3. SME Technology Resource Business models for JICA (based on findings in Study 1 and Study 2),
4. JICA's (financial) support measures to promote leveraging of Japanese SMEs' resources

5) Study Reporting

In addition to the initially scheduled Tokyo and Hanoi seminars, a seminar in Ho Chi Minh City was held, to report and discuss the main findings of this study. Needs for financing has been expressed by the local SMEs in the Supporting Industries.

I. Current situation and resources of supporting industries

Industrial development is remarkable in Vietnam and industrial clusters are being formed. However, supporting industries are still poorly performing in terms of quantity and quality. The Vietnamese government recognizes that the upgrading of supporting industries is their challenge. As one of measures to achieve the upgrading, they expect foreign supporting industries, especially from Japan, to expand their business to Vietnam and introduce their technology. As Japan's manufacturing sector is the number one investor in terms of foreign direct investment to Vietnam. There are high expectations for Japanese SMEs to move into Vietnam with their technology,

As Japanese supporting industries are finding out that their future prospects in their domestic markets is becoming smaller each day, the numbers of companies that are finding their way into overseas markets have increased and Vietnam has attracted them as one of the promising area. Enhancing such SME investment to Vietnam, can lead to the achievement of JICA's goal of developing the supporting industries and private sector, which is one of JICA's priority assistance areas.

However, the range of supporting industries in Vietnam is broad. Therefore, in this report, we will firstly map respective supporting industry technologies that can be provided from Japan and then identify the actual status of Vietnamese technical level and the Vietnamese domestic needs at each technical level in the mapping.

Next, we will identify the impediments for small and medium-sized companies of Japanese supporting industries to move over to Vietnam to start their business, and finally propose the measures to solve or alleviate those problems through official assistance by JICA.

I.1. Actual situation and needs for private-sector's technologies for supporting industries in Vietnam

I.1.1 Current status of technologies of supporting industries in local companies

Regarding the current situation in technologies of local industries in Vietnam, there are companies that have engaged in supporting industries such as metallic molding, plastic injection molding, die-cast and glass. However, all of them have management issues of renewing existing tool machines, introducing new machines and implementing research and development of frontier area in Vietnam, and their interest is focused on how to get the financing to purchase higher performance machines to improve their technical level.

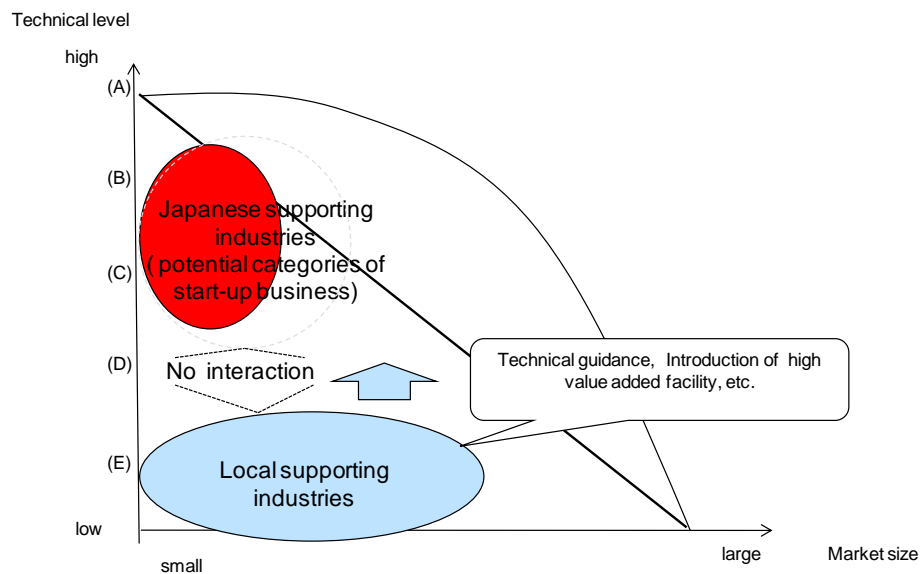


Figure 1 Structural Image of Vietnamese Supporting Industries

I.1.2 Current situation of technology of supporting industries from the standpoint of Japanese assembly set manufacturers

Regarding the current situation of technology of supporting industries from the standpoint of Japanese assembly manufacturer, the quality level of local companies by and large in Vietnam isn't relatively high and it is difficult to outsource production to them except parts that quality standard is not a big issue in terms of final assembled product function. However, all of those assembly manufacturers have intentions to expand their business with Vietnamese local companies if quality is secured in the future. On the other hand, there are great needs for Japanese small and medium-sized companies mainly in metal molding, casting, heat-treating and electronic parts. However, competitions with foreign supporting industries such as Taiwanese and Korean suppliers have become fierce and the Japanese SMEs will need to compete with them both in terms of quality and price

Furthermore, looking at the current situation from the aspect of Japanese manufacturers of Japanese supporting industries who have moved to Vietnam, we found that many companies point out the following; "fragility exists in each of technical field of Vietnam's supporting industries" and "there is still a large business chance left for Japanese companies".

Evaluation of the needs for technologies for each element is summarized in the table in the next section.

I.2 Resources of Japanese small and medium-sized companies that can be utilized to obtain development objectives.

I.2.1 Japanese companies relevant to major supporting industries in Vietnam

The followings are examples of companies from material processing industry moved into Vietnam. There are more material processing companies moving into Vietnam than companies of water, environment and energy, but the total numbers of companies are only limited, so far. By moving into Vietnam, numbers of companies that have expanded their business, such as metallic molding companies expand their business domain to plastic molding, or companies starting business with new partners who they didn't have any business in Japan, are increasing.

Table 1 Examples of Japanese material companies moved into Vietnam

Company Name	City	Business Area	Established Year	Number of Employee
Daiwa Plastics (Singapore based 100%)	Ho Chi Minh	Forming process of thermoset·thermoplastic resin	1995年	459
Kyoshin Kogyo 100%	Ho Chi Minh	Manufacturer of terminal for connector, terminal for connector, presive press, manufacture of plastic forming part	1995年	267
Suruga Seiki 100%	Ho Chi Minh	Part of precise mold, manufacture·sales of mechanism element for precise location	1995年	
Kanto Sanyo Semiconductors 51.7%	Ho Chi Minh	Control base of household electric manufacturer, manufacturer·sales of semi-conductor precise mold	1995年	461
Tacmic 92.5%	Dong Nai	Plastic injection forming·flow shaping, paint, print, assembling and others	1995年	954
Eidai Kako 88.7%	Ho Chi Minh	Manufacturer·sales of synthetic resin products	1996年	252
MK Seiko 100%	Ho Chi Minh	Manufacturer·export of plastic household furnishing, automobile parts and others	1996年	240
Muto Seiko 97.4%	Dong Nai	Precious mold for plastic forming, plastic precious	1996年	1325
Kyoei Industry 32%	Hai Phong	Manufacturer and sales of iron and foundry piece	1996年	140
Daiwa Plastics 100%	Hanoi	Forming process of thermoplastic resin	1997年	621
Sumitomo Corporation 50%, Southern Steel Co. 40%	Dong Nai	Process·sales of steel stock	1998年	
Futaba Denshi Corporation 100%	Ho Chi Minh	Manufacturer·sales of mold parts	2001年	
Mitani Sangyo Co. Ltd. 91%	Dong Nai	Manufacturer·assembling of resin moling tool	2002年	356
Matsuo Industrie 100%	Hanoi	Manufacturer of resin for automobile	2002年	270
Gunma Gohkin	Ho Chi Minh	Designing·manufacturer of die-casting mole and manufacturer of die-casting products	2002年	
Honda Metal Industries 70%, Masuoka 30%	Ho Chi Minh	Manufacturer of modl	2002年	96
Toyota Tsuso Corporation 94%, Sugiyama Kogyo Co.,Ltd. 6%	Hanoi	Designing·planning of mold	2003年	63
Nippo (Thailand based 100%)	Hanoi	Manufacturer of precise plastic formed parts and others	2003年	
Nippon Steel Trading 80%, Hanwa 20%	Binh Duong	Shear process·sales of steel plate	2003年	40
Japan Steel Works (Singapore based 100%)	Hanoi	Maintenance service for plastic injection forming machines	2004年	6
Kyoei Manufacturing 100%	Hanoi	Press·welding manufacture of two-wheel vehicle	2004年	700
Nagoya Precision Mold 100%	Hanoi	Designing·manufacture of plastic mold		36
Muro Corporations 100%	Dong Nai	Manufacture·sales of vehicle, press parts of industrial instrument, pressed mold	2005年	79
Muto Seiko 50% (Singapore basead 50%)	Hanoi	Manufacture·sales of precise plastic parts and mold	2005年	448
NIDEC Nisshin Corporation 60%, NIDEC 40%	Hanoi	Manufacture·sales of plastic mold	2005年	171
Nifco	Tây Ninh	Manufacture of plastic products	2005年	
Nippons Steel Trading 90%, Nippon Steel Corporation 10%	Bac Ninh	Shear manufacture·sales of steel plate	2005年	56
Citizen Machinery 100%	Hai Phong	Manufacture·shaping of mold	2006年	
Metal One 80%	Hai Phong	Manufacture of steel plate	2006年	13
Nissei Jushi 100%	Ho Chi Minh	Maintenance servie of injection molding machine and others	2006年	
Tohoko 60%, Tohoku Rhythm 40%	Hanoi	Mold·sales of precise mounding manufacture and precise plastic parts	2006年	163
Sumitomo Heavey Industries, Ltd (Singapore based 100%)	Hanoi	After-the-sales-service of plastic injection machine	2006年	
Tenma 100%	Bac Ninh	Manufacture of plastic forming parts, assembly parts and mold	2007年	
Dai-ichi Seiko 100%	Binh Duong	Manufacture of precise plastic parts	2007年	100

(Source) Extracted from Toyo Keizai, Inc. "Directory of Japanese companies in overseas 2009"

However, not all of the companies are steadily expanding their business despite the technology resources they bring to Vietnam. There were a couple of companies who have withdrawn from Vietnam for having difficulties in their management, especially, when foreign companies only producing for export markets were allowed to form a 100% subsidiary, their counterparts were State Owned Enterprises (SOEs) which were difficult for the SME owners to negotiate in a time. When an investment or business decision was required within a short period, the SME owners could not dedicate their whole time to stay in Vietnam during the negotiation period at the pace of SOEs, as the SME owners were also running a business in Japan with short manpower.

I.2.2 Necessity and current situation of overseas business operations for Japanese small and medium-sized companies

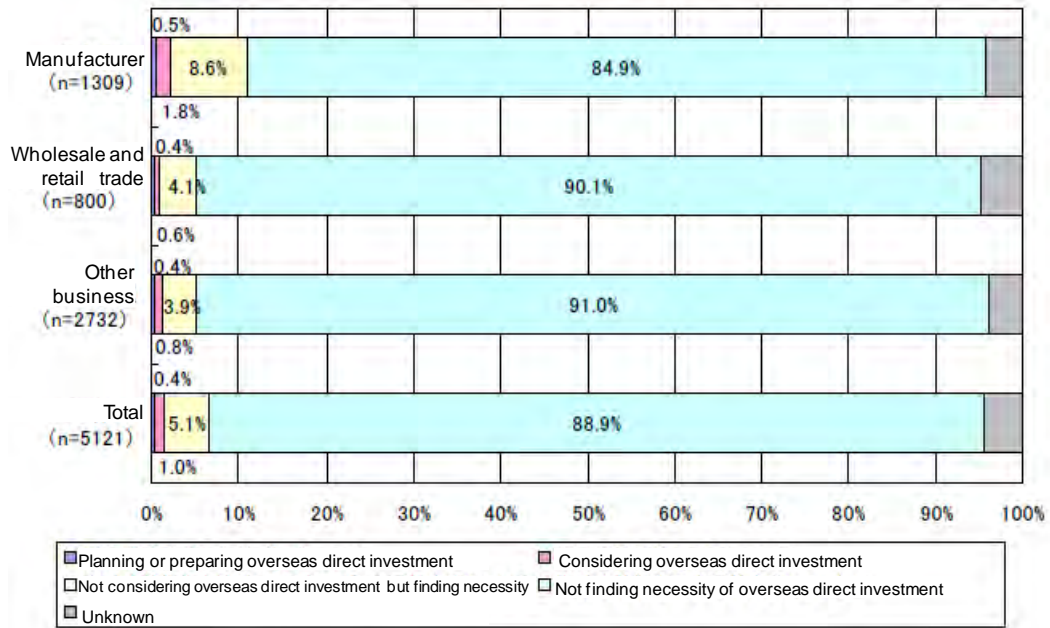
The following four challenges are what Japanese material processing industry is facing, based on the report of the revised Material Processing Industry Vision (June 2010, Japan's Ministry of Economy, Trade and Industry)

Issues of material processing industry pointed out in the revised Material Processing Industry Vision (June 2010, METI)

- 1) Due to changes in the competitive conditions of business activities of the industry, development of capabilities to propose and to sell will be the key elements for success.
- 2) Necessity to respond to the growing demand of emerging countries and to ensure competitiveness of our domestic enterprises taking into account of the growing competitiveness of other Asian countries.
- 3) Insufficient capacity for a company alone to finance the capital investment, research, development in developing human resources and other capital that is indispensable to ensure competitiveness.
- 4) Slow actions to improve energy efficiency by small and medium-sized enterprise

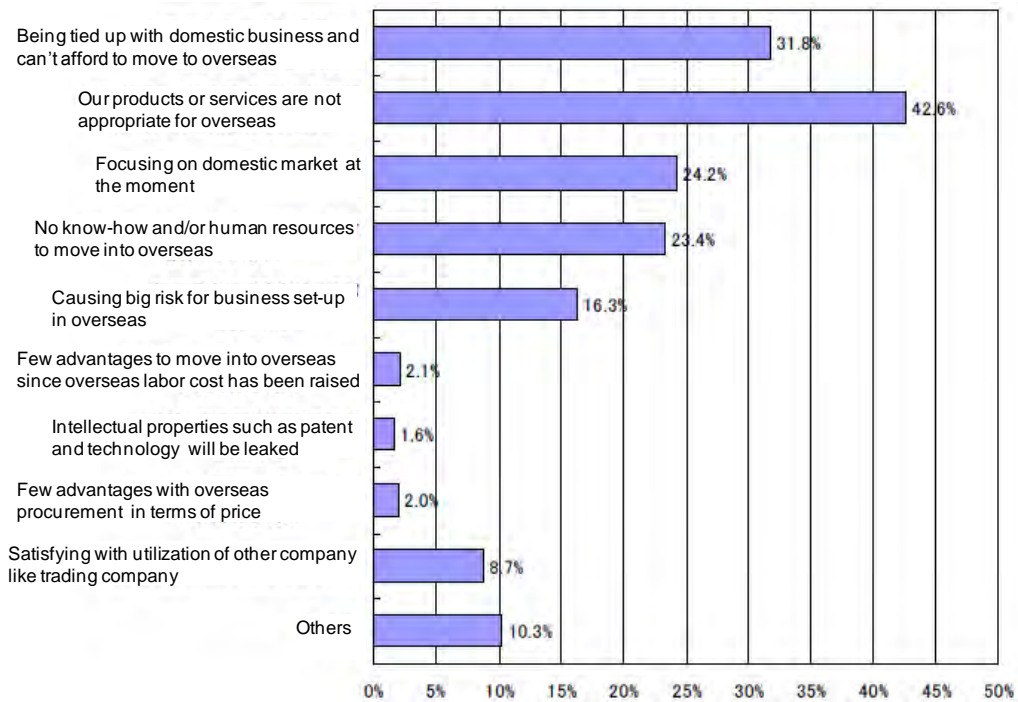
Especially as a counter measure for 2), "necessity for overseas operation" is pointed out as the future direction of material processing industry in the Material Processing Industry vision.

However, reality is that only limited numbers of Japanese mid-sized and small-sized companies find the necessity to invest in overseas facilities



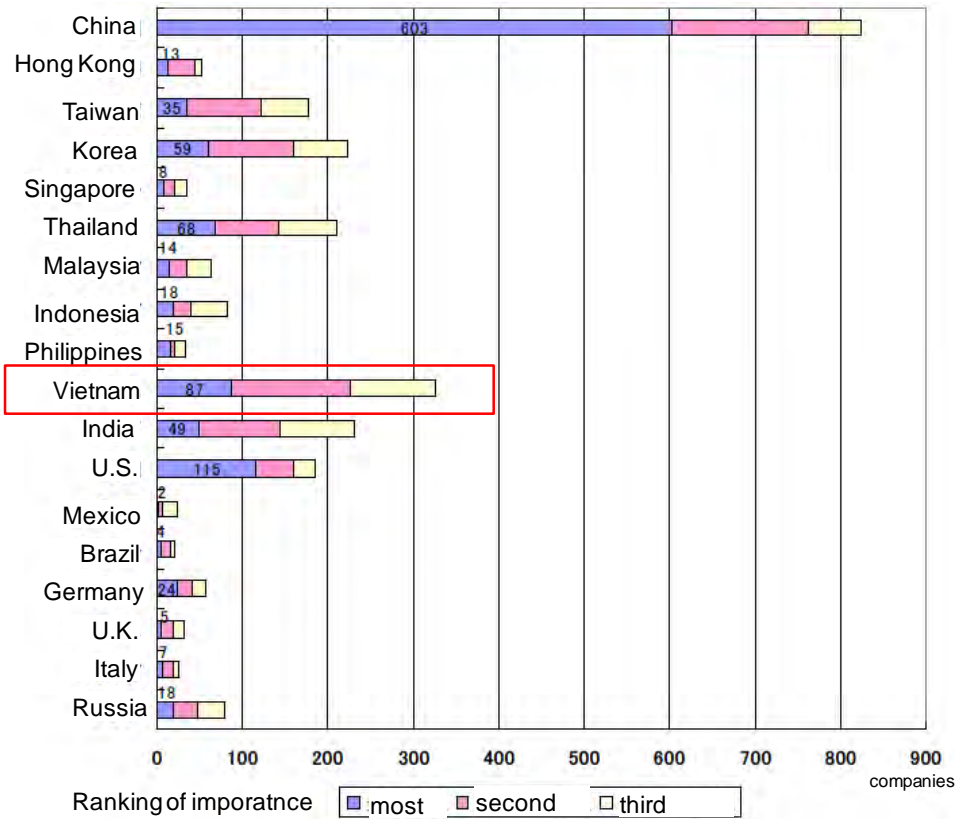
(Source) SMRJ, Fact-finding survey of small and medium-sized enterprise overseas business activities 2008
Figure 2 Status of overseas direct investment by small and medium-sized enterprise that has not currently set-up business abroad (by industry)

Among the reasons why those companies don't feel necessity for overseas direct investment, "Products or Services of their business are not appropriate for the overseas market" comes as the number one reason with 42.6% and "we're busy with our domestic business and can't afford overseas operation" comes next with 31.8%.



(Source) SMRJ, Fact-finding survey of small and medium-sized enterprise overseas business activities 2008
Figure 3 Reason why they don't find necessity of overseas direct investment (N=4553) (Subject to companies who don't feel necessity for overseas direct investment)

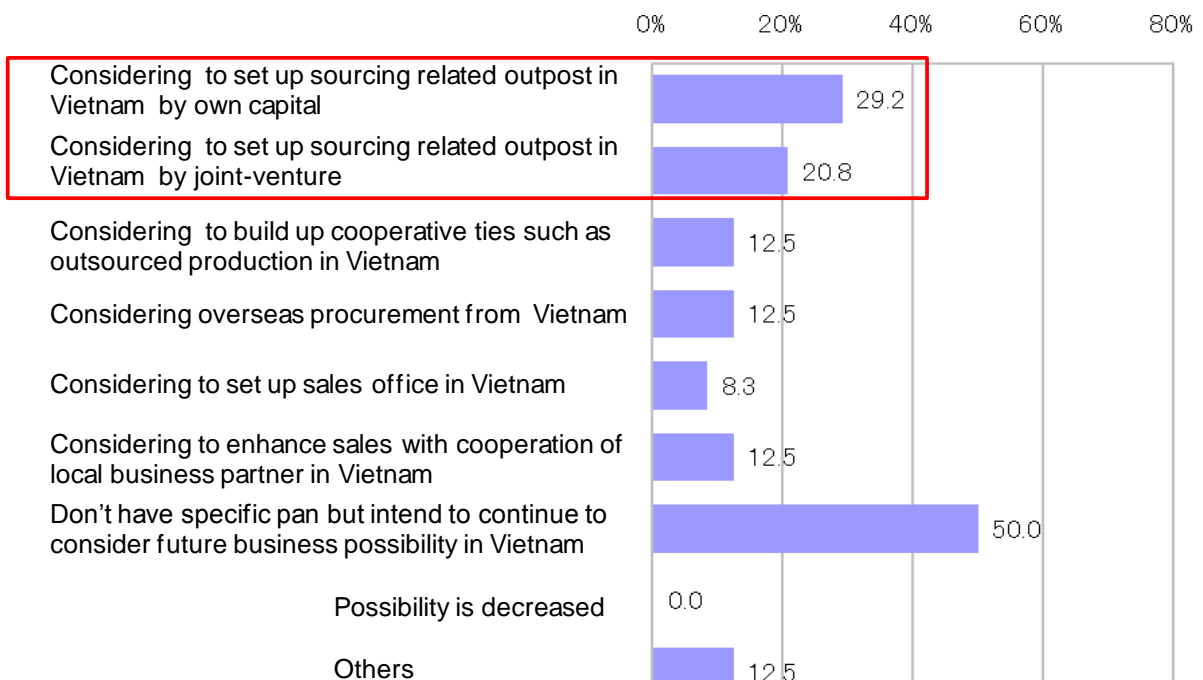
Under such circumstances, for a few companies who find necessity of overseas direct investment, Vietnam comes second after China as the most important region/market for their business growth.



(Source) SMRJ, Fact-finding survey 2008 on small and medium sized enterprises business activities

Figure 4 Ranking of important regions and countries for future business set-up for small and medium-sized companies (N=1212)

Looking at specific possibilities of business development in Vietnam for material companies who show strong interest, “we’ll consider setting up the sourcing related outpost in Vietnam by our own capital” comes out on top at 29.2%, while “we’ll consider to set up the sourcing related outpost in Vietnam by joint-venture” come to 20.8%. Those answers show high percentages and we can see that many material processing companies are considering utilizing their outposts not only for sales but also for sourcing including manufacturing



(Source) METI (Result of questionnaires from the participants of the Vietnam Material Mission 2010)
Figure 5 Possibility to set-up business in Vietnam of material companies that are highly interested in Vietnam (N=23)

To respond to those challenges of small and medium-sized enterprise including the material processing industry, enhancing ties with overseas countries is necessary, and it can be said that utilizing the Vietnam market as one of the overseas growing markets is an effective measure. Actually, given Vietnam is making efforts to enhance their supporting industries not only for Japanese needs but also for themselves, we can say that there will be an advantage for Japanese material industry who are at a turning point to move into Vietnam as well as for Vietnam.

Next, we will investigate in which specific area the needs of both Japan and Vietnam will meet.

I.2.3 Technical Resources in the supporting industries

I.2.3.1 Outline of the study and preparation of technology roadmap

In order to advance supporting industries in Vietnam, here we prepared a technology roadmap by studying ‘Roadmap of requirements for the supporting industries in Vietnam’ which was drafted by the Vietnam-Japan Joint Initiative, with a goal to identify the technology area required by local Japanese companies in the future.

More specifically, we have identified the technology area where we have specified the needs of items which local Japanese companies will require in the future.

- Items which is currently not supplied by local Japanese companies, but is expected to have demand from Japanese manufacturing companies after the entry of Japanese supporting industry companies in the coming 3 to 5 years
- Items which is not currently (able to be) supplied by local companies, but is expected to be supplied by the local companies in the coming 3 to 5 years

Consequently, technology roadmap is prepared for 12 fields including sheet metal/ welding, resin molding products, rubber/tire, die-cast/casting, glass, electronic parts, component, pressing, painting, resin, heat treatment, plating (surface treatment).

Table 2 Required items of supporting industries

Supporting industries			Supported Area (in demand)							
Items	Products/ Service	No.	Textile /sewn products	Motorcycle	Home Electronics (white goods)	Home Electronic	Metal processing /mold/forming /assembly	Office equipment	Automotives (bus/truck)	Automotives (car)
Parts	Sewing and related machines	1	△							
	Sheet metal/welding	2				△			△	△
	Resin molding	3							△	△
	Rubber	4				△			△	△
	Die-cast/casting	5							△	△
	Glass	6						△	△	△
	Electronic parts	7				△				△
	Electronic component	8					△	△		
Facility	Pressing	9		△		△				
Material	Painting	10				△	△	△	△	△
	Resin	11				△				
Treatment	Heat treatment	12						△	△	△
	Plating (surface treatment)	13							△	△

(Legend)

- △ :Expect supplies from Japanese related company in 3 to 5 years (no supply by Japanese companies, yet)
- :Expect supply (by pure local supplier)
- △ :Hope to have a Japanese related supplier within 3 to 5 years

(Source) Based on the 「Roadmap of requirement for supporting industries in Vietnam」

As per each technology fields, we conducted a survey on the needs and the current technology level in Vietnam by classifying each technology which Japanese companies possess. In the actual situation, with regard to business activity, it is difficult to completely express the business activity only by classification, and we need to consider other conditions such as materials, dimension and weight of products, customers' attribute and applications,

manufacturing facility, and related technology to cover the whole picture. However, as we aim to generalize and show the actual situation of industry in Vietnam objectively, we hereby investigate the current technology level and the needs from each industry in Vietnam by classification.

The classification of the technology was conducted through interviews with related industrial associations and corporations. The survey on the current technology level and the needs in Vietnam was conducted through the discussion between local Japanese companies, local industry associations, and local companies in Vietnam.

In the following tables, we have evaluated the technology level of the Vietnam market with a 5 grade scale as follows:

- Level A: Technology that nearly does not exist in Vietnam
- Level B: Technology that is only provided by foreign affiliated firms in Vietnam
- Level C; Technology that has started to be provided by local companies
- Level D; Technology that has become generally available by local companies
- Level E; Technology that is provided with excessive competition by local companies

Also in the following tables, the intensity of needs from the companies in Vietnam is described with a 4 level scale as follows:

- Yes: Strong interest to use such technology
- Some: Needs exist to some extent
- No (have possibility in future): weak needs, but may heat up in the future
- No: Needs do not exist for local production

As we see in the next tables, there are many technology fields that have local demand (“Some” or higher) and have few local suppliers (Level C or higher), and which is not facing cutthroat competition from international markets (area painted yellow), such as Resin, Resin molding, Heat treatment and Surface treatment have gathered high interest.

I.2.3.2 Steel metal/ welding

【Current situation in Vietnam】

- As the introducing cost of welding facilities is still high in Vietnam, welding method at local companies is mainly covered arc welding by manual. Meanwhile, some companies have been gradually advancing automation and local companies which can respond to automation are increasing especially in the South area.
- YAG laser processing and stud welding is not so common in Vietnam. Submerge arc welding is mainly processed for shipbuilding. Spot welding is mainly processed for steel furniture.

【Possibility of business development】

- YAG laser processing, stud welding, and TIG welding is dependent on foreign companies and there is high needs.
- Plasma welding is almost not available at local companies. As the needs are hardly seen as well, the possibility of business development is low.
- CO₂ welding, submerge arc welding, spot welding, and covered arc welding is common among local companies. The possibility of development of foreign companies will be found only in cases where they have unique technology about materials or steel thickness, etc.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Sheet metal- arc processing	Plasma welding	A	No (have possibility in future)
	YAG laser processing	B	Some
	Stud welding	BC	Some
	TIG welding (Argon welding)	C	Some
	CO ₂ welding	D	No
	Spot welding	D	No
	Submerge arc welding	D	No
	Covered arc welding	E	No

I.2.3.3 Resin molding

【Current situation in Vietnam】

- Resin molding is becoming generally available in Vietnam, especially injection molding, however, even it is injection molding or foam molding, the products which need special form and high accuracy may have some possibility of developing business by Japanese companies.
- On the other hand, manufacturing molds for resin forming still have large demand.
- Insert molding is available by local companies. However, there are still extra needs. Double molding and thin wall molding is rare in Vietnam and local companies cannot completely respond.
- Material resin for processing is dependent on import from overseas.

【Possibility of business development】

- Double molding, FRP molding, pressure molding, rotation/slash/dip molding, thin wall molding, foam molding, outsert molding, insert molding, vacuum molding is dependent on foreign companies and there is high needs.
- Porous plastic material molding, biodegradable molding is almost not available at local companies and the needs are hardly seen as well. The possibility of business development seems to be low.
- Blow molding, extrusion molding, injection molding is available at local companies. The possibility of business development will be found only in case they have unique know-how such as special materials or low production cost.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Resin molding	Porous plastic material molding	A	No (have possibility in future)
	Biodegradable plastic	A	No (have possibility in future)
	Double molding	AB	Yes
	Thin-wall molding	B	Yes
	FRP molding (Hand lay-up/ Spray-up)	B	Some
	Pressure molding	B	Some
	Rotational/Slash/Dip molding	B	Some
	Foam molding	BC	Some
	Vacuum molding	C	Some
	Insert molding	C	Yes
	Outsert molding	C	Some
	Blow molding	CD	No
	Extrusion molding	CD	No
	Injection molding	DE	No

I.2.3.4 Rubber

【Current situation in Vietnam】

- Rubber products processed by local companies are mainly for consumer use such as shoes, tabi socks (Japanese socks), sports goods. Automotive tyre, tube, gasket, etc. is dependent on import from Japan.
- Most of rubber processing is generally available at local companies, however, assembly manufacturer is choosing different companies (local, Taiwanese, Japanese) depending on the required processing accuracy
- Material rubber is dependent on import from overseas.

【Possibility of business development】

- Rubber processing industry is mainly run by local companies as there are not so many foreign companies in Vietnam yet. Foreign companies will have possibility not only in specific small classification areas of technology, but also in whole range of rubber industry.

The chance of business development is widely expected by bringing in Japanese know-how.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Rubber	Transfer molding	B	Some
	Compression molding	C	Some
	Injection molding	C	Some
	Pressing	C	Some
	Punching	C	Some

I.2.3.5 Die-cast/ casting

【Current situation in Vietnam】

- Including local companies, there are only about 10 companies which specialize in die-cast.
- However, there are many assembly manufacturers processing casting by owning casting machines as a part of in-house process. Die-cast specialized companies will have orders mostly when the production of the assembly manufacturers becomes tight.

【Possibility of business development】

- As there are not so many die-cast companies in Vietnam, possibility of business development is widely seen with high needs especially for die-cast and sand mold casting.
- Although assembly manufacturers own their casting machines, during busy period, they will not accept orders for casting consigned by other manufactures. The needs for Japanese die-cast specialized companies will be found at a certain level, especially during the busy/peak period.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Die-cast • casting	Evaporative pattern casting (full mold)	B	No (have possibility in future)
	Die-cast	C	Some
	Sand mold casting (green sand mold)	C	Some
	Lost-wax	C	No

I.2.3.6 Glass

【Current situation in Vietnam】

- Art glass and glass for construction use is becoming common in Vietnam. Also, some local manufacturers are working on development of strengthened glass for construction use and some have put it partially into practical use.
- On the other hand, local manufacturers have no chance to develop glass for industrial use as there is almost no inquiry from the customers such as automotive or home electronics manufacturers.

【Possibility of business development】

- Spherical lens and strengthened glass are dependent on foreign companies and have high needs.
- Glass mirror polishing, optical thin film product, aspherical lens is not available among local companies, but the possibility of business development is not high as there is almost no needs for it.
- Art glass is available among local companies. Possibility of business development of foreign companies can be seen only in case they are unique in materials or artistic quality.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Glass	Glass mirror polishing	A	No
	Optical thin film product	A	No
	Aspherical lens	A	No
	Spherical lens	B	Some
	Hardened glass production	BC	Some
	Art glass production	D	No

I.2.3.7 Electronic parts

【Current situation in Vietnam】

- Except wire harness, other electric parts are almost not available among local companies. Major local assembly manufacturers are purchasing parts from Japanese companies or import parts from overseas.

【Possibility of business development】

- Generally speaking, those parts are supplied by foreign companies such as Japanese companies by mass production for global market.
- As for Vietnam, the number of electronic parts manufacturers is small except for some harness manufacturers. On the other hand, foreign companies, including Japanese companies, in Vietnam have high needs for local procurement, especially for electric components for transport equipment (transistor, transformer etc.) and parts for home

electronics (speaker, transformer etc.). However, as the production site is located basing on global market policy, considering the fact that the domestic demand in Vietnam is limited, it will be difficult to develop the business in Vietnam.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Electronic components	Cable manufacturing	B	Yes
	Connector manufacturing	B	Yes
	Code manufacturing	B	Yes
	Switch manufacturing	B	Yes
	Power supply unit manufacturing	B	Yes
	Transformer manufacturing	B	Yes
	Coil manufacturing	B	Yes
	Harness processing	D	No

I.2.8 Electronic components

【Current situation in Vietnam】

- Except assembly and connecting of electronic appliances, and one-side processing of PCB, other electronic components are not available among local companies. Major local assembly manufacturers are purchasing from Japanese companies, or import from overseas.

【Possibility of business development】

- Generally speaking, the components are supplied by foreign companies such as Japanese companies by mass production for global market.
- Therefore there should be needs for flexible board (multilayer board and high current board) and rigid board for transport equipment and home electronics, however, as the location of production site is decided based on global marketing policy, and considering the fact that domestic demand in Vietnam is limited, it will be difficult to develop this business in Vietnam.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Electronic components	Flexible circuit board	A	Yes
	Multilayer board	A	Yes
	High current board	A	Yes
	Rigid board	B	Yes
	prototype/small lot (printed board) manufacturing	B	Yes
	Double-side processing	B	Yes
	Assembling and connecting of electronic equipment	C	Some
	One-side processing	C	Some

I.2.9 Pressing

【Current situation in Vietnam】

- Pressing which is processed by local companies is mainly single action die and punching die. They are able to respond to the required level, However, products in complicated shape or products which require higher accuracy are imported from Japan.
- Many pressing companies also have plating facility as in-house process.
- Meanwhile, local companies cannot respond to pressing with higher level technology such as progressive die and transfer die, since manufacturing of those press dies is less common in Vietnam.

【Possibility of business development】

- The number of both of foreign and local companies which will process pressing is limited, as the mass production is still limited so far. However, there would be a certain amount of needs.
- As for press die, Japanese SME can expect great needs. Press processing itself also has high possibility of business development in case there is unique know-how for complicated shape or higher accuracy.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Pressing	Shaving	A	No (have possibility in future)
	Fine blanking	B	Some
	Forming	B	Some
	Multi forming	B	Some
	Progressive die	B	Some
	Roll forming	B	Some
	Transfer die	B	Some
	Bending	C	Some
	Punching	C	Some
	Single action die	C	Some
	Spinning	C	Some

I.2.10 Painting

【Current situation in Vietnam】

- Painting which is processed by local companies is mainly powder coating, wood coating, and aqueous coating. Industrial coating such as electrodeposition coating, electrostatic coating, urethane coating is not commonly available.
- Paint for industrial use is mainly supplied by Japanese major paint companies.

【The possibility of business development】

- Electrodeposition coating, electrostatic coating, urethane coating, epoxy coating, powder coating, and aqueous coating is dependent on foreign companies with high needs.

- UV coating is not available among local companies, but also has slight needs. The possibility of business development of UV coating is not high.
- Wood coating is available among local companies. Foreign companies will have business possibility only in case they have special colour variation etc.
- Generally speaking, basic colour is available by purchasing from Japanese companies in Vietnam, but complicated colour is not available. As for paint for industrial use, its business area and demand still needs to be expanded.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Painting	UV coating	A	No (have possibility in future)
	Electrostatic coating	AB	Some
	Electrodeposition coating	AB	Some
	Epoxy coating	B	Some
	Urethane coating	B	Some
	Aqueous coating	C	Some
	Powder coating	C	Some
	Wood coating	D	No

I.2.11 Resin

【Current situation in Vietnam】

- There is almost no resin manufacturing plant in Vietnam and resin is mostly imported from Japan or Thailand. The import dependency rate is about 85%.
- In recent years, Petro Vietnam and Idemitsu are planning to establish a resin manufacturing plant. It is expected that the situation will be improved after this investment is successfully completed.

【Possibility of business development】

- There are great needs for local purchase, but large amount of investment is required to establish a manufacturing plant, Just because of that, SME will face a difficulty to advance the business.
- Resin which is locally manufactured is PP, PVC, and PPS. All of them are manufactured mainly by foreign companies. Meanwhile, needs from local industry for other resin is high and domestic and foreign chemical companies are preparing a plant manufacturing plan and it will help to advance domestic procurement rate.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Resin	ABS resin	A	Yes
	EP (epoxy)	A	Yes
	Fluororesin	A	Yes
	PMMA (Acryl)	A	Yes
	Themosetting resin	A	Yes
	Urethane resin	A	Yes
	Enginerring plastic	A	Some
	PBT (polybutylene terephthalate)	A	Some
	PES (polyether sulfone)	A	Some
	PI (polyimide)	A	Some
	Elastomer	A	No (have possibility in future)
	FRP (fiber-reinforced plastic)	A	No (have possibility in future)
	PPS (polyphenylenesulfide)	B	Some
	PP (Polypropylene)	BC	Some
	PVC (Polyvinyl chloride)	C	Some

1.2.12 Heat treatment

【Current situation in Vietnam】

- Includes local companies, the number of manufacturers which specialize in heat treatment is small. However, some of assembly manufacturers and casting companies own heat treatment machines for in-house process, at the same time, they undertake the treatment for outer companies when they have extra machine capacity.

【Possibility of business development】

- Even though some companies own heat treatment machines, in some cases they don't undertake the treatment depending on the demand situation. Besides, they are not able to respond to heat treatment in high level such as nitride treatment.
- Heat treatment generally has a high possibility of business development, and heat treatment specialized companies can expect growth there.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Heat treatment	Austempering	A	No (have possibility in future)
	CVD(chemical vapor deposition)	A	Some
	Solution treatment	A	Some
	Vacuum annealing	A	Some
	Carburized quenching	B	Some
	Full annealing	B	Some
	Gas nitrocarburizing	B	Some
	Nitride treatment	B	Some
	Strain relieving annealing	B	Some
	Stress relieving annealing (SR treatment)	B	Some
	Subzero treatment	B	Some
	Vacuum normalization	B	Some
	Vacuum quenching	B	Some
	Annealing	C	Some
	Induction hardening	C	Some
	Normalization	C	Some
	Quenching	C	Some

I.2.13 Plating (surface treatment)

【Current situation in Vietnam】

- Some assembly manufacturers and press processing companies own plating bath and they can process the treatment as a part of in-house process. Basic plating method such as copper plating, chromium plating, zinc plating is available among local companies.

【Possibility of business development】

- Since in-house plating by assembly manufacturers and pressing companies and plating processed by local companies is limited to basic plating method, the needs for plating which requires higher technology of Japanese companies, such as electroless nickel plating, can be widely seen. There are also high needs for plating companies who can process plating which meets environmental standard.
- Except zinc plating, local companies are not sufficient to respond to all requirements for plating. On the other hand, the needs are generally seen except special treatment such as gold plating, electroless copper plating, alodine treatment, parkerizing, electroform, and chemical forming treatment.

Category	Technical item	Level in Vietnam	Needs in Vietnam
Surface treatment (plating)	Alodine (Aluminum chromate) treatment	A	No (have possibility in future)
	Chemical forming treatment	A	No (have possibility in future)
	Electroform (rack method)	A	No (have possibility in future)
	Electroless copper	A	No (have possibility in future)
	Gold plating, Silver plating	A	No (have possibility in future)
	parkerizing (phosphate film)	A	No (have possibility in future)
	Acid pickling	B	Some
	Alumite (anodization)	B	Some
	Black chromium	B	Some
	Chromate (general)	B	Some
	Electroless copper	B	Some
	Electroless nickel	B	Some
	Hard alumite	B	Some
	Hard chrom (rack method)	B	Some
	Hot-dip aluminum plating	B	Some
	Hot-dip zinc plating	B	Some
	Nickel	B	Some
	Nickel chrome	B	Some
	Trichromate	B	Some
	Zinc stannate alloy plating (rack method)	B	Some
	Baking treatment (hydrogen embrittlement)	C	Some
	Chromium	C	Some
	Copper	C	Some
	Zinc	D	No

I.3 Risk of business development for Japanese medium-sized companies and direction to respond to local needs

I.3.1 Development phase and bottleneck of Vietnamese supporting industries

As we saw above, there are fields that Japanese resources meet the needs of Vietnam, mainly in supporting industries in Vietnam. Developing Vietnamese supporting industries is indispensable for the development of Vietnam's economic and it's necessary to build several kinds of supporting industries in terms of area/field and level by their domestic companies and foreign companies including Japan who are moving into Vietnam.

By promoting establishment of various kinds of supporting industries, competition and collaboration will occur and diversity will increase which will lead to further growth in the supporting industries.

However, even if there are such supporting industries, there are various kinds of bottlenecks existing when small and medium-sized enterprise who have only limited experiences in overseas operations move into Vietnam and try to develop their business there.

In most cases, supporting industries are managed by small and medium-sized enterprise with limited experiences in overseas business and mostly they set up new business abroad after their business customer established their business abroad, to deal with their needs. After all, the first bottleneck is shortage of absolute numbers of companies who have established their business in Vietnam to be their customers.

Japanese companies have moved into Vietnam to take advantage of the cheap labor cost in the labor-intensive industry. Then accumulation of assembly manufacturer such as motorbike and electronics have been promoted and it resulted in accelerating Japanese companies, mainly component manufacturers of those set manufactures, to move in to Vietnam. And with "China Risk¹" becoming more evident, Vietnam has started to draw attention as a new production site/outpost other than China.

As mentioned before, it seems that supporting industries such as pure-play companies of such as metal-molding, heat treating and facility manufactures that have customers like the component manufacturers mentioned before will accelerate to set up their business there.

Taking these situations into consideration, Vietnam can be said to be at the stage that their supporting industries have started to accumulate their customers. Therefore, it can be said that Vietnam stands at the dawn to our national domestic supporting industries.

¹ Business risk that is associated with China's unique business environment, which is a combination of fast rising labor costs, appreciation of the Chinese Yuan currency, product safety issues and anti-Japanese sentiment that may lead to labor disputes

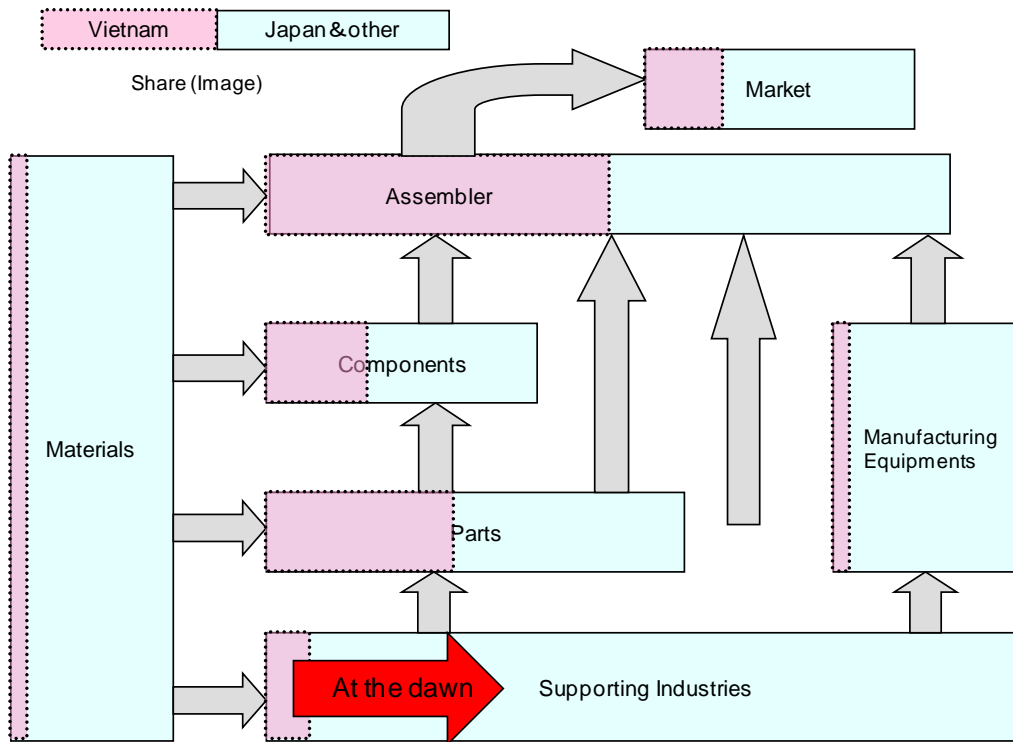


Figure 6 Image of Vietnamese industrial structure

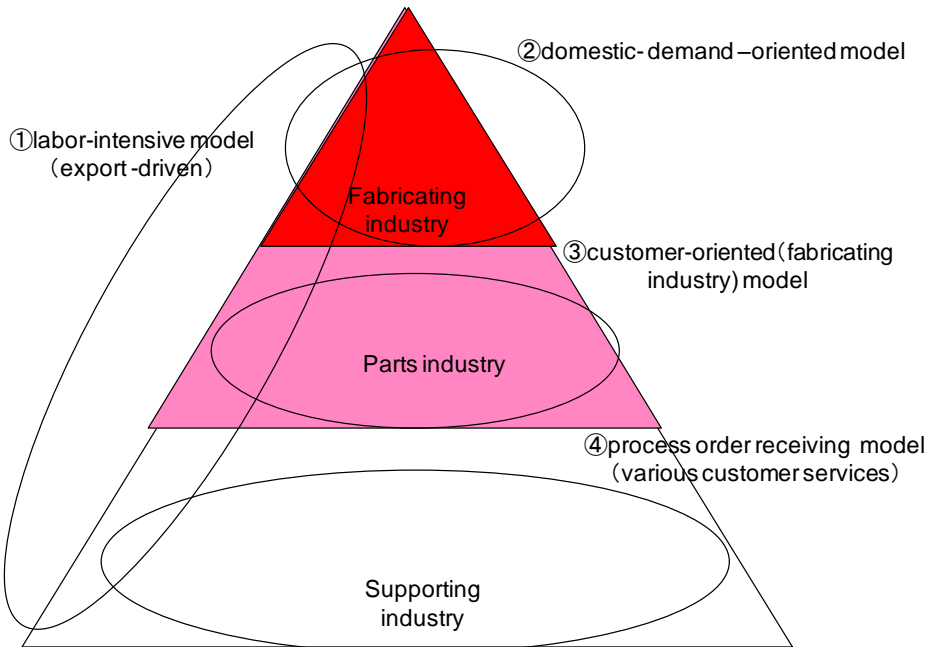
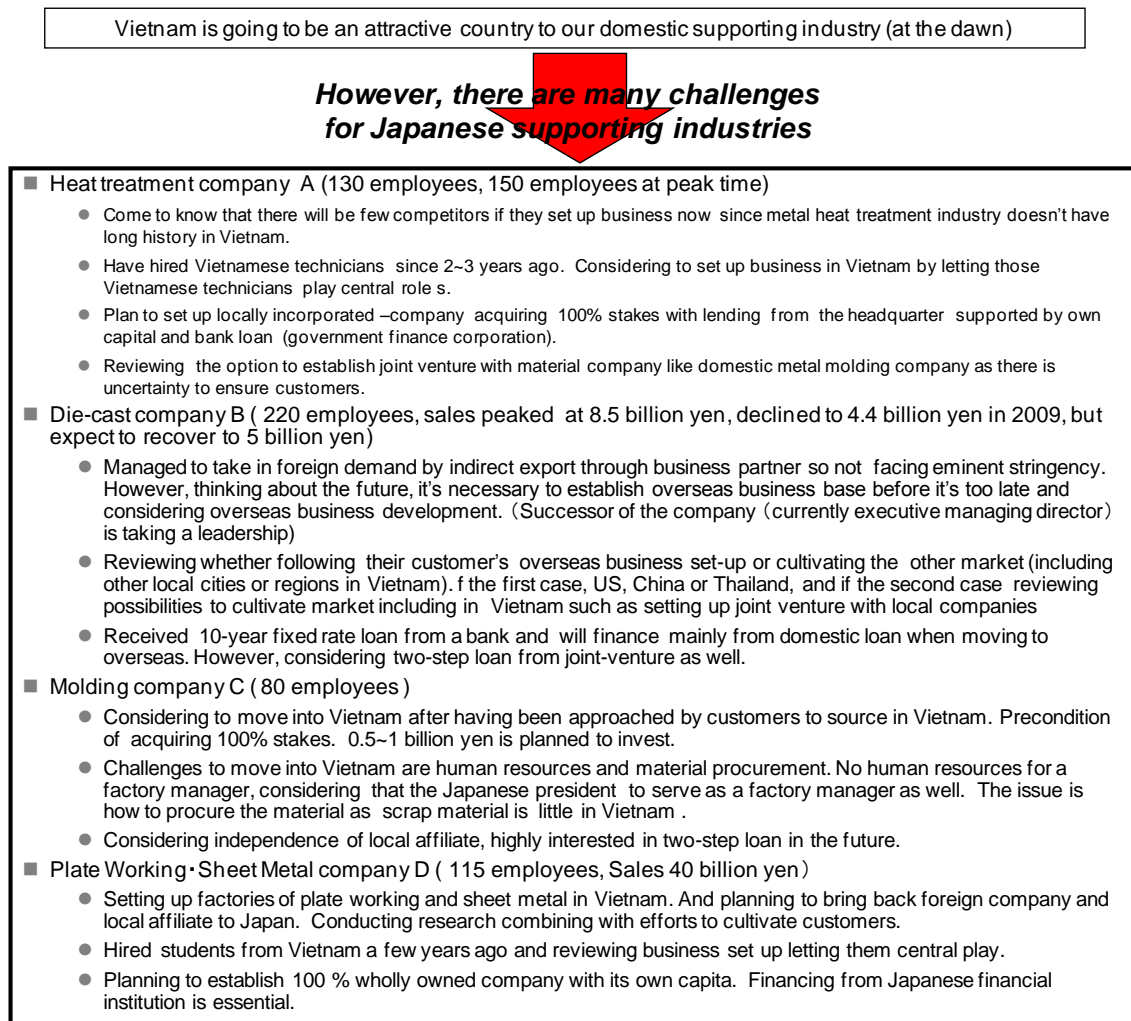


Figure 7 Basic pattern image of Foreign Direct Investment (FDI)

I.3.2 Challenges to Japanese supporting industries

However, there are a many challenges for the Japanese supporting industries when they actually come to develop their business in Vietnam. The followings are the specific concerns and actual situation of the Japanese supporting industry.



**Figure 8 Examples of Issues for Japanese supporting industries
(current situation and concerns by individual companies)**

Although the problems of Japanese supporting industries may slightly differ from company to company due to each company's situation. However, all the problems can be linked to three managerial resources - "Human resources", "Capital", and "Information". One of the largest issue is the human resources, especially in shortage of plant/factory managers.

- <Issues for overseas advance of mid-sized company>
- The issues for overseas advance is human, fund and information but among them the most important issue is “human”.
 - The issue is recruitment and training at local, however; this is no issues about a bottleneck before expanding out business.
 - The most important issue is that there is no personnel to send to the local, especially, a factory manager.
 - The factory manager who is specialized in technology should be a personnel who has experience in the head office. (Works have been increasing and no personnel is available. Also, there is no personnel who can handle foreign matters).
 - A president from the head office is preferable, but it is possible to choose a personnel if he/she has ability and is trustable such as OB of trading firms.
 - It is not necessary for us to have many workers so there are not much problems.
 - As for issues of “fund”, there are presently a few companies that are thinking to do overseas development among the companies with healthy business results in Japan.
 - Commercial banks in Japan are offering low interest rate so there are not much problems for companies that are willing to do foreign development.
 - It seems that there are companies with technology but without funds because business environment has been worse after Lehman’s fall.
 - Also, it is difficult for Japanese company to do fund-raising from local financial institutions.
 - Real “information” is scarce (so it is unable to decide)
 - It is the most important information for companies is clients and markets.
 - The information, such as business activity status, market scale/movement are more necessary than technology information.
 - Moreover, we are interested in local company’s information (e.g. where to get partners or customer information).

Figure 9 Issues for Japanese supporting industries when they move to overseas to develop their business

I.3.3 Technology Risk/Challenge for Vietnamese supporting industries and direction of JICA’s assistance

We have confirmed that Japanese supporting industries are facing challenges when they move into Vietnam, while Vietnamese supporting industries are facing many challenges as well.

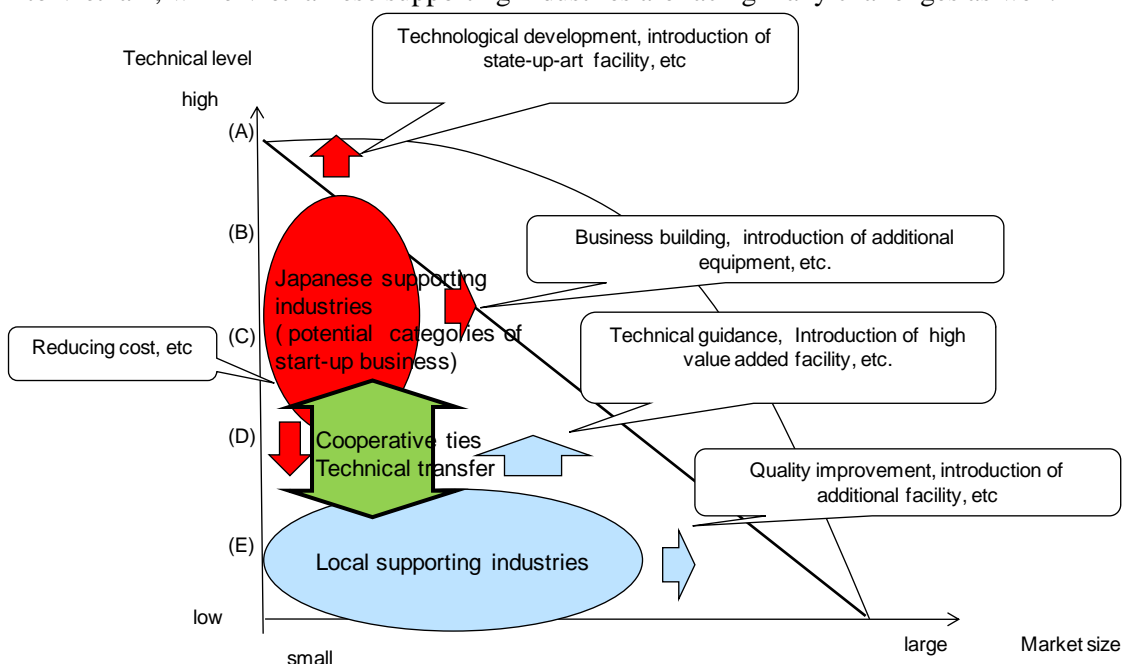


Figure 10 Structural image of Vietnamese supporting industries

The Vietnamese infrastructure and legislative system are inadequate comparing with other countries. Their foreign exchange risk is high and it is positioned as a high-risk country from many aspects of business risk, including tax and labor affairs in business, as surveyed by JETRO. Especially the business risk from the point of accumulation of related industries, they receive the worst evaluation among those surveyed. Therefore, it is necessary to pave the way to solve these risks for SMEs to move in to Vietnam without anxiety, to have them transfer technology to Vietnam, to increase the numbers of such companies, and to enhance industrial accumulation or development of industrial clusters.

The capacity of Japanese companies alone cannot respond to provide all processes required by their customers and at their requested cost. So it is necessary to manage business ties with local companies to respond to the processes needs, efficiently. In order to accumulate and expand supporting industries steadily, local companies of several kinds of supporting industries and accumulation of the customers from various kinds of business categories and capital are required. Also, from the view of supply chains, in order to avoid not only the risk of foreign exchange but also the risk of transportation (time) as to overseas procurement, business ties between local companies and Japanese companies are required. In order to implement that, while Japanese companies try to make their efforts to improve their technical capabilities and to expand the scale of facility investment, it is necessary to enhance their competitiveness against local companies in terms of cost reduction and development of state of the art technology. Thus these collaboration ties and competing relations should bear good industrial accumulation results.

In that sense, the largest challenge for Vietnamese supporting industries is to respond to a complete liberalization of Tariff by AFTA that is planned in 2015. Because of the currently existing tariff, there is an advantage of domestic procurement within Vietnam rather than importing parts and materials from Thailand, Malaysia and Indonesia that are relatively advanced in industrialization, but there will be few advantages in the future, once AFTA is introduced.

Therefore, even for transportation equipment and electronics for domestic consumptions, importing from the rapidly industrializing neighbor ASEAN countries could be sufficient enough, and reduce the need for such domestic production. The possibility of establishing new business by assembly manufacturer may decline. If assembly manufacturers don't accumulate their business any more, the business range of the existing supporting industries could become narrower.

It is required to promote supporting industries more strategically, in order to utilize the remaining time until complete tariff liberalization (AFTA), more efficiently, and by taking the competition of industrial accumulation between ASEAN countries into consideration, in order to realize economic growth through enhancement of industrial competitiveness. From the view point of this international competition in industrial accumulations, and to support the domestic companies to move in to Vietnam, it should be considered that the main direction of

JICA to support and, enhance development of the human resources in local mid-sized and small-sized companies in the supporting industries.

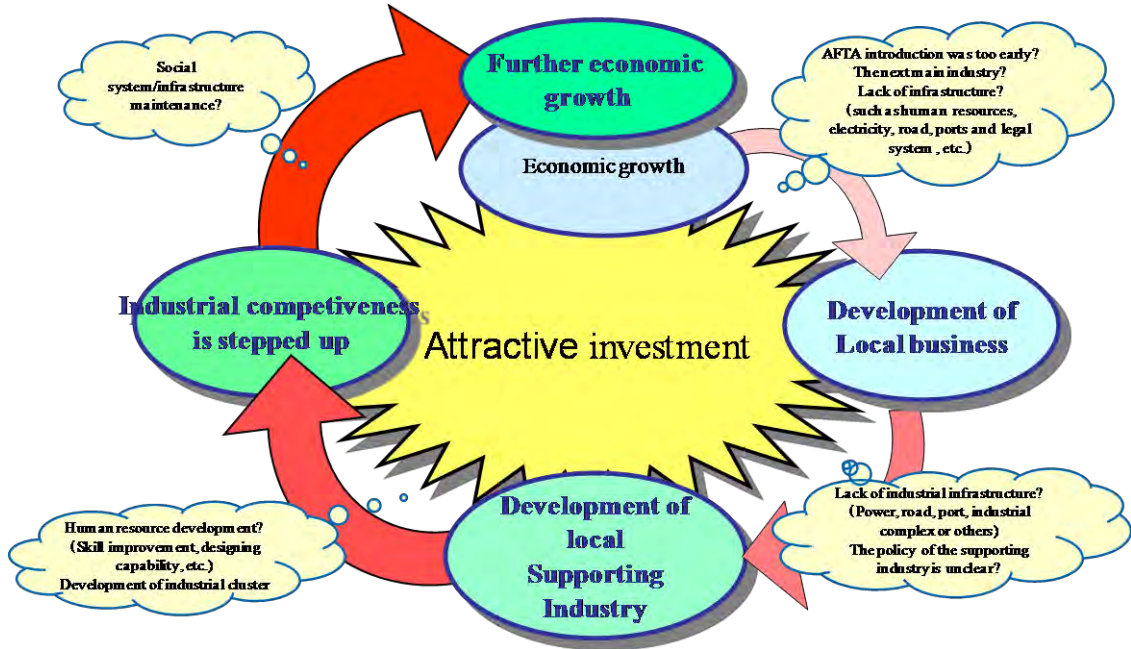


Figure 11 Image of positive growth cycle for development of supporting industries, enhancement of industrial competitiveness and economic growth

(Supplement) Current Situation of the Water, Environment and Energy Sectors, and their Resources

Vietnam, with its economic development and industrialization and urbanization, along with efforts to correct the income disparity and regional disparities, demand for public services including water, environment, and energy has been increasing, for which Japanese middle core SMEs' expansion into the Vietnamese market may provide contribution to their resolution. water, environment and energy sectors, however, may have increased their quantitative service capacity, but still holds issues in their qualitative service level. The Vietnamese government has attempted to improve their service quality by setting various environmental standards, which caused some of the environmental standards such as the waste water release to be even stricter than Japanese standards. However, their practice and implementation, due to problems in monitoring and lack of resources in businesses to comply with such regulations, have not seen immediate improvement. In these areas, the active use of the technologies held by Japanese middle core SMEs can be expected.

On the other hand, although Japanese middle core SMEs may have high probability of contributing to the development issues in water, environment, and energy sectors of Vietnam, the business characteristics of these sectors, long term stable supply is required, and financial strength to withstand long periods for investment recovery as well as strong political power will also be required. At the same time, as characteristics of Vietnam, it should be pointed out that they are required to provide products and services at a low price that can compete with China and Korea that can provide technologies that are no longer used in Japan. It can be pointed out that it would be difficult to participate in the market just by the strength of simply providing a high technology that is used in Japan. Therefore, by SMEs themselves, while there is high potential, it is a difficult market to join.

In this chapter, the technical level and needs of water, environment and energy sector in Vietnam shall be clarified, while drawing from the few successes of Japanese SMEs in Vietnam and other high-growth markets, the hurdles, and conditions for success shall be considered, and ideas for the public assistance methodology as JICA to Japanese SMEs expanding their businesses in Vietnam shall be recommended.

S.1 Current Situation and the Needs of Water, Environment and Energy Sectors

S.1.1 Public Water Supply and Sewage

Vietnam has abundant water resources, with annual ground water flow of 255 billion cubic meters, and estimated usable water resource of 60 billion cubic meters annually. Due to

geographical conditions and limits from infrastructure, however, less than 5% of that amount is utilized. Of the total water demand, 84% is for irrigation use². The amount used for drinking water is relatively small, but since the Government of Vietnam plans to increase the water supply coverage significantly in the future, a quick investment will be needed.

Table 1 shows the rough estimate of the water demand based on the National Strategy on Rural Water Supply and Sewage 2020, and Water Supply Strategy for Urban Areas. In 2020, a water supply of 8.28 billion liters in the urban areas, and 6.12 billion liters in the rural area will be needed.

Table 3 Estimate of Water Supply Demand in Vietnam

		2000	2010	2020
Population (million)	Urban	19	30.4	46
	Rural	67.4	61.7	56
	Total	86.4	92.1	102
Water Supply target	Class I City	150 l/day covering 80%	165 l/day covering 100%	180 l/day covering 100%
	Rural	60 l/day covering 25%	69 l/day covering 85%	60 l/day covering 80%
Water Demand (million l)	Urban	2,280	5,016	8,280
	Rural	1,296	4,697	6,120
	Total	3,576	9,713	14,400

* Class I cities have population above 500 thousand and area above 50 sq km.

(Source) Yokohama City Water Works, National Strategy on Rural water supply and Sewage 2020

Corresponding capacity of sewage treatment will be required. According to the National Strategy on Rural Water Supply and Sewage 2020, only 50% of the households are using latrines. Most of them are very simple and cannot be considered sanitary. Of all the latrines used, only 20% can be considered sanitary as of 2000. According to the National Strategy, 70% of the rural households should be using sanitary latrines by 2010, and by 2020, all rural households should be using sanitary latrines.

The public spending to achieve this target, however, cannot be considered sufficient. According to the estimate by the Government of Vietnam, in order to improve the water supply and sewage in the rural areas, an annual investment of 15 USD per person over 10 years will be required. The actual investment in 2000 amounted to only 0.13 USD. Therefore, the demand for investment is huge, and there is large expectation for the private sector to step in.

Therefore, there seems to be sufficient demand. On the other hand, this is a sector that has already seen many attempts, and going in the market from scratch would be a challenge. For example, water supply in the urban areas is already targeted by major water supply companies

² Estimated by Water Environment Partnership in Asia

from around the world, resulting in fierce competition. In smaller cities, on the other hand, the service is often undertaken by the public sector, and regulation is tight. Also, the water source itself is quite abundant, and the service does not require significant technical sophistication. In terms of technology, the old fashioned well boring or river pipelines, coupled with a simply purification would suffice. This is of course well within the technical capabilities of Japanese SMEs, but they will have to overcome significant competition, and profitability would be a huge issue.

For small cities of 10,000 people or less, sewage system is often lacking. Therefore, it would be important to create institutions for operation and maintenance of sewage service. However, serious deployment efforts are yet to be taken, and the business feasibility is unclear. Also, the local government already receives grants for sewage treatment. Any private initiative would require negotiations with the public sector. SNV, the Dutch aid organization, will be starting a pilot project in this area, but they have faced trouble in selecting the candidate cities to launch the projects. However, since it is an untapped market, there are opportunities. It is naturally possible for a Japanese middle core SMEs to try out their luck.

For rural communities with population less than 5,000, there have been long efforts by UNICEF and SNV. There are, however, issues to be resolved if it is to be considered as a viable business. The operator needs to start from changing the general attitude of the people (such as convincing the people to use latrines in the first place), and the hurdle would be higher still if the operator expects to collect a fee for the service. According to the SNV project manager, this would be a tough process that would take time and effort.

S.1.2 Power

Power demand in Vietnam is rapidly growing at 17% annually. According to the 6th Power Development Master plan, the total generation in 2010 will be 113 TWh, which would grow into 294 TWh in 2020. Investment cannot keep pace with such rapid demand growth, and as a result, Vietnam suffers from chronic power shortage. In generation, transmission and distribution, a significant amount of investment is needed. To cope with such demand, the Government of Vietnam intends to rely heavily on private sector participation.

Most of these demands will be borne by the public utility (EVN) and Independent Power Producers (IPPs), using large scale investment in power plants and grid extension. As for areas that Japanese middle core SMEs can participate, large scale grid-related projects are hard to participate by themselves, but there will be opportunities by joining a team or consortium that would bid for such projects, contributing to the team as a supplier.

Other areas that may hold opportunities for Japanese middle core SMEs would be rural electrification and renewable energy sectors.

However, according to the Vietnam Institute of Energy (under Vietnamese Ministry of Commerce and Industry), who prepared the 6th and 7th Power Development Masterplan, of the 9800 rural communities, 96.6% were already electrified as of 2009. The remaining communities

will also be electrified in several years using mini-hydro and grid extension. Also, there are Chinese micro hydro turbines that sell for about 20 USD, which are used by many households to generate their own power. The few remaining areas maybe electrifying some of the remote islands, where currently diesel generators are used. Diesel tends to be costly, so cost –effective alternatives are welcome. If there are SMEs that can provide technology to electrify remote islands in a cost effective manner, there may be business opportunities.

As for renewable energy, wind power is said to be promising. However, the feed in tariff that was announced in late 2010 (pending approval) was significantly lower than the international level of profitability (the current cost would require 12 cents/kWh to be profitable, while the announced feed-in tariff was 8-9 cent/kWh). This would be insufficient to secure business feasibility. However, if there were SMEs that has the technology to secure profitability at this revenue level, this would provide an opportunity. Already there are several projects in place in central Vietnam. The German aid organization GIZ is currently planning to provide a one stop service for wind power project, which would allow potential players to assess the feasibility of such projects.

Other renewables tend to be niche. There have been proposals for biogas projects, but according to the results of SNV's biogas projects, while it may be significant in some village communities to solve cattle waste and sewage, provide energy and create employment, it is questionable if it would be sustainable as a business venture. Same can be said about solar power. If an SME possess a specialized technology, there might be a niche where it can be applied, although finding that niche may not be easy.

As the regulatory framework behind these sectors, the feed-in tariff was announced in a pending decision, while financial aspects of the Clean Development Mechanism was set in Decision 130/2007/QD-TTg issued on 2007, and in 2008, Ministry of Finance and Ministry of Natural Environment has issued a Joint Circular 58/2008/TTLT-BTC-BTN&MT to set the details of this Decision 130/2007/QD-TTg.

S.1.3 Solid Waste Treatment

Vietnam is facing a rapid increase in the amount of solid waste. Urban solid waste is increasing at an annual rate of 13%. However, so far the solid waste disposal hasn't become a major issue. Disposal sites are becoming harder to procure, but it is still manageable.



*e, f estimates of RNCOS

(Source) Ministry of Mineral and Natural Resources, Natural Resource and Environmental Policy Strategy Institute, Research & Consultancy Outsourcing Services (RNCOS)

Figure 12 Increase in the Urban waste (%)

There are, on the other hand, some concerns about the global warming effects from the methane released from waste fills. Therefore, Japanese middle core SMEs might be able to contribute with such recycling technology and waste reduction technologies.

In the urban areas, paper recycling and PET bottle recycling is already practiced on a wide scale. Breaking into the market may pose some challenge. Apart from that, most of the waste is food waste, with significant amount of plastic mixed in. Incineration and composting would be difficult, according to JICA experts.

S.1.4 Demand in Industrial Sectors

Although beyond the scope of public service, as a possible area of contribution from Japanese middle core SMEs, special needs from various industries could provide opportunity. This would include super pure water supply, factory waste water treatment, and waste disposal.

In terms of water supply, there are demands to further purify the tap water in various factories and office buildings. It may be possible to tap into such demand. Most of the major high-spec water purification firms have already come to Vietnam, such as Nakagawa Chemicals, GK Finechem, and Metawater. However, a simple reverse osmosis wouldn't hold any competitive edge. Further value added needs to be there, such as innovative sales channel and other applications that are suited to the local conditions. Strength in niche heap chemical processing or membrane processing may be able to secure some position in the market.

In terms of industrial waste water, the release criteria in Vietnam is even stricter than the Japanese standards, and few local firms have the ability to comply. In this sense, there are opportunities for Japanese firms. However, as mentioned, major Japanese players are already in Vietnam. Also, many of the treatment plants need to be integrated into the factory itself, which means that the firms often need to collaborate with the manufacturers during the design and construction phase. Significant skills in operation are also required. Therefore, the firm needs to maintain a long term relationship with the manufactures. A simple one time sales model may not

work.

Theoretically, there is some possibility to produce various environmental related facilities and instruments in Vietnam. However, these items are designated to be exempt from import duties. Therefore, unless there is significant scale merit, it would generally be easier to simply import. It would be difficult to find advantages of production in Vietnam.

Factory waste processing is an area where several Japanese firms have already started operation. The business relies on sorting by human labor in order to pick out the valuable items (such as copper and other metal). It can be undertaken with relatively small capital investment, and depending on the type of waste, there would be some business opportunities. Currently, however, all such businesses take circuit boards from electronic manufacturers and send them back to Korea and Japan for processing. With volume, however, it would be possible to handle the end processing in Vietnam. Since ties with the factory would be necessary, finding a way into the market could be a problem. The profitability of the business fluctuates widely with the market price of various metal resources, which may pose risk to the stability of the operation.

Some of the local waste treatment businesses are considering ways to utilize Japanese technology. Joint venture with such local firms could be an inroad for Japanese SMEs.

S.2 Resources of Water, Environment and Energy Sectors

S.2.1 Major Japanese firms in Vietnam That Operates in Water, Environment, and Energy Related Businesses

Table2 shows major Japanese firms in Vietnam that operates in water, environment, and energy related businesses. As shown, there are limited numbers of firms in the field. Also, many firms do not provide a full range of service in the sector. They supply relevant equipment and chemicals, or provide consultation. The size of the Vietnamese operation is relatively small, with most firms having less than 100 local staff.

Table 1 Major Japanese firms in Vietnam That Operates in Water, Environment, and Energy Related Businesses

Business	Location	Major Japanese Owners
Engineering Consultation Service firm	Hanoi	Nihon Koei 60%
Power Generator O&M	Haiphong	Nishishiba Electric 90%
Electric Wiring, Design, Piping	HCM	Fuji Furukawa E&C 55%
Air Conditioning and Painting Facilities	Hanoi	Taikisha 100%
Water treatment chemical sales	Haiphong	Tetsugen 50%
Engineering for Pumps & water treatment	Hanoi	Ebara Engineering 100%
Environmental Equipment design and sales	Bin Duon	Fuji Kasui Industries 100%
Water treatment chemical and equipment sales	Hanoi	Kan-Ei Industries 100%
Stainless pipe manufacturing	Hanoi	Endo Manufacturing 100%
Air Cleaner Manufacturing	Hanoi	ROKI 65%
Air Conditioning and electrical installation	HCM	Shinryo Cooling
Water treatment facilities Installation and O&M	Hanoi	Nakagawa Chemical Equipment 49%

(Source) Kaigai Shinshutsu Kigyo Soran 2010

S.2.2 Technology Map for Water, Environment, and Energy

Considering the various businesses that are already operating, and also considering the general technological area as well as the industrial situation in Japan, technology map for these sectors can be summarized as Table 3. These sectors have relatively mature technology, and considering the socio technological situation in Vietnam, older technology rather than cutting edge technology should be more suitable.

Table 2 Technology Map for Water, Environment and Energy

Service	Technical Area	Assessment	
Water Supply	intake	Technically possible. Cost is an issue.	
	purification	coagulation	Part of a plant. SMEs can participate in a consortium
		chemical treatment	
		controls	
		membrane treatment	Cost competitiveness is an issue.
	distribution	public water pipes	Large pipeways difficult to handle by SMEs alone
	industrial high purity water	Japanese SMEs have advantage in high level treatment	
Waste water treatment	pipeway	Large pipeways difficult to handle by SMEs alone	
	treatment	aeration	Part of a plant. SMEs can participate in a consortium
		coagulation	
		sludge treatment	
		ozone treatment	
septic tanks		Already operating in Vietnam(Sanicon)	
industrial waste		Japanese SMEs have advantage in high level treatment	
Power	generation	Large plants difficult by SMEs alone	
	transmission	SMEs may act as one of the suppliers. Cost is an issue.	

	distribution		SMEs may act as one of the suppliers. Cost is an issue.
	Off-grid power	solar	Possible. Cost is an issue,
		mini hydro	Manufacturers exist, although use export model
		mini wind power	Possible. Cost is an issue,
		waste generation	Possible. Cost is an issue,
		mini grid	Possible. Cost is an issue,
	demand management		Possible. Cost is an issue,
Waste Treatment	Urban Waste	Collection and land fill.	SMEs may act as one of the suppliers. Cost is an issue.
	Rural Waste	RDS	Possible. Issues with waste quality
		composting	Possible. Issues with waste quality
		Husk fuel	Possible. Cost is an issue,
		biofuel	Possible. Cost is an issue,

(Source) NRI

S.2.3 Possible Areas of Contribution for Japanese Middle Core SMEs in View of Technological Areas

Since SMEs are limited in their various resources, business opportunities that require large scale investments (plant, pipelines, and grid) or long term operations would be unsuitable for the Japanese SMEs in terms of the opportunities in Vietnam. The problem is not so much as to raising capital, but more related to concerns for their financial strength, human resource and the continuation of the operation. Therefore, for large scale project, a realistic option would be to join a consortium or a team led by trading companies and other players, or to focus on standalone facilities that can be operated without long term operation and maintenance, facilities that fill some short term demand, or technologies that may not be crucial but would be wanted.

S.2.3.1 Water Supply

For water supply, the basic process is intake, purification and distribution. In the urban area, these would require significant pipelines and treatment plants, which would be too large for a single SME to handle alone. SMEs could still participate in a consortium to provide equipments and services, but the opportunities are limited.

It could be possible to provide small scale water purification facilities in the rural areas. Some Japanese SMEs have small purification equipments that utilize membrane treatment. It would be technically possible to introduce such facility in rural Vietnam. However, many communities already have one source of water source or another. Whether there is an additional need for such water supply needs to be carefully studied.

S.2.3.2 Waste Water Treatment

Also for waste water treatment, urban sewage that requires large scale pipelines and treatment plants cannot be singlehandedly built and operated by SMEs. Therefore, the opportunities would

lie in rural areas where simple technologies like septic tanks and bio-toilets would make sense.

S.2.3.3 Power

In the power sector, for equipments and services that relate to the main grid, SMEs can only play a minor role by supplying equipments and services. Better opportunities may be found in off-grid rural electrification. These systems tend to be temporary settings before the community is connected to the main grid, and thus have limited scope in scale and time frame.

Manufacturers of micro hydros and micro-wind turbines, or small scale solar systems exist in Japan, and some (such as Tanaka Suiryoku Co, Ltd, and Eaml Engineering Co. Ltd.) have provided products to the developing world. Vietnam can become their potential market.

However, actual cases show that these manufacturers will not market in developing economies by themselves. They provide their products as a part of rural electrification project, which are undertaken by large scale plant manufacturers. While it is one thing to have manufacturing capabilities for turbines and inverter units, marketing them in unfamiliar land and providing installation as well as operation and maintenance would be quite another, and would be very risky for these SMEs.

Also, demand management, which assists local firms to save on energy use, is another area where SMEs do have a strong presence. Most of these services by SMEs, however, tend to focus on a single building or firm. Large scale grid level demand management would require significant resources.

S.2.3.4 Solid Waste Disposal

Solid waste is dealt in many countries by the local municipalities. Collection and incineration (if applicable), landfill operations are the main activities. Since the technology is limited and operations tend to involve intimate local knowledge, it is a challenge for Japanese SMEs to expand into this field. Technologies such as ground seals to prevent ground water contamination are used, but it is part of the landfill operation, and would be difficult for Japanese SMEs to secure a market, much less profit from it.

In this sector, however, there are technologies to create fuel out of particular wastes (RDS), or composting that would produce value added to a specific part of the waste. These technologies basically involve sorting of the garbage, and then drying and compressing them. Since the process is relatively simple, there are small innovations that SMEs can make to make significant improvement.

Among these technologies, composting can reduce the amount of trash, by utilizing solid waste as fertilizer or as heating fuel for greenhouse. It is therefore possible to deploy this technology in a small scale in the rural area, and the barriers to entry can be low enough for SMEs to try out.

There have been cases of Japanese firms creating fuel out of paper and office waste in India. In areas where securing landfills can be difficult, such methods are welcomed as a way to reduce the overall waste.

S.2.4 Hurdles for Japanese Middle core SMEs to expand into Vietnam

However, through various interviews with relevant firms, it has been established that many SMEs are simply not willing to expand into Vietnam or elsewhere just now, even when they have promising technology. The hurdles that they face may not be always focused on financing the venture.

In many cases, a simple equipment sale would not suffice in these sectors. Once you provide the service, a long period of installation, adjustment, calibration, operation is required. This will not simply be a matter of manufacturing technology. Especially if it is a service oriented firm, training can be a significant burden for them. In order to assist the SMEs to expand into Vietnam, assistance on these levels may be necessary. Assigning a staff to oversee the Vietnamese operation is a big burden for the SMEs. With other resources involved along with the business risk, and the long period required before turning a profit, SMEs would find it difficult to make such a commitment.

S.2.5 Cases where Japanese firms expanded into Countries other than Vietnam

There are cases where SMEs related to such public services have expanded into other developing countries, which may be informative.

Nippon Poly-Glu Co. Ltd., who manufactures and sells water purification plants using glutamic acid derivative as the coagulant, is famous for their active expansion into developing countries. Currently, they have operated in Thailand, Mexico, Myanmar, and Bangladesh, of which Bangladesh is the largest.

Poly-Glu sells the coagulant, but to ensure proper use, they insist on direct sales, hiring “Poly-Glu ladies” locally to demonstrate their usage. Main customers are the rural water producers. While the operation started very small, it has gained significant reputation, and recently, there are demands for larger facilities to service small municipalities.

The salient points of their venture were as follows;

- **Complete Localization.** By hiring foreign students in Japan, and encouraging them to start business once they return home, it was possible to have a local operation without expensive Japanese staff on site.
- **Target the Rural area.** While urban areas have higher population density, there is more competition. By starting from rural areas that has no competition, it would be much easier to gather trust through word of mouth.
- **Demonstrate that you are in for the Long Time.** First several years were difficult, since the local people were suspicious whether the firm would continue their operation. Lack of

knowledge about local customs was also an issue. However, by gradually building up trust, it allows you to create a brand out of yourself.

- **Low cost.** So far, Poly-Glu has spent only 5 million Yen for this project. Large investment leads to expensive products, which would make the product too expensive. It is important to limit your investment, and try to use local media and government to work for you.

According to Poly-Glu, because of the small amount of investment, financing was not a big issue. JICA and JETRO were helpful in their advice on legal frameworks, various paper works (e.g., procedures on incorporation, mergers and acquisition and local taxation), and ties with the government. The key to success is to target something that no one else is doing in a rapidly developing market, thereby securing a monopoly position. Once you have the infrastructure, such as the sales network on the Poly-Glu ladies, it will become possible to use it for other purposes.

Sinfonia Technology Co. Ltd. (Tokyo), manufacturer of small wind turbines and solar panels, has expanded their business to Brazil. Brazil is looking for ways to appeal their concern for the environment, especially along with the 2012 World Cup games. Sinfonia plans to install their products in football stadiums and other facilities. In doing so, they chose not to place their own office in Brazil, but look for reliable partners for manufacturing and sales. By simply licensing the production (starting from partial manufacturing, eventually moving to a full manufacturing license), they have managed to keep their product cost down. In 2010, they expanded their operation to Uruguay.

In their venture to Brazil, Mitsui Sumitomo Bank Brazil has supported them with market research, and the solicitation and evaluation of manufacturing and sales partners. In the future, if the operation expands, they will naturally assist in their financing. The Bank also plans to use the CO₂ reduction from the project as a part of the emission trading.

The important points in this transaction were as follows:

- **Initially, market research and partnering is more important than financing.** To expand, the company didn't directly open their own offices. They conducted market surveys and partnered with a local firm for sales and production. How to find reliable partners was a very important concern for them
- **Partner and agents that can provide long term support.** In finding a manufacturing partner, a firm with good manufacturing skills was needed. As for sales representative, it is not just a matter of sales, but they also have to provide the assessment for the installation, along with the operation and maintenance. Finding partners with such capabilities were important.
- **Support from the local bank.** In addressing the issues above, Sinfonia Technology relied on Mitsui Sumitomo Bank Brazil. Obviously, they have the ability to provide advice on local regulations and paper works (e.g., incorporation procedures, M&A with foreign corporations and local taxation). Through such support, the financing arrangement may eventually bring business to the Bank.

- **Advantages for the Bank.** The Bank is not simply waiting for future possibilities of financing arrangement. By participating in emission trade through this arrangement, the bank can also expand their operations.

The support that the Mitsui Sumitomo Bank provided may also be provided by JICA to an extent. But also in this case, financial support comes later. It is the local information that proved to be valuable. Information such as local regulation and market conditions, potential partners for sales and manufacturing was important.

Another case is Creative (Higashi Hiroshima), who creates plants for producing fuel pellets out of paper waste, thereby reducing the amount of waste as well as reducing CO₂. Creative has made a plant in Gujarat, India. The plant involves a manual sorting station, and then compresses it along with some plastic, thereby creating a high calorie fuel. The reason for their Indian venture was that the president of the company was a personal friend of the region's top politician.

The problem was that they could not afford to have their staff stationed in India for an extended period of time. Waste collection was handled by the local government, and the firm made a contract to stay for just one year. Within that period, they plan to transfer all the necessary technology, and come back.

Clearly, the issue was not financial, but rather human resource. Also, finding the initial opportunity was out of personal ties, which was a matter of luck.

S.3 The Course for Utilizing the Resources of Japanese Middle core SMEs in Water, Environment and Energy Sectors to Meet Local Needs

In all of the sectors, it would be difficult to find a total green field that is highly profitable. However, we do see individual cases of ventures. They rely on the individual strength of the technology, and individual channels of opportunities.

Looking at other cases, the waste fuel plant in India by Creative was realized through a personal channel. There were personal correspondence about the possibility of reducing waste, which eventually became a business. In the cases of waste water treatment for factories, the business relationship in Japan between the developers and manufacturers with the water processing firms were vital.

While there are no large untapped markets, these services often need to gain confidence from the local government and the community. Even if there is an opportunity, it will not be a quick sales operation. If JICA wants to support Japanese SMEs to venture into Vietnam and other markets, it needs to provide support in finding small opportunities, and also provide guarantees for Japanese firms that may lack the track record or deep pockets. This, however, may be difficult, since the guarantee cannot simply be monetary. It needs to guarantee the continued

operation of the service.

In terms of financial assistance, the need for significant amount of financing may be limited in the early phases. Unless the firm expect the local subsidiary to gain compete independence including their financing, there is little need to borrow locally. Also, the strength of Japanese SMEs lies in their niche strength and versatility. Therefore, a supporting scheme should not limit itself to a specific sector or technology, but to maintain flexibility and versatility that would allow the support of any firms in any industry.

Even if there are business opportunities, the largest hurdle is human resource rather than financing. To avoid tying up precious human resource, Creative plans to install and train local staff within a year. Poly-Glu hires foreign students who study in Japanese colleges as part time workers, and after their return home, encourages them to start their businesses, thereby reducing cost and ensuring sufficient local knowledge. The company maintains that the biggest contribution that JICA may offer is connections with local government, or various regulation related information.

Sinfonia Technology chose not to set up their own offices, but to rely on local partners for manufacturing and sales. Finding the right partner was the key, and this was strongly supported by Mitsui Sumitomo Bank Brazil. The bank does have an eye on the future financing opportunities, but sees this as a long term goal. For the midterm, it plans to take advantage of the emission trading opportunities from assisting solar and wind power projects.

In total, looking at the actual cases of Japanese SMEs in the public service related sectors, keeping the costs down by avoiding Japanese staff is important. In all the cases, the firms try to avoid excessive investment by limiting the time frame of their exposure, or utilizing local partners, aiming to localize as much as possible. Support to these efforts must address these concerns of the Japanese middle core SMEs. Therefore, if JICA wishes to provide private sector assistance, it should not focus on financial assistance alone, but provide information regarding changes in regulation and possible market opportunities, human resource enhancement through training, or various information on potential local partners. By providing a comprehensive package of assistance to the private sector, Japanese SMEs would feel more at ease to expand their business.

In regard to this point, JICA has capabilities that private sector cannot match, such as trust of various local government agencies and information on directions of new regulations and promising areas, which are achieved through JICA's assistance to the local government on their various masterplans and institution building.

II. Business entry models utilizing Japanese resources which contributes to developing countries and Directions of Assistance to enhance resource utilization

In light of the direction and challenges of matching needs and resources of supporting industries and environmental and energy technology, and water industries, we first discuss the possible business entry models to participate in the developing countries' market, based on interviews in Vietnam. Then we sort out the challenges SMEs face for each type of business entry model and discuss the direction of possible official assistance to alleviate the challenges and enhance the resource utilization in the developing countries.

II.1 Overview of Business Entry Models

Here, we list up a few business entry models that can match the needs of developing countries and the technology and service resources of Japanese SMEs in the supporting industries for private sector development, and in the field of high public interest sectors such as energy, environment and water, which was discussed in the previous chapter.

The study on the Supporting industries revealed that there are many technology areas in the private sector material processing industry in Japan, which can meet local needs. When Japanese SMEs enter business in Vietnam to take advantage of its technology, the following types of business entry models may be applied.

In the water environment and energy Industries, we were not able to identify local needs large enough for a small and medium enterprise to set-up a 100% subsidiary in Vietnam, but were able to show several niche businesses developing in other countries, and will be described in the following table.

II.1.1 Local production and processing Model

This model assumes investment to set up a production/processing center in the developing country where it can provide technical guidance and management to upgrade the production capacity of its local staff. The final product of the production/processing can be an assembled product, manufactured parts, or processed material.

Final product assembly in developing countries often takes advantage of the low-wage labor-intensive process. In the early stages, this model tends to become an efficient business model to earn foreign currency through export of products manufactured, but with the expansion of the domestic market, production for domestic consumption shall increase.

SMEs in the parts manufacturing and material processing industry, such as precision machinery (e.g., a tester) tools or special equipment (NC gear cutting machine etc.), press, heat treatment/surface treatment tend to follow their customers if they choose to move over to the developing countries.

II.1.2 Japanese export business / local marketing services

This model assumes business entry in the form of export business or sales agent, and does not assume factory/processing plant expansion to the developing country. However, it may require some facility or plant to provide after-sales service, as dealers may sell their products locally. It also assumes service offices for sales in the agency, collecting fees and maintenance fee, and can expand into rural areas.

For the water/environment/energy sector, the service fee is to be ultimately borne by the residents, which often require a lower price set by ignoring profitability. Therefore, Japanese companies are less likely to develop a profitable business, and even if it did enter this area, it may well be decided from the point of view of Corporate Social Responsibility.

We do not know cases of profitable environment/energy/water business in Vietnam. However, we have showed cases of developing business in other countries by exporting water purification equipment and water treatment ingredients, the export of eco-power systems and waste treatment plant (for example: including composting) and of BOP and environment-related businesses.

For companies in the Supporting industries which can produce a global niche product, it is possible to expand their export business to Vietnam.

Table 6: Japan's SMEs business entry model (example)

Field Business entry model	Business model which can enhance sustainability, efficiency and effectiveness in the deployment of JICA's development programs in the country. (Service sector with high public interest such as Energy/environment/ water)	Business models which can contribute to the development challenges faced by people in the country through direct participation by Japanese SMEs (Mainly in the private sector - supporting industry)
	Local production and processing businesses (Establishment of processing factories and offices / and investment)	•
Japanese export business / local marketing services (Goods imported from Japan. Marketing, sales, maintenance service and payment collection)	<ul style="list-style-type: none"> • Export sales of low-cost equipment and supplies for water energy and environment • (e.g.: water purification agents, wind and solar power generation, 	<ul style="list-style-type: none"> • Supporting industries for export and sale of global niche product (e.g.: special-purpose refrigerators and test specimens)

performed locally, etc. Rep office or Local marketing subsidiary or Local sales agency network)	waste recycling plant)	
Local business support services (support organization established / investment)	<ul style="list-style-type: none"> • Design and technical consulting in the environment area by local human resources (e.g.: waste water treatment) 	<ul style="list-style-type: none"> • BPO services (e.g.: CAD operator, quality control trainer/coach)
	<ul style="list-style-type: none"> • Public Quality inspection Center (e.g.: industrial laboratories as third-party quality rating agencies) • Business Development Services (BDS) (e.g.: training, consulting, marketing assistance, marketing research, legal and accounting services and application assistance) 	
Business infrastructure rental service (Rent factories or facilities equipped with necessary functions which normally would take time to search or develop)	<ul style="list-style-type: none"> • PPP development of small factories with proper environmental measures to rent for companies in the supporting industries (e.g. factory to rent with common wastewater plant for plating companies, or with desulfurization equipment for casting companies) 	

II.1.3 Local business support services

This is a business entry model without plant expansion nor product export, but just provides technology alone. For example, design and technology consulting, outsourcing of professional staff such as CAD operators, accountants and clerical work, etc.

As this business model has a labor intensive cost structure, it would be necessary to hire local professional staff, who can be paid at local price level, and to train them properly, so that they can provide the professional service at a level acceptable for Japanese SMEs.

There is a need for public product quality assessment center, such as third-party product evaluation institutions such as industrial laboratories in Japan. The inspection test skills can be transmitted from the private sector, but having public entities as the implementing entity would be desirable.

In addition Business Development Services (BDS: training, consulting, marketing assistance, marketing research, legal and accounting services, and application assistance service) can be another example and this service is already provided by Japanese SMEs.

II.1.4 Business infrastructure rental service

There is another business model that enhances the business entry and expansion of the above three types of businesses. For example, a company which develops factories to rent, which are equipped with proper functions, such as processing plants equipped with special wastewater treatment necessary for plating.

This type of rental service is expected to speed up decisions for market entry, by developing the time consuming but necessary business infrastructure upfront, hence reducing the

time-to-business as well as the initial amount of investment, which will reduce the break-even point. By shifting the entry business from an upfront investment model towards a scalable business model, the chances for the entry business to become viable will increase.

II.2 Challenges for Japanese SMEs by each business entry model

The following are the challenges of SMEs who considered, or is considering, entry into Vietnam, which was revealed from interviews with small and medium enterprises.

II.2.1 Local production and processing Model

- Secure Factory Manager level personnel:

As mentioned earlier, the small size of SME limits the number of factory managers who are experienced in administrating, guiding and managing, the plant on-site.

In addition, those who can speak Vietnamese and Japanese and who can assist factory manager are limited.

- Research the market to assess the amount of orders, potential business partners and competition

Since the amount of local investment will be quite significant for a SME, business entry decision cannot be made unless there is sufficient amount of expected orders from potential customers. Therefore, the importance of marketing research and business planning (investment climate assessment and market research including assessment on competition and business partners) should be highlighted, and assistance during this planning phase would be required.

In particular, if a SME, which has management skills and sufficient technology, is seeking to invest in market overseas, then their main bank would normally assist their foreign investment. However, for SMEs which are not supported by their main bank, but are willing to take the risk of FDI, the SMEs and their new financier should take a closer look of the results, risk and prerequisites for successful entry from the above marketing research to assess the investment risk and confirm whether the SME has the management/financial strength to withstand such risk. If the SME does not have such management/financial strength, then the SME would need to obtain support from public assistance organizations, to fill the gap.

Especially, if the SME needs local financing which was denied by their local banks in Japan, then they will need to find a new financier or a guarantor who will be willing to share the cost of business risk and credit risk with the SME.

- Secure and train sufficient number of local workers and local suppliers:

In order to continue efficient production, securing sufficient local suppliers of raw materials and subcontractors would be required.

This, in turn, would require technical guidance to local suppliers and joint venture partners and may further require (public) financial assistance for them to upgrade

(replacement investment) their machinery and equipment. In addition, factory workers will require training, after the decision to enter the market has been made.

- Obtain assistance for Export Procedure:
If the SME is unfamiliar with exporting or customs, they may need to obtain assistance for customs and exports procedures.

II.2.2 Japanese export business / local marketing services

- Secure assistance for Import and export procedures:
If the SME is unfamiliar with import and export, they may require assistance for customs and import and export procedures.
- Opening an account at a local bank suitable for international business:
This business entry model will require international transfer payments and foreign currency exchange between Japan and Vietnam. Hence, the SME would need to open an account at a local financial institution that can communicate with the SME, preferably in the Japanese language.

II.2.3 Local business support services

- Upgrading capacity of Vietnamese professional staff
Professional staff with high level skills such as Computer Aided Design operators, technology consultants, accountants, etc. will be the cornerstone of this business entry model. Moreover, to make this business profitable, it would require the professional staff to be Vietnamese who can work at local price/salary levels. Therefore, the business will need to train or upgrade the skills of the Vietnamese staff. In some cases, several years training in Japan may be necessary to acquire the skills and experience through OJT.

II.2.4 Business infrastructure rental service

- Ensure the number of rental users
SMEs usually require great care and are troublesome customers, even though the rental size is small compared to large corporations. Therefore, it is necessary to secure the number of newcomers who, to a certain extent.

II.3 The direction of JICA's assistance to alleviate the challenges

As we have seen, SMEs challenge for overseas market entry can be categorized into issues related to, lack of "human resources", "finance", or "Information and business network ", respectively. For each of these issues, JICA may develop assistance menus in the following direction.

II.3.1 Direction of support for human resource issues

II.3.1.1 Response to the human resource issues of Japanese SMEs

On the factory manager personnel shortage issue, JICA may consider increasing the number of senior volunteers and JICA experts and organize them to function as a human introduction resource and actively use their network to promote matchmaking, and register them and their willing colleagues on JICA's international cooperation career information web-site (PARTNER). JICA may be able to introduce personnel on a contract basis who worked in trading houses and have good knowledge and networks within the local country markets if they are registered at the Action for a Better International Community (ABIC), which is a private nonprofit organization established by the Japan Foreign Trade Council, Inc..

Staff versed in general affairs, accounting and labor management in the local country, and who preferably is a person who can understand the local and Japanese culture and language, would also be required to assist the factory manager. Therefore, for small and medium enterprises which lack any kind of staff, Japan Overseas Cooperation Volunteers (JOCV) who are familiar with the local country may be helpful. In the past, the Secretariat for the Japan Overseas Cooperation Volunteers have been providing career counseling for returning members. From the perspective of facilitating the overseas operation of Japanese SMEs to utilize their resources in the local country, JICA may continue such career counseling as needed for the effective utilization of JOCV's service to the SMEs. However, it may be necessary to re-education and train the JOCV to gain professional skills and familiarize them with the SME. Therefore JICA may introduce JOCVs to have an internship with SMEs that are considering entering a developing country market, with an opportunity to be fully employed and work in the target developing country.

II.3.1.2 Capacity building of local staff

Considering the shortage of human resources at SMEs, it is important for the SMEs to obtain a local person, who is not only interested in learning the SME's technology and know-how, but also willing to seek, introduce and manage the business opportunity in their own country with the SME.

Effective use of local persons who obtained a degree in universities and graduate schools in Japan, or who received on-the-job training through the Technical Intern Training Program of Japan, would be a good starting point for recruiting such local personnel. However, to become managers of local business and trading with Japanese and overseas companies will require a different set of skills and training. This may be done through continuous training and follow-up of graduates of foreign technical interns, through effective job-matching (e.g.: by registering in PARTNER). To make long-term human resource development programs, such as the above to work, coordination of several training institutes and training programs will be required. In

addition, it will require mutual agreement on further internships and final acceptance of employment, as well as how the total training costs should be shared.

However, it may take several years of training for a local person to become a factory manager, starting from the Japanese language education. Therefore, utilization of JICA's foreign investment scheme to upgrade private-sector vocational/technical colleges could be another channel of enhancing the development of local managers.

In addition, it also takes time to develop staff who have sufficient level of skills to provide technical guidance in their local workplaces. Therefore, collaboration with existing local training schemes could be effective. For example, coordinating or marketing the existing business courses conducted at JICA's Japan Center Project to candidates for local management staff could provide a short cut to this type of personnel shortage. Especially, since the Vietnam Japan Cooperation Center (VJCC) is conducting a "Management Education Program" which teaches employees and managers of local firms, the basic knowledge for corporate management and production management (quality, cost, delivery, 5S), collaboration with this program could be effective.

II.3.2 Direction of assistance in marketing and customer intelligence in the local markets

II.3.2.1 Utilization of the technology map as basic data for policymaking by government officials in both Japan and Vietnam

Organizations working on industrial policy development, such as METI and economic organizations, showed keen interest on the technology map of supporting industries in Vietnam. This document can be utilized to help various Vietnamese government officials to further understand the nature and importance of supporting industries, and hence improve the integrity of their industrial policy, which may enhance the direct investment of end-product manufacturers, and eventually expand markets for Vietnam's supporting industries. The technology map can also be utilized in an awareness campaign for SMEs to consider future direct investment into Vietnam.

This map has been developed for Vietnam, but developing and providing the same type of technology map for countries, which Japanese SMEs are interested in direct investment, and which JICA has listed development of private sector and supporting industries as priority areas, could be a new direction for assistance for intelligence in the local market.

II.3.2.2 Providing updated information on legal and regulatory systems

For Japanese SMEs, updated and tutorial information on the politics and legal and regulatory systems is as important as information on business intelligence and business practices. In developing countries, including Vietnam, political, legal and regulatory systems and the background for such systems are difficult to understand. As the legal and regulatory systems are

changing rapidly, to address the rapid development in economy, guidance on the past changes and information on the local discussions on the future possible changes in the legal and regulatory system are valuable for long term investment decisions.

II.3.2.3 Objective assessment of the technology and quality level of local firms

Quality assurance is a prerequisite for SMEs in Japan, when they deliver their product to their customer. Therefore, SMEs have their own in-house personnel and equipment to prove the quality of their products. However, (potential) customers may require evaluation by an objective third party. Thus, there is a need for Technology Evaluation Centers. Similarly, in order to objectively demonstrate their level of quality control level to foreign and local manufacturers, local companies in the supporting industries would need the service of a third party Technology Evaluation Center which can objectively evaluate the level of their technology or quality. However, such center may not be viable without public financial assistance, which JICA may provide (partial) funding and technology assistance in the operation of such center.

II.3.2.4 Providing Local business information

Companies require live business information which can be obtained from local companies. Especially, demand for information of local companies, such as potential joint venture partner companies are high.

JICA has been dispatching senior volunteers to local companies, and, JETRO offices in Vietnam has been developing list of promising companies in Vietnam such as through organizing trade fairs. Therefore, providing updated and selected company information to match the needs of SMEs looking for overseas investment opportunities, obtained from the senior volunteers and from JETRO, can be promising.

II.3.2.5 Providing assistance for Business planning

In order to increase the number of companies to seek opportunities and invest overseas, supporting small businesses, which lack the human resources to design new overseas business plans, from the business planning stage can be effective. Early stage cooperation with JETRO, SMRJ and regional banks to detect and assist the overseas business intentions of SMEs would be necessary.

However, to what extent should JICA, as a public institution, provide support should be carefully discussed. Assistance for designing the export and trading documentation procedures can be provided by trading houses, banks and logistics companies.

II.3.3 Direction of Finance Assistance

Detailed in the next section, general direction of finance assistance can be suggested as

follows.

II.3.3.1 Design of Financial Assistance should be carefully designed to match the intricate Funding needs of Japanese companies in supporting industries

Regarding loans, Japanese SMEs which are contemplating foreign direct investment will most likely use loans made available by their main financing banks (main banks) in Japan and make foreign direct investment from Japan. As the Japanese Yen interest rate is currently very low, subsidiary companies in Vietnam (100% wholly owned, or joint ventures) will tend to borrow from their parent company in Japan, which may borrow from the main banks (this scheme is called Parent (to child) loan), unless the parent company has already exhausted its credit line. Therefore, borrowing needs from local subsidiary companies which their parent company can borrow from their main banks, will be limited.

However, there exists strong financing needs by SMEs under intricate conditions. For example, companies which are trying to fully localize their operations, including financing operations, may have needs to borrow for their local investments. Moreover, subsidiary companies which their parent companies have either exhausted their credit line or run out of collaterals will have a strong need to borrow from local financial institutions, if collateral is not required.

Japanese SMEs which are planning to invest in Vietnam, but do not have banking relationship with the large Japanese commercial banks which have branches in Vietnam, or which have been turned down their loan applications in Japan due to their credit risk, would not be likely to receive loans from local banks, where they do not have local repayment track records. This also shows that SMEs may have strong needs to obtain local credit guarantees.

These needs will be difficult for Japanese regional banks to address, as they do not have the capacity to assess the local business and manage the local collaterals (in Vietnam) to be submitted by the local subsidiary, the business and credit risk will be too high for these Japanese financial institutions to control.

However, should JICA be able to assess the technology and local market by mobilizing their local information network and provide hands-on management assistance and hence be able to select promising business projects, JICA may also be able to provide financial assistance to these projects through Two Step Loans (TSLs) or credit guarantees (through funds) which will be discussed in further detail later.

The remaining issue is, whether JICA can develop the capacity to provide management/business assistance and risk-taking financial assistance at their own cost, more efficiently than private (Japanese) financial institutions, and whether JICA can select SMEs and their foreign direct investment projects that have development and economic impacts large enough to match JICA's assistance cost. Especially, for the selection of the appropriate SMEs and their FDI projects, JICA's assessment of the SME's technology in the local business environment would be the necessary key element.

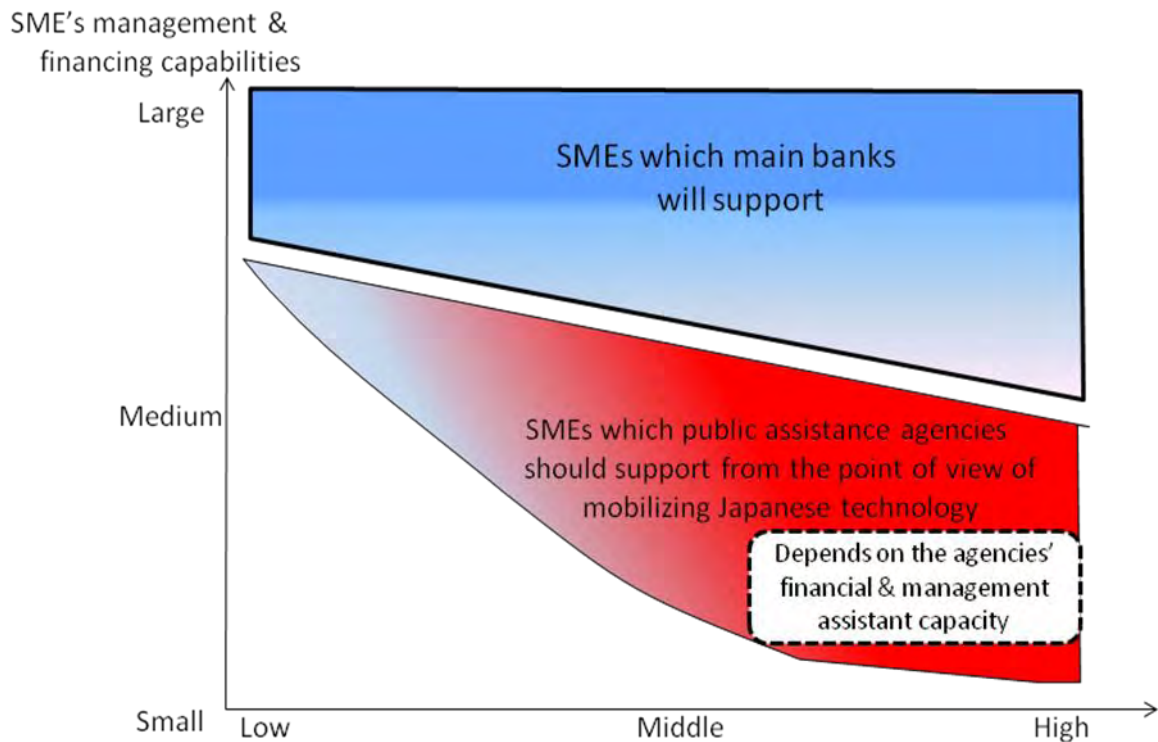


Figure 13 Perspectives for Assisting Japanese SMEs' Overseas Direct Investments

Regarding Equity financing, SME owners/managers will usually hesitate on non-family member equity participation which will make ownership and control of the company more difficult to manage. However, neutral and public agency owners may be welcomed by SME owners who wish to diversify their business risk while maintaining control for business decisions. In this regard, (indirect) equity participation by JICA or International organizations will not be resisted and shall rather be expected to productive if they can provide a balanced and objective opinion for the joint venture, as a third party investor.

Regarding other financial related services, SMEs have needs for advice on their overseas (financial) operations which can be provided by JICA through its experience in Government to Government loans and international remittance, trade finance, foreign exchange transactions, local payment practices in Japanese language and the opening of accounts at banks which provide such services.

II.3.3.2 Implement both direct and indirect approach for effective assistance to local companies in the supporting industries

SMEs in the local supporting industries (both Japanese subsidiary and Non-Japanese subsidiary), have difficulty in obtaining loans at normal level of interest rate and thus have limited funding options, since the local banks do not have track records of repayment by these SMEs and hence do not have the credit assessment capability for these SMEs.

Consequently, it is necessary to support the capacity building of local bank's credit assessment and business matching capacity where subcontractors and customers may have better assessment of the SMEs in this industry. Promotion of bank loans to these SMEs in the supporting industries can be implemented through the third phase of JICA's assistance programs for SMEs (SMEFP-III, loan assistance. Approved amount 173.79 yen billion).

However, until the local financial institutions gain capacity in crediting to the supporting industries, JICA will have high demands by local supporting industries to provide the TSL or equity or credit guarantee by funds and equity financing directly and indirectly.

The following table summarizes the above discussion.

Table 4 Issues of Japanese companies' overseas direct investments and JICA's Assistance menu (draft)

Challenge	JICA's Assistance menu (draft)	
Human resource development	• Securing and developing Japanese international manpower (at the factory manager level)	(1) Introduction of senior volunteers (2) Introduction/recommendation from JICA experts
	• Same as above (secure Japanese management level staff well versed in sales and marketing, logistics, General affairs and Accounting)	(1) If human resources experienced in overseas trading, and accounting of overseas local activity is the key issue, introduction of organization which have such experienced personnel registered (such as "ABIC"). (2) Introduction of the members of Japan Overseas Cooperation Volunteers who have returned home.
	• Capacity building of Local human resources	(1) Improving local business managers' business mindsets through business course programs at JICA's local Japan Centers
		(2) Assisting private sector technology / vocational training projects in the manufacturing industry (Example: Combining Japanese language education with assistance for private sector local vocational schools by mobilizing JICA Overseas Investment program.)
(3) Continuous Follow-ups for technical interns who have completed their vocational training in Japan, and introduction to Japanese companies		
Intelligence on Markets, potential Partners customer information	• Evaluation of supporting industries in terms of technology maps	• Conducting survey/mapping of technology in the priority country and on their technology
	• Securing Timely and relevant information/advice regarding the local country's industrial policy and rules & regulation changes	• Collecting and disseminating information obtained from JICA's expert in the local markets

	<ul style="list-style-type: none"> Objective quality assessment technology in the local field 	<ul style="list-style-type: none"> Establishing Technology Evaluation Centers to meet the needs for technology/quality assessment by a third party organization
	<ul style="list-style-type: none"> Find and provide specific information regarding potential local joint venture companies and local companies' suppliers 	<ul style="list-style-type: none"> Guidance based on most recently updated information of local companies which was obtained through the visit of senior volunteers
	<ul style="list-style-type: none"> Assistance for Business planning 	<ul style="list-style-type: none"> Provide necessary assistance during the initial business planning stage (example: "Assistance for the development of supporting industries in developing countries.
Financial Assistance	<ul style="list-style-type: none"> Access to local financial institutions, Assistance to diversify Japanese SME's investment risk 	<ul style="list-style-type: none"> Utilization of JICA's Overseas Investment program. In addition to financial assistance, provide advice on the local business operation, by utilizing JICA's G to G relationship and the experience gathered through JICA's local (expert) network.
	<ul style="list-style-type: none"> Facilitating the clustering of local companies and non-Japanese FDI (Companies which have a business relationship with Japanese, Taiwanese and Korean companies) through financial support to such companies in Vietnam 	<ul style="list-style-type: none"> (If possible) Investment by the new equity fund and lending by local financial institutions.

(Legend)

	: Assistance menu for Japan based companies
	: Assistance menu available for both Japanese and local companies
	: Assistance menu for the local companies

III. Outline of JICA's financial assistance scheme to utilize the resource from Japanese enterprises (SMEs in particular)

In considering the outline of JICA's financial assistance scheme, it would be productive to differentiate two types of assistance. The first is financial assistance for Japanese enterprises when they enter and invest in foreign markets and also when they continue to invest there. The second is financial assistance for the local enterprises.

Regarding the latter, the local enterprises, there is several challenges in finance for SMEs including lack of availability of long-term funds, difficulties of development of credit guarantee system to supplement lack of collaterals of SMEs, although the total outstanding of extended credit to enterprises sector are growing fast. In these overall circumstances for SME finance, for SMEs to aim to become suppliers to FDI enterprises including Japanese manufacturing, finance for new machinery and equipments and working capital would be a challenge, which is also the key issue for development of the supporting industries in Vietnam.

We will discuss the outline of JICA's new finance assistance scheme under the above mentioned viewpoints in this chapter. First, we will review the existing challenges for SMEs in Vietnam, especially the SMEs in the supporting industries. Then, we will recommend the outline of JICA's new finance assistance scheme.

III.1 Review of finance means for Japanese SMEs to enter Vietnamese markets and potential needs

III.1.1 Finance needs by Japanese enterprises when they enter foreign markets and continue to invest

Japanese SMEs which already invested in foreign markets generally have financed for the initial investments by borrowing from their main-banks in Japan or by funding from their own funds. After the initial investments, they tend to start borrowing from local branches of Japanese banks when they expand the local business. They also borrow from the local banks in order to diversify the borrowing sources and in order to ensure convenient settlement services, which still share limited portion such as 10% of the total local finance. The Japanese SMEs which supply the local exporting FDIs usually borrow in US\$ while those which supply to enterprises focusing on domestic markets borrow more or less in VND.

There are three types of entrance to foreign markets by Japanese SMEs; i) establishing local affiliates/subsidiaries, ii) establishing joint venture with local enterprises, iii) establishing cooperation with local enterprises by investment of equity or/and technical assistance. Types i) and ii) would require significant finance among those types. Regarding the finance source, it is difficult for local banks to provide those projects with finance unless there is enough track record of the business, according to the interviews with the banks. It is also difficult for the local

branches of Japanese banks to lend without credit enhancement such as credit guarantee to finance those projects because Japanese SME's local projects would face local business risks, which is difficult to assess regardless of availability of track records in their Japanese business history, while it would be possible to finance them when they enter the Vietnamese markets as suppliers to large Japanese manufacturing enterprises, according to our interviews.

We discuss more details on those difficulties of finance for Japanese SMEs. There are two types of finance needs for Japanese SMEs to enter foreign markets.

The first type is the case in which Japanese SMEs are entering foreign markets based on requests by the main client manufacturers to supply them from the local market. Initial investment could be financed by "parent loan" sourced by Japanese main banks for this First type. Those SMEs' local affiliates might need finance from local banks or local branches of Japanese banks when they try to diversify or expand the local business after a several years of the initial investment.

The second Type is the case in which Japanese SMEs are entering foreign markets without confirmed opportunities of local business and need to develop local customers. Initial investments for this Second type would be difficult because neither Japanese nor local banks could finance those SMEs without track record of the local business

Finance needs have been materialized mostly for First type while finance needs for Second type has stayed potential because of the mentioned difficulties. In order to minimize investment risk, SMEs of Second type would start by technical assistance, trading contract, or other cooperation such as training of the local staffs in Japanese SMEs and seek for future opportunities of joint venture business with local partners while they might have small amount of stake in the local partners.

Table 5 Types of entrance to foreign markets entrance by Japanese SMEs

	Type 1 Dependent on existing customers	Type 2 independent
Reason for FDI	Requested by commitment of order from existing customers to invest abroad	Not so sure about opportunities abroad
Support from business partner	Supported by customers in Japan	Explore markets by themselves
Finance for initial investment	Borrowing from Japanese main banks	Need finance in the local markets
Challenges for finance	Need local finance after a few years of initial investment to diversify customers	Difficult in local finance because of lack of track records in local business

Note) Type 2 may include needs for step-by step investment in which SME start by cooperation with local SME in technical transfer and/or training of the local staffs in order to search for future opportunities while minimizing capital investment.

III.1.2 Finance needs of local SMEs in Supporting Industries to Supply Japanese FDIs

Japanese FDIs try to increase local contents ratio supplied by local supporting industries. In this regard, it is important to ensure finance required by the local supplier SMEs.

Local suppliers usually start from test production and step up to mass-production examination and contracted production when they start business with FDIs such as Japanese manufacturing. During this process, local SMEs often need to invest in high quality machinery in order to pass the test, which require finance for that investment. They also need significant working capital when they enter contracted production for FDIs.

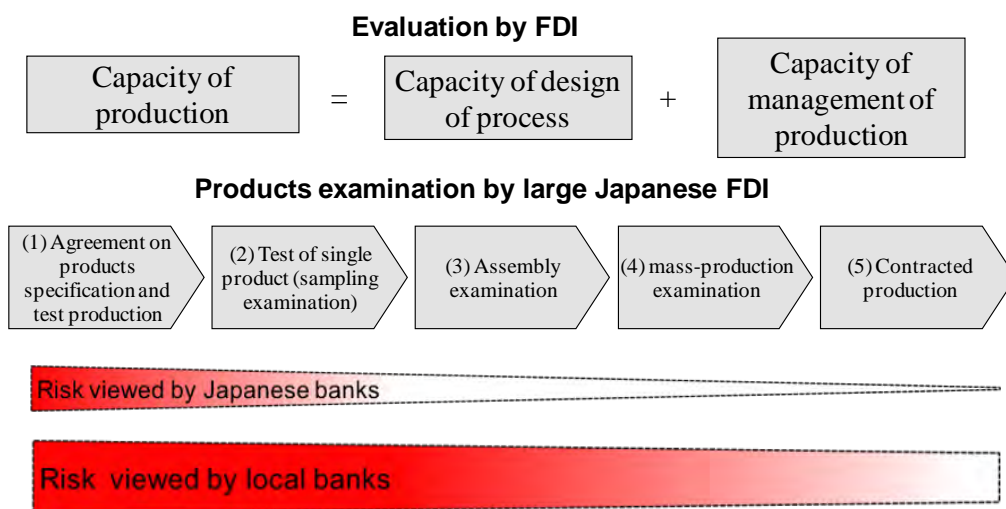


Figure 14 Difficulties of finance for local SMEs to start business with FDI manufacturer

However, local banks often stay cautious to finance for such investment by local suppliers because it is difficult for them to assess credit risk of the contracts with FDIs before contracted production³ Therefore, it is critical to support finance needs by the local suppliers so that FDIs can expand capable suppliers for higher local contents ratio.

III.1.3 Finance needs of local SMEs in SI

Looking at transition of liability outstanding of the supporting industries, composing of 5 sectors such as electronics & informatics, textile & garment, leather & shoes, mechanical, and motor vehicles, liabilities of the 5 sectors as a whole have increased 24% annually in the 3 years

³ In case of business with Japanese companies, local SMEs which are selected to start the test production are very likely to proceed to contracted production. If it is possible to take this business custom into consideration upon credit assessment, it would contribute to smooth finance for SI SMEs.

until 2008. Among the 5 sectors, increased amount is highlighted in the sectors of leather & shoes, electronics & informatics, and motor vehicles.

Table 6 Transition of liability of Vietnam Supporting Industries

		liability					08/05 growth
		2004	2005	2006	2007	2008	
Supporting industries		94,434	112,024 (19%)	128,696 (15%)	158,812 (23%)	213,487 (34%)	24.0%
Electronic s, informatic s, telecom	Electrical Machinery And Apparatus N.e.c.	11,332	15,727 (39%)	19,818 (26%)	23850 (20%)	26369 (11%)	18.8%
	Radio, Television And Communicatio n Equipment	6,206	7,610 (23%)	10,580 (39%)	15093 (43%)	18413 (22%)	34.3%
Textile & garment	Textiles	27,143	33,376 (23%)	33,066 (-1%)	39591 (20%)	48645 (23%)	13.4%
	Wearing Apparel; Dressing And Dyeing Of Fur	14,555	16,424 (13%)	20,543 (25%)	24974 (22%)	32023 (28%)	24.9%
Leather & footwear manufacturing		20,463	21,672 (6%)	22,824 (5%)	27532 (21%)	53030 (93%)	34.8%
Mechanical manufacturing		6,469	7,738 (20%)	9,920 (28%)	12757 (29%)	14427 (13%)	23.1%
Production and assembling of motor vehicles		8,267	9,478 (15%)	11,945 (26%)	15015 (26%)	20580 (37%)	29.5%

Unit : billions VND (unless specifically mentioned)
(Source) GSO

SME's share against total manufacturing in terms of asset is about 35%, according to GSO statistics. Assuming that SME's share in terms of liability (borrowing) is also 35%, transition of amount of the borrowing of SMEs in the supporting industries is calculated as the table below, in which outstanding of borrowing is 76 trillion VND, growing by 19 trillion VND in 2008.

Table 7 Transition of Borrowing of SMEs in Supporting Industries

	2005	2006	2007	2008
Outstanding of borrowing	39,895	45,832	56,557	76,028
Increase of borrowing	6,264	5,937	10,725	19,471

Unit : billions VND (unless specifically mentioned)
(Note) Calculated assuming that SME share in borrowing is 35% of the total manufacturing.
(Source) GSO

Annual growth amount has been accelerated in the past few years, which suggest finance needs of the local SMEs in the supporting industries are significant. On the other hand, the local financial institutions are cautious to finance new customers and new business projects in supporting industries because they lack capacity of credit assessment for the SI business and

need to comply with strict regulatory requirements such as collateral and risk assessment, while they prefer to finance for existing customers and real estate development projects, etc. Credit guarantee system is still under development although the regulatory framework has already been established.

There is significant potential finance needs to be satisfied under those circumstances. In particular, SMEs in the supporting industries need finance assistance when they start and expand the business with FDIs because of large information opaqueness. In order to address these challenges, Small and Medium-Sized Enterprises Finance Project Phase III (SMEFP III) is supposed to help the local financial institutions to enhance capacity of credit assessment of the supporting industries. Moreover, other policy assistance such as database of SI-SMEs planned by MOIT and “credit assessment handbook” suggested by Action Plan for Promotion of SI under Vietnam-Japan Joint Initiative III.

Challenges for SME finance include lack of collateral, delay of development of credit guarantee system, low accuracy of information submitted by SME, and lack of available long-term funding source, according to interviews with participating financial institutions (PFIs) of SMEFP III. Regarding the promotion policy for SI, development of legal framework, promotional policy, cooperation among the SI SMEs are expected to be enhanced. Projected loan plans for SMEs in general are ambitious in the PFIs. One of the PFIs observed increase of new SME borrowers by 3,500 in 2010, and plan to have annual increase of SME loan in 2011 by amount double of that in 2010.

III.1.4 Summarizing the finance needs of SMEs in SI

The following table summarizes the review of finance for SMEs in SI.

Table 8 Summary of the Financing needs of SMEs in Vietnam’s Supporting Industries

Type of company Finance needs	Japanese company (upon entrance)	Japanese company (after entrance)	Local company, JV	FDIs from other countries (Thailand etc)
Finance needs	<ul style="list-style-type: none"> Finance for factory, machinery and working capital 	<ul style="list-style-type: none"> Additional investment to enlarge customer base 	<ul style="list-style-type: none"> Working capital. Finance for equipments to enlarge customer base such as Japanese companies. 	<ul style="list-style-type: none"> Finance for factory, machinery and working capital
Type of finance	<ul style="list-style-type: none"> Long-term finance Business risk is low if having a company to supply upon entrance. Refer to the estimation made in this research regarding the amount of necessary fund 	<ul style="list-style-type: none"> Long-term finance Business risk is low if having track record of business in the local market The amount of necessary fund would increase with growth of FDI companies. 	<ul style="list-style-type: none"> Long-term finance Enlarging business to FDI is with high risk because lacking track record. Estimation of necessary fund was done during SAPROF of SMEFP III. 	<ul style="list-style-type: none"> Long-term finance Risk is moderate since it is necessary to develop the local market upon entrance Although the amount of necessary fund is unclear, it would increase.

Issues for finance	<ul style="list-style-type: none"> Commonly use “Parent loan” sourced by Japanese main banks 	<ul style="list-style-type: none"> Able to borrow from local banks, but only the major banks can provide long-term finance 	<ul style="list-style-type: none"> Difficult to get finance since local banks consider high risk by their credit assessment 	<ul style="list-style-type: none"> Some may able to have “Parent loan” but local banks have limited capacity to provide long-term finance
Needs for Non-finance assistance	<ul style="list-style-type: none"> Assistance for human resource and information to set up local factory 	<ul style="list-style-type: none"> Assistance to enlarge local supplier company and information on sales partners 	<ul style="list-style-type: none"> Assistance for local banks regarding credit assessment of supplier to FDIs. Assistance for business matching with FDIs such as Japanese company 	<ul style="list-style-type: none"> Expect enlargement of local suppliers
Financial support scheme	<ul style="list-style-type: none"> TSL(Two-Step Loan) and investment funds for business with high risk 	<ul style="list-style-type: none"> TSL since local banks are not fully capable of providing long-term loan 	<ul style="list-style-type: none"> TSL to supplement local banks capability of providing long-term loan Investment fund to support extending business model as JV 	<ul style="list-style-type: none"> SL to supplement local banks capability of providing long-term loan Investment fund

III.2 Recommendation on Outline of Finance assistance

III.2.1 Sectors and Projects to be Supported with Priority

In this section, by focusing the SI sector as a target of development assistance in accordance with the assessment in the Chapter I and II, we will discuss on sectors and projects to be supported with priority bases on the 5 sectors designated in the Master Plan for Promotion of Supporting Industry and the business sectors which have been suggested by Japanese manufacturers in Vietnam-Japan Joint Initiative III in terms of needed technology, and with consideration of possible finance and non-finance assistance.

III.2.1.1 Local SMEs in SI :

As previously discussed, Second type of Japanese SMEs to enter Vietnam markets would be a key target to be assisted. Japanese SMEs in the second type would need local partners to develop the local business.

According to statistics of GSO, there are about 8,000 enterprises of which SMEs are about 6,800 in the supporting industries in Vietnam as of 2008.

Table 9 Number of Local SMEs Supporting Industries

Sectors		Number of enterprises	
			Number of SMEs
Manufacturing total		38,384	35,843
Supporting industries		8,011	6,868
Share among manufacturing		20.9%	19.2%
Electronics, informatics, telecom	Electrical Machinery And Apparatus N.e.c.	590	537
	Radio, Television And Communication Equipment	374	324
Textile & garment	Textile	1,577	1,438
	Wearing Apparel; Dressing And Dyeing Of Fur	3,174	2,596
Leather & footwear manufacturing		819	587
Mechanical manufacturing		1,085	1,037
Production and assembling of motor vehicles		392	349

(Source) GSO

III.2.1.2 SMEs under SOEs :

There are many SMEs in groups of SOEs which are under control of State Capital Investment Corporation (SCIC). SMEs and the SOE groups sometimes wish to cooperate with FDIs including Japanese FDIs, because most of them need to be restructured according to the national policy to further develop market economy in Vietnam. According to interviews with SCIC, manufacturing share is about 20%, and the supporting industries share is about 10% among those of enterprises under SCIC. Japanese SMEs could have advantages to make available human resource, knowledge of local business, and human network which might be provided by the local partners in cooperation with those enterprises.

III.2.1.3 FDIs

We believe FDIs from Japan and non-Japanese countries/regions such as Thailand and Taiwan where the supporting industries have become matured will be the key targeted sectors for assistance, because larger SI which cooperates with Japanese manufacturer in those countries/regions are about to enter Vietnamese market.

Indeed, a large supplier to Japanese manufacturers in Vietnam which is invested by a Taiwan SI strongly hopes further development of availability of SME suppliers as outsourcing partners, according to our interview. The Taiwan SI is also interested in participating in the finance

scheme, such as funds discussed in later sections⁴, from the viewpoint of SI development in Vietnam and of financial returns from the finance scheme. Those larger FDI enterprises from non-Japanese countries/regions including both FDIs in Vietnam and those to be about to invest in Vietnam could also be participating targets of the following assistance schemes.

III.2.2 Outline of Finance Assistance Scheme

As discussed, Japanese SMEs which are bankable by Japanese main bank would not face significant difficulties of finance because they can mobilize necessary funds for initial investment by borrowing from Japanese main banks, and even government supported funds such as Global Assistance Funds operated by Japan Asia Investment Capital are also available.

However, SMEs which plan to invest in Vietnam in the near future would need to develop the local market by themselves rather than relying on existing relationship with Japanese partners, which mean that those SMEs may face challenges of finance as both local banks and local branches of Japanese banks would not be able to finance without their business history in Vietnam. For those SMEs, finance assistance scheme to provide longer-term risk capital which has not yet been available as finance assistance scheme shall be required⁵

On the other hand, SMEs which have already invested in Vietnam and plan to expand the local business have successfully financed the projects by borrowing from branches of Japanese banks and large local banks so far. In order to further diversify the business to local markets, they will need larger amount of VND finance. Assistance such as Two Step Loan (TSL) to support the availability of long term funds is critical to support expansion of the local businesses by FDIs.

TSL is also necessary for local SMEs to cooperate and establish joint venture business with Japanese SMEs.

FDIs from non-Japanese countries/regions which would be also significant in terms of development of SI in Vietnam, will need finance assistance such as long-term risk funds and TSL for their initial investment and expansion of the local business.

Those are key targets and appropriate finance assistance scheme to cover the gap of finance needs and the availability from the markets will be in demand.

⁵ Loans to the companies as the following could also be target borrowers: Technologically capable SMEs, but hit by the earthquake on March 11, 2011 or SMEs considering diversification of production sites in order to minimize/diversify risks from natural disasters.

Table 10 Supply/demand gap for financing SMEs in the Vietnam Supporting Industries and JICA's Assistance Opportunities

Firm Type Financing Method	Japanese Subsidiaries (when entering local market)	Japanese Subsidiaries (after entering local market)	Local SME and Joint Venture with Vietnam-Japanese SMEs	Third country (e.g. Thai) subsidiary
From Japan	Loan	Δ (Same as left)	—	—
	Equity	Δ (Same as left)	—	—
From Local FI	Loan	○ Long Term funding by TSL (When SME plans to fully localize their operation, local banks lack the capacity to provide long term loan)	○ Long Term funding by TSL (Local banks currently lack the capacity to provide long term loans)	○ Long Term funding by TSL (Local banks currently lack the capacity to provide long term loans)
	Equity	○ Long-term and risk financing (Case (ii) & (iii) in the next figure would be suitable for equity financing, where success depends on market development and is riskier than other cases)	Δ (Risk is limited and hence debt financing is more suitable, since SME owners prefer independence.)	○ Long term and risk financing (Equity participation by a neutral public sector may be useful for objective management discussions)

(Legend)

- (Shaded area): Area where financing demand/supply gap exists and where JICA or other public organization may be able to close such gap, if the organization has the capacity to properly assess the business risk and the capacity to shoulder the risk and information cost.
- Δ: Area where financing gaps may exist as above, but where it would be difficult for any institution to have the information capacity to assess the business and credit risk better than the SME's main bank. A gap will exist when SME wishes to invest overseas even after discussion with their main bank revealed the project to be too risky for the bank to finance.
- : Not applicable

Gap between finance needs and availability for Japanese SMEs for initial investment in details are depicted in the chart below.

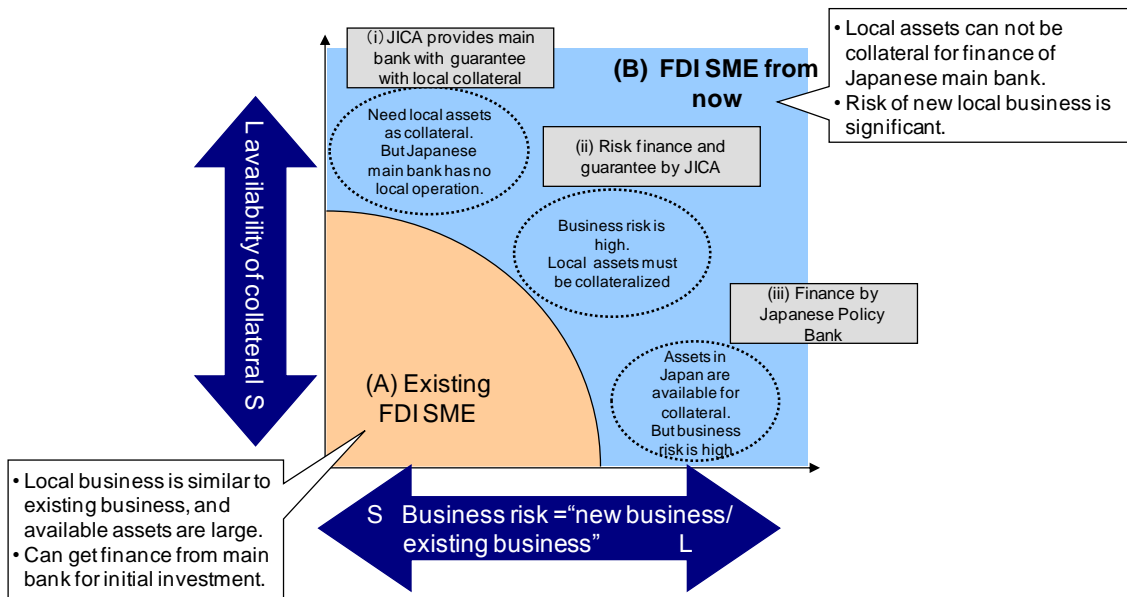


Figure 15 Types of finance and difficulties of Japanese SMEs for initial investment

III.2.3 Menu of Finance Scheme

III.2.1 Loan Scheme (Two Step Loan)

Under a Loan Scheme, JICA may provide local financial institutions long-term loans so that the financial institution shall, in turn, lend long-term loans to eligible enterprises for eligible projects with certain development effects, which is a Two Step Loan Scheme⁶.

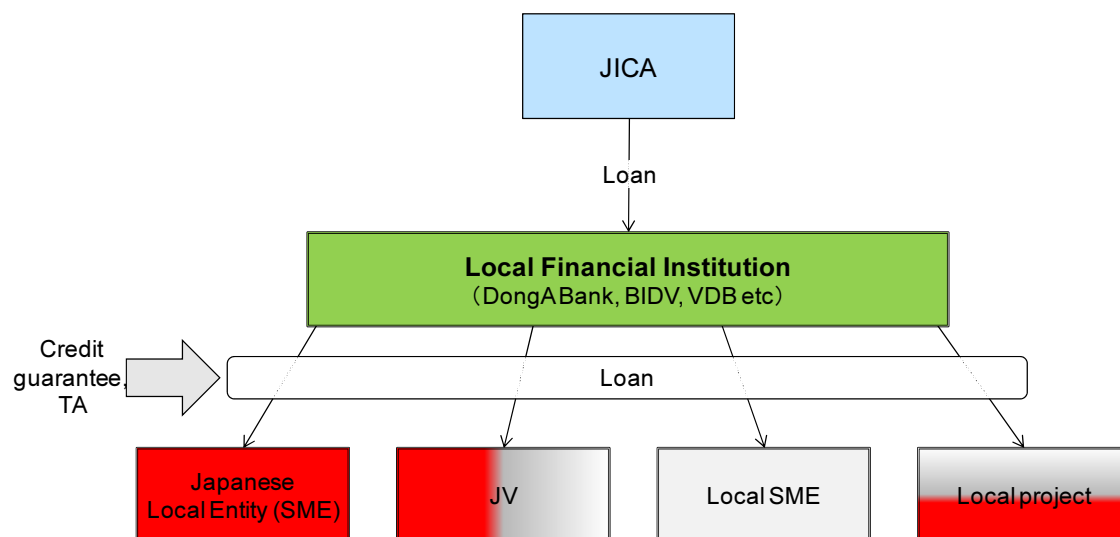


Figure 16 Loan Scheme

For finance by Japanese SMEs to invest in foreign business, as most of them aim at stable growth strategy to focus on the existing business model, loan scheme could be more consistent with the business model than funds scheme discussed later.

Finance assistance scheme to support the expansion of local business, on top of assistance for the initial investment, would encourage more Japanese SMEs under consideration of investment in Vietnam.

Loan scheme could be suitable to local SI SMEs with non-high growth business model too. Loan scheme has more advantage that local financial institutions are familiar with loan practice and can implement the scheme smoothly. Challenges of loan scheme, however, would necessity of credit enhancement such as credit guarantee by VDB to such projects as high risk business model to which neither of local financial institutions nor branches of Japanese banks could finance by themselves.

⁶A scheme where other international financial institutions and private companies can participate as investors/lenders, could also be conceived. However, it would be rather difficult for such scheme to focus only on JICA's target SMEs where Japanese SME technology should be introduced.

III.2.2 Local Scheme (Two Step Loan) in which sub-projects shall be pre-assumed

This scheme is effective for cases in which JICA has already specified the entities to be supported by means of the loan scheme (TSL). In other finance schemes, the target projects cannot be specified by JICA, but rather, depend on selection by PFI of TSL and General Partner of funds, under the TSL scheme proposed in the previous section and funds scheme to be discussed in the next section.

A TSL scheme could be applied to the scheme for this purpose as shown in the below chart.

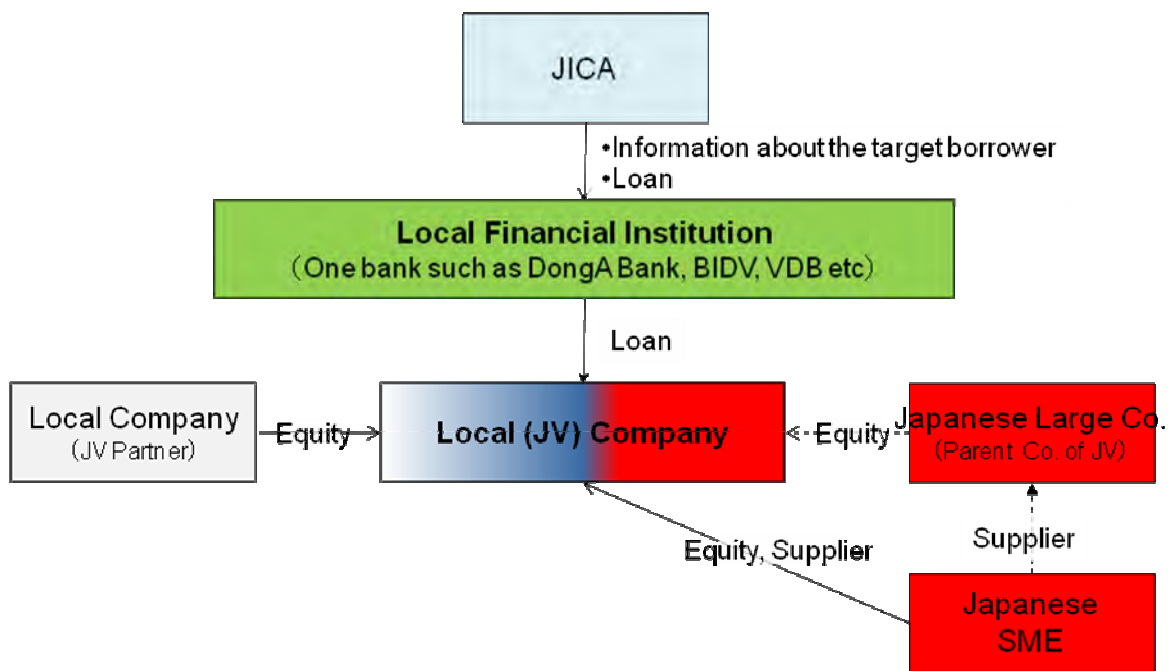


Figure 17 Loan Scheme for a Targeted Local Company

This scheme, furthermore, can be used to finance entities and projects which are designed to support SMEs in Vietnam, such as human resource development services, industrial park for SI SMEs, and database of SI SMEs under planning by MOIT.

Information provided by JICA for credit assessment to the local financial institution participating in the TSL scheme would be critically important. Still, it should be noted that the final decision of loans shall depend on the local financial institution.

III.2.3 Funds Scheme

There are many funds to invest in Vietnam. Some of them are private equity (PE) funds which invest in non-listed SMEs, as discussed later. The highlighted nature of funds scheme is that the General Partner (GP) is positioned to manage the operation from selection of invested projects, hands-on support for management in order to bring high return from the invested

projects. Therefore, funds scheme is usually equipped with certain incentive system to encourage GP towards successful investment.

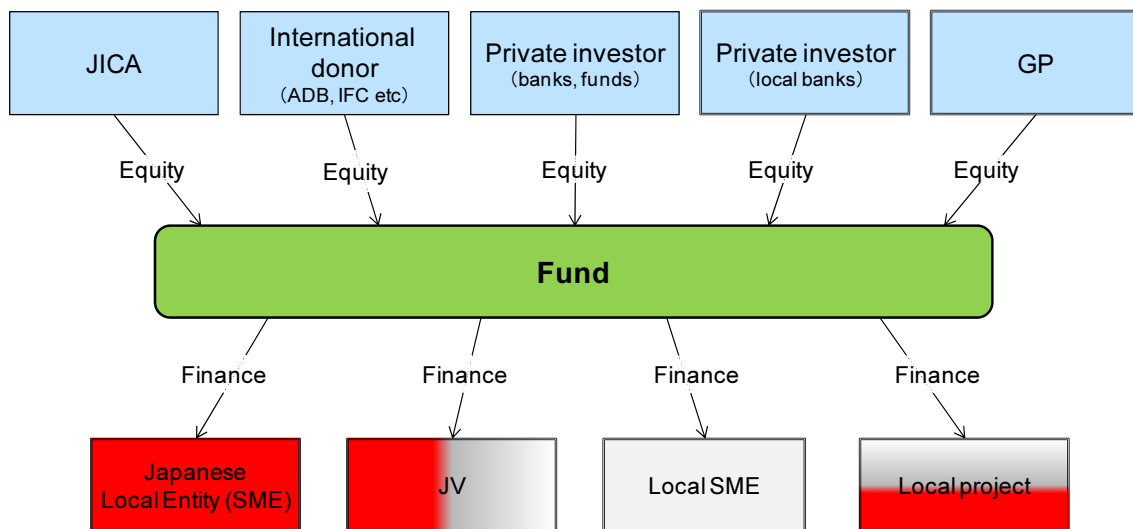


Figure 18 Funds Scheme

III.3 Potential Investors for Funds Scheme

III.3.1 Needs of Japanese Domestic Investors and Prerequisites

We assessed potential investment needs of Japanese investors based in Japan especially for the assumed finance assistance scheme by JICA based on interviews⁷. The key implications of the assessments are summarized in the following table.

⁷ As inputs for this study, NRI used results from previous research on credit assessment of JICA conducted in 2010.

Table 11 Summary of Investors Needs for Finance Assistance Scheme

	Funds	Business companies	Banks	Government Banks
Sectors	• Growth	• Growth and large size	• Clients	• SI
(i)term	• 5~7 years	• Long term	• Case by case	• Case by case
(ii)Risk to prefer	• Business risk	• Business risk	• Business risk	• Business risk (guarantee)
(iii)Return	• IRR15% (USD)	• Cost of capital + interest rate gap, etc.	• Case by case	• Case by case
(iv)Development effects, external effects	• Concept to attract investors	• N/A	• Support for clients	• Industrial development, environmental business
Expectations for JICA (JICA's supplementary support among above (i) to (iv))	• Supporting policy by VN government • Assistance of FS of SMEs • Lower cost of funds	• Long-term and lower costs of funds • Mitigation of Regulatory and institutional risk	• Development of Industrial park for SMEs • TA for supporting technology	• Supporting promotion of Japanese enterprises' technology

III.3.2 Review of Existing Investment Funds to Invest in Vietnam

PE Funds in Vietnam are launched by Dragon Capital, Vina Capital, and PNP Vietnam Fund Management while there are many investment funds, most of them targets foreign investors. Dragon Funds are focusing Japanese investors and cooperating with Japanese funds companies in the business of PE funds.

Typical target return of those funds is 15% annually in terms of US\$ to attract foreign investors, which could be interpreted to be more than 30% in terms of VND with consideration of foreign exchange risk, considering the current inflation and foreign exchange rate risk.

Funds with Objective of Development

Mekong Enterprise Fund managed by Mekong Funds is the most famous funds with objective of economic development. Investors for Mekong Enterprise Fund include multinational/government investors such as ADB, the Nordic Development Fund, the State Secretariat for Economic Affairs of Switzerland, the Finnish Fund, and other private funds. ADB considers that Mekong Enterprise Fund contributes to growth of private sectors and economic integration in the Mekong region, which implies this funds aim at both growth of the individual enterprises and regional development. Mekong Enterprise Fund has invested in 10 enterprises since its start in 2002 until 2005, and invested enterprises include leading companies which have grown from small enterprises when invested.

Regional Funds in South East Asia

Japanese venture capitalists have been active in investment in Asian enterprises including Vietnamese companies and successful in IPO. Funds Managed by Japan Asia Investment

Company have IPO cases including Alphanam M&E Joint Stock Company (listed in Hanoi Stock Exchange), Dong A Plastic Group Joint Stock Company (listed in HCM Stock Exchange). Japanese VC in recent years have accelerated establishing local bases in South East Asia and China.

III.4 Outline of Investment Funds with Objective for Development in Vietnam

It is often difficult for Japanese SMEs to get finance from Japanese banks including the local branches for initial investment because of high business risk unless there is ample availability of assets to be collateralized. For the local SMEs to cooperate with Japanese SMEs, it would be possible to get finance for expanding existing business by receiving technical assistance from Japanese enterprises. But availability of long-term finance is limited.

On the other hand, Japanese SMEs which has intention to enter foreign markets with enough cash and availability of collateral may have already established investment or may be able to get finance from their Japanese main bank or finance by their own funds when they start foreign investment.

Considering the overall circumstances, funds scheme might be effective to support finance for feasible business plan of Japanese SMEs with higher risk. However, PE funds to support SMEs are still limited in the markets, and requirements from investors for higher return would mean higher hurdle as a means of finance assistance scheme with development objective. Therefore, the following discussion will focus more on detailed assessment of PE funds scheme.

We can assume two types of PE funds based on needs from SI-SMEs and requirements from investors; “PE Funds for High Growth SMEs” and “PE funds for long-term view SMEs”.

Table 12 PE funds, growth type and long-term view type

	PE funds for High growth SME	PE funds for long-term view SME
investor	Existing investors in PE funds, other financial investors	<ul style="list-style-type: none"> ※investment to funds •Tier I, Tier II suppliers in Vietnam •Tier I suppliers in other countries such as Thailand, Taiwan •group of enterprises in industrial association •Japanese banks (investment vehicle under banks) ※ Direct investment •Japanese SMEs which plan cooperation in technical transfer and training •Japanese larger enterprises which plan pilot business for the future opportunity
Target business	<ul style="list-style-type: none"> •local enterprise and JV •Japanese enterprises (high growth oriented business by combining Japanese technology and local enterprises' sales channel and human network) 	<ul style="list-style-type: none"> •Japanese SME which pursue middle growth business as suppliers to Japanese manufacturers •JV business might be promoted by JICA funds participation because the JV risk could be mitigated.
return	15% and higher as USD base	15% and higher as VND base (inflation rate +)
management	Fund companies	<ul style="list-style-type: none"> •fund companies •local banks
Selection of target business	Commission to GP	<ul style="list-style-type: none"> •Fund operation committee may decide •fund investors could propose the target business
Expectation for JICA funds	Not particular, same as for other investors	<ul style="list-style-type: none"> •long term equity and loan •lower target return by JICA
Non-finance assistance	<ul style="list-style-type: none"> •training of staff (JICA) •introduction of local SME (SCIC, SOE) 	<ul style="list-style-type: none"> •training of staff (JICA) •introduction of local SME (SCIC, SOE)

III.4.1 PE Funds for High Growth SME in SI

Target business must be SME with high growth expected. Development objective to support FDIs might remind investors of technical transfer from Japanese manufacturing which could increase attractiveness of the funds although development objective shall not be so highlighted.

In finding local target SMEs, candidates could be searched in the enterprises under SCIC and clients of local banks. Workshop organized by banks may bring opportunities for GP to interview the candidates. While GP implements hand-on support for the management, the target SMEs are able to use non-financial assistance menu such as feasibility study, training of staffs, promotion of technological transfer.

The Vietnamese government can provide indirect supports to facilitate investment in this sector should they decide to put more weight in their industrial policy. For example, establishing quality standard of supporting industry which may discriminate high quality products from general quality ones such as imports from China, or incentive policy for SI can increase chance of success of the invested business and thus enhance further investment. FDIs may be requested periodical review/change of suppliers to provide more opportunities for new entrance.

Exit of the funds may be more often done by buy-up of share by business manager rather than IPO.

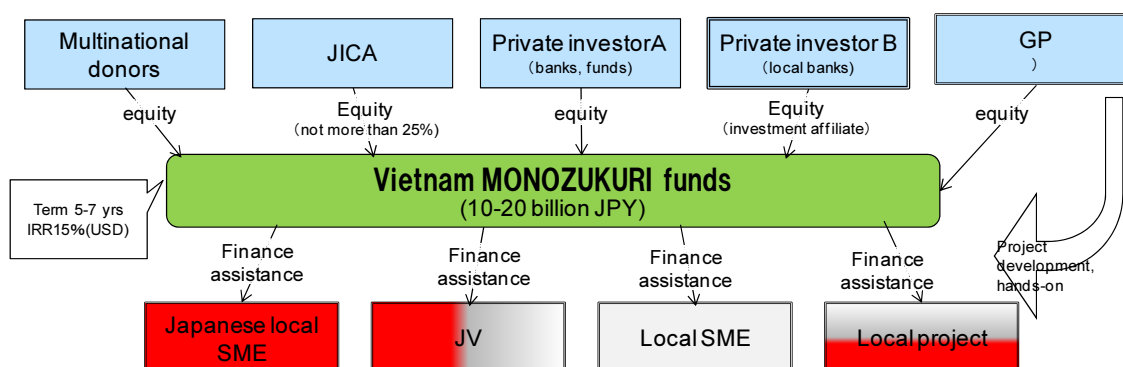


Figure 19 Pattern 1 : PE Fund for High Growth SME in SI

Scheme and condition of PE Funds for High Growth SME in SI may be similar to existing PE funds.

Table 13 Example of PE Funds Scheme Condition

Item	Typical example
Location	Tax haven. (Affiliate/subsidiary in Vietnam)
Operation	PE funds become GP, developing projects and implement hands-on
Fee	Management fee of certain % of managed assets (2%, for example)
Bonus	Bonus for GP when target profit is cleared (standard profit:8%, 6:4 for over profit sharing, for example)

III.4.2 PE Funds for long-term view SME in SI (Monozukuri-Funds)

PE Funds for long-term view SME in SI (Monozukuri-Funds) is a type of funds in which required return shall be lower in comparison with typical PE funds while investors can pursue non-financial objectives such as development of supporting industries.

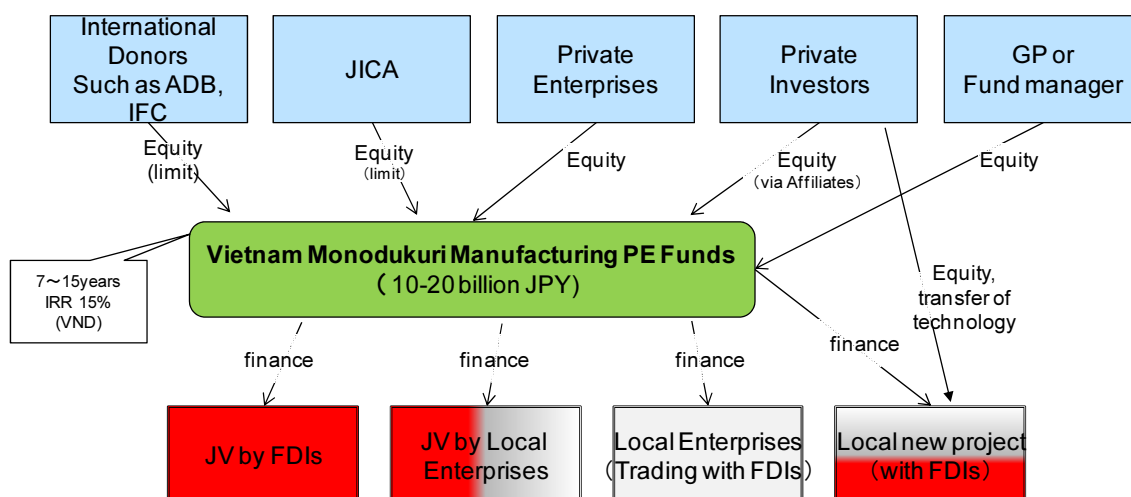


Figure 20 Pattern 2 : PE Funds for Long-Term View SME in SI (Monozukuri-Funds)

This scheme might be used to invest in local SME to be supported by Japanese SME in technical transfer and receipt of trainees as a preparing step of equity investment, which also mitigate concern of Japanese SME on credibility of local partners.

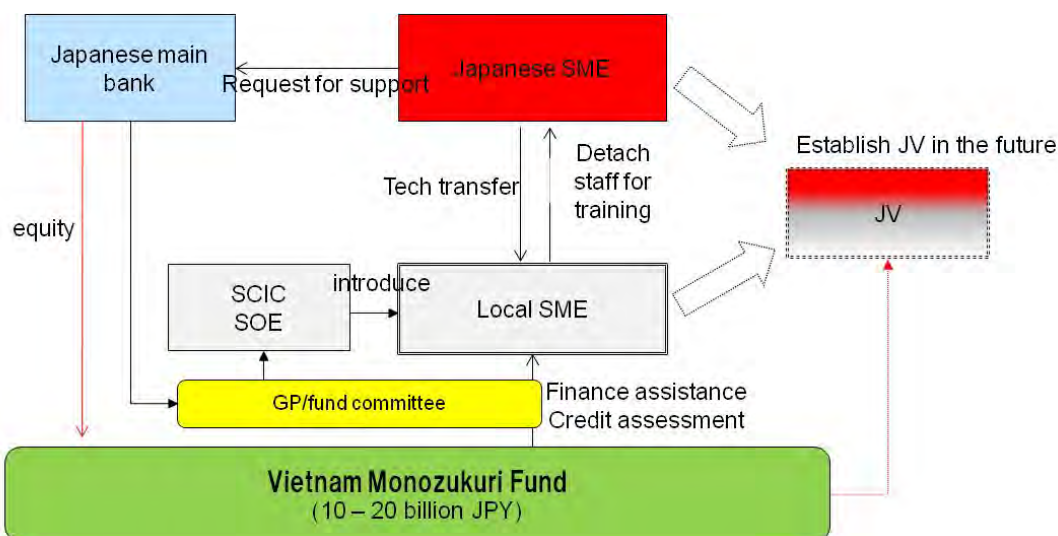


Figure 21 Support Technology Transfer/Acceptance of Trainee by Japanese SME which Seeks for Future FDI

Another usage of this scheme is to enhance the outsourcing of FDIs performing Tier I or Tier II for major assembler in Vietnam and which are contemplating the outsourcing of part of their internal processing in order to prepare for concentration/expansion/diversification of their core business. Those FDI companies have needs to invest in the PE funds for the development of SI and for financial return from investment to SMEs by means of direct stake or indirect investment through PE Funds.

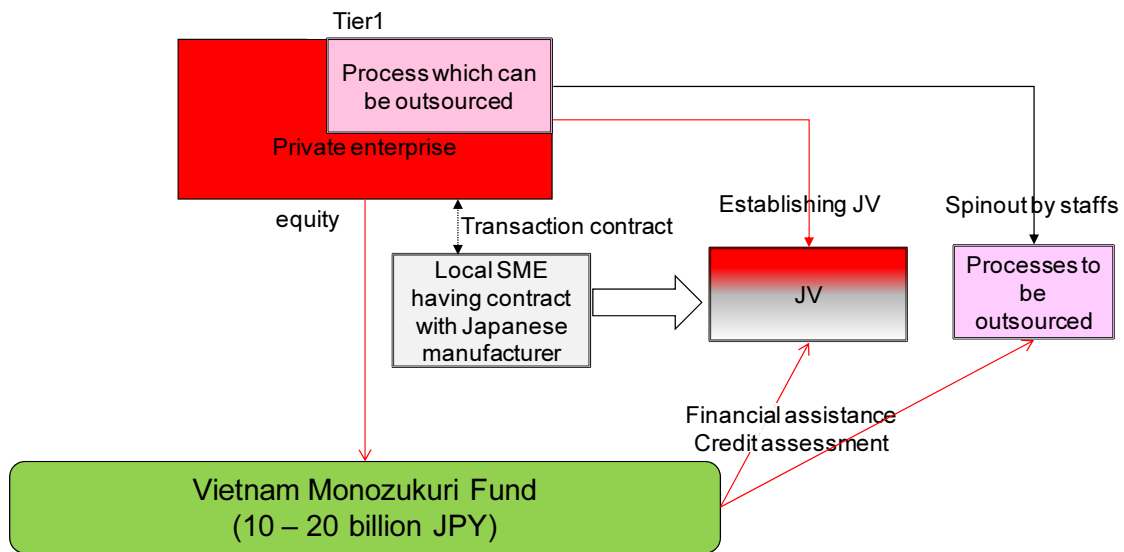


Figure 22 Assist JV and Spinout SME under Tier I and Tier II FDI

Selection of target projects might be determined by a kind of committee after initial long listing by investors and then short listing through assessment by GP, rather than just a discretionary selection by GP.

III.4.3 Assumed Relevant Players for PE Funds Scheme

We summarize the key players of the PE Funds as follows.

- Target enterprises
 - Japanese: SMEs which has capacity in the technology designated as B and C in the SI technology map
 - Non-Japanese: Tier I or Tier II enterprises in non-Japanese countries/regions such as Thailand and Taiwan which plan to invest in Vietnam
 - Local: First, local SMEs which have experience in SI, and that seek for higher technology in cooperation with Japanese enterprises in order to achieve growth. Second, manufacturing in regulated sectors, and SMEs under SOE groups which aim at new business by new linkage with FDI would provide Japanese SMEs with access to local markets, human network, and various human resources. Third, local enterprises which are partners for Japanese SMEs under preparing stage for investment and prefer to start from less risky cooperation such as technology cooperation and receiving trainees. Support by the funds scheme to these local partners would mitigate concerns for Japanese SMEs on credibility of the local partners.
- Investors:
 - FDI which has invested in Vietnam as Tier I and Tier II supplier for large assemblers,

and seek for outsourcing part of internal process in order for diversification/expansion of the business would significantly benefit from development of SI. Part of those FDIs would also take opportunity of investment return from investment in SI-SMEs.

- ADB could invest in the funds scheme under limit of 25% of total amount, unless the target business is limited to certain countries such as Japan. In order to invite ADB, the scheme shall cover local projects which are indirectly related Japanese enterprises, or Tier I and Tier II suppliers as target projects.
- Japanese banks could be interested in investing in the funds to support SME clients to invest in foreign markets.

- Fund operation:

- Local funds which have experience in PE funds might be candidates. Considering existing PE funds targeting Japanese investors, Japanese funds could cooperate with the local funds in invitation of investors and selection of target SMEs.
- Generally speaking, location of funds might be in tax haven such as Cayman, with branch or affiliate in Vietnam. Fee scheme in the case of PE funds for High Growth SME in SI would follow market practice in which management fee is fixed (such as 2%) with incentive bonus by enhanced allocation of profits over hurdle rate of return.
- Fund Operating Committee for integrated support by financial and non-financial assistance (PE Funds for long-term view SME in SI, Monozukuri-Funds, in particular): Major challenges for local SI include long term training system for human resource development. Besides, cooperation from SOEs and SCIC would be critical for Japanese SMEs to find appropriate partners under assistance from Vietnamese government. The committee should be established and perform so that those assistances become effective, and hands-on process to maximize profits, finance and non-finance assistance shall be provided under an integrated strategy.

Table 14 Tentative Function of Funds Operating Committee

Name	Monozukuri Fund Operation Committee (tentative)
Member	Investors: JICA, ADB, other investors Fund manager Government sectors: MOIT, MPI, SCIC, SBV, etc. Japanese business: JETRO, JBA, etc.
Function	<ul style="list-style-type: none"> • Discuss and decide the investment strategy in accordance with the investment policy • Introduce/select the target business to be invested/financed • Monitor the GP in operation of the funds • Perform intermediary of assistance for management resource (human resource, information, advice, finance, etc.) • Introduce non-financial assistance provided/supported by JICA • Request Vietnamese Government to improve the policy to support the supporting industries (or remove disturbing policy) • Evaluation of investment results • Others

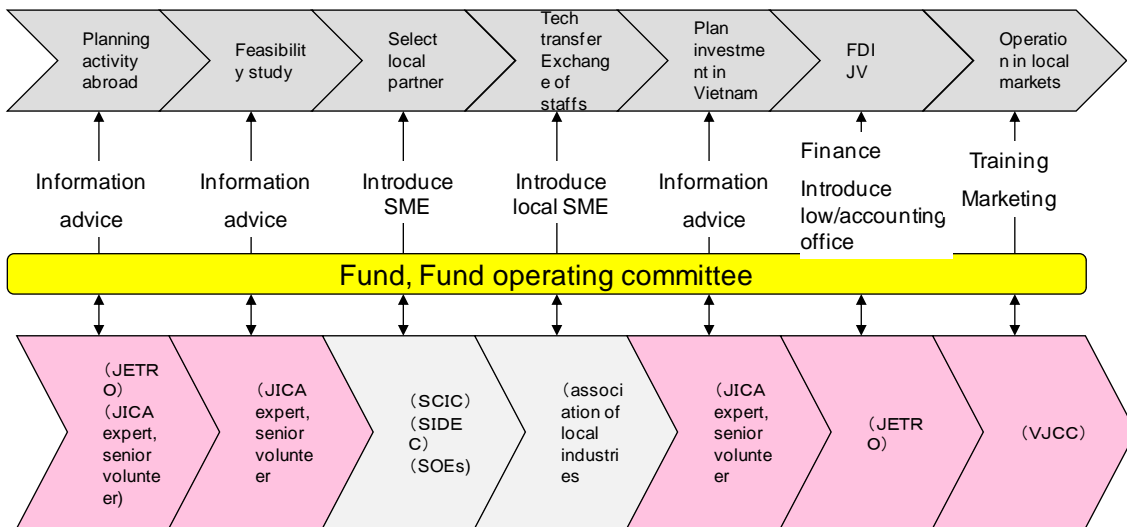


Figure 23 Image of Continuous Assistance by Financial and Non-Financial assistance

Appendix

1. Technology Maps

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Sheet metal-arc processing	Plasma welding	A kind of arc welding (=heat source is ask). The heat source is plasma arc and the arc has mechanically/electronically convergent plasma column. It generates high-density heat.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd.(Fukuoka-pref., 2300 employees) •Toko Electric Co., Ltd.(Chiyoda-ku, 1011 employees) •Hitachi Technologies and Services.Ltd. (Ibaraki-pref., 650 employees) •Yamato Scale, Co., Ltd. (Hyogo-pref., 450 employees) •Sanyoh MFG. Co., Ltd. (Tochigi-pref., 400 employees) 	A	No (have possibility in future)
	YAG laser processing	YAG laser is solid laser utilizing yttrium aluminum garnet. Including welding, it enables wide range of processing for metals and ceramics.	<ul style="list-style-type: none"> •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Hitachi Technologies and Services, Ltd. (Ibaraki-pref., 650 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Sanyoh MGD. Co., Ltd. (Tochigi-pref., 400 employees) •Japanice Co., Ltd. (Yokohama-city, 400 employees) 	B	Some
	Stud welding	Place a pin (screw) which is called 'stud' to a special gun and put the gun to base materials. The gun and a corresponding special welder automatically weld the materials in a short time.	<ul style="list-style-type: none"> •Tanico (Shinagawa-ku, 1200 employees) •Toko Electric Co., Ltd.(Chiyoda-ku, 1011 employees) •Yokokawa Bridge Corp. (Funabashi-city, 650 employees) •Topia Corporation (Mie-pref., 370 employees) •Kotohira (Nagano-pref., 330 employees) 	BC	Some
	TIG welding (Argon welding)	One of arc welding. The arc heat which is generated by a tungsten rod which melting point is extremely high, weld metals. Use shield gas like CO2 welding. Can be added solubilization agent. Applied to welding high-pressure pipe, precision equipment, etc.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd.(Fukuoka-pref., 2300 employees) •Tanico (Shinagawa-ku, 1200 employees) •Toko Electric Co., Ltd.(Chiyoda-ku, 1011 employees) •Yokokawa Bridge Corp. (Funabashi-city, 650 employees) •Hitachi Technologies and Services.Ltd. (Ibaraki-pref., 650 employees) 	C	Some
	CO2 welding	During arc welding, which weld same kind of metal by electric discharge (arc discharge), use carbon dioxide as shielded gas for welding. Applied to iron-based materials. Not applicable to nonferrous metals such as aluminum.	<ul style="list-style-type: none"> •Toko Electric Co., Ltd.(Chiyoda-ku, 1011 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Hitachi Technologies and Services, Ltd.(Ibaraki-pref., 650 employees) •Yokokawa Bridge Corp. (Funabashi-city, 650 employees) •Katakura Industries Co., Ltd. (Chuo-ku, 555 employees) 	D	No
	Spot welding	During compression of two base materials (welded materials), apply electrical current, and weld the materials with the resistant heat. Heavily used for car body.	<ul style="list-style-type: none"> •Tanico (Shinagawa-ku, 1200 employees) •Toko Electric Co., Ltd.(Chiyoda-ku, 1011 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Yamato Scale, Co., Ltd. (Hyogo-pref., 450 employees) •Tsugawa Corp. (Kanagawa-pref., 449 employees) 	D	No
	Submerge arc welding	One of arc welding. Utilize flux particle (solubilization agent)and weld wire. Supply flux along to weld zone (flux comes out with it's own weight by opening the valve), and supply the wire into the flux to weld. This is one of the most typical automatic welding process.	<ul style="list-style-type: none"> •Yokokawa Bridge Corp. (Funabashi-city, 650 employees) •Takigawa Kogyo Co., Ltd. (Hyogo-pref., 300 employees) •Hasama Ricoh Inc. (Miyagi-pref., 280 employees) •Nikko Techno (Hiroshima-pref., 267 employees) •Obe Machinery and Engineering Co., Ltd. (Ehime-pref., 250 employees) 	D	No
	Covered arc welding	Using metal stick (Core wire) which is covered by flux or protective layer as electrode, welding rod which is covered by flux or protective layer as electrode, generate arc between the rod and base material. Using the arc heat, get the welding rod and the base material welded. Commonly said 'Stick welding', 'manual welding'. The equipment is relatively simple and generally used in general field of industry.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd.(Fukuoka-pref., 2300 employees) •Tanico (Shinagawa-ku, 1200 employees) •Hitachi Technologies and Services.Ltd. (Ibaraki-pref., 650 employees) •Yokokawa Bridge Corp. (Funabashi-city, 650 employees) •Katakura Industries Co., Ltd.(Chuo-ku, 555 employees) 	E	No

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Resin molding	Porous plastic material molding	Porous plastic is resin which enable is able gas, liquid, sound to go through. Process same-sized particles of material at optimized time, temperature, and pressure. The application is Air filtration, liquid filtration, silencer, shaft bearing with grease, etc... Each conditions such as material, shape, porous density, containing polymer can be adjusted to meet requirements.	<ul style="list-style-type: none"> •Kyowa Nasta Co., Ltd. (Chuo-ku, 280 employees) •Yamashita Electric Co., Ltd. (Shinagawa-ku, 200 employees) •Daishin Kako K.K. (Nara-pref., 170 employees) •Matsumoto Co., Ltd. (Osaka-pref., 130 employees) •Konan G-tech Co., Ltd. (Hiratsuka-city, 120 employees) 	A	No (have possibility in future)
	Biodegradable plastic	Biodegradable plastic is degradable by microbe. There are biological resource (biomass) origin (=bioplastic) or petroleum origin. The molding process still has a problem in material yield as we cannot apply usual sense in this material.	<ul style="list-style-type: none"> •Takara Inc. (Katsushika-ku, 285 employees) •Kyosei Co., Ltd. (Fukui-pref., 270 employees) •Fukoku Bussan Co., Ltd. (Ohta-ku, 200 employees) •GC Dental Products Corp (Aichi-pref., 200 employees) •Hidakasangyo Co., Ltd. (Aichi-pref., 110 employees) 	A	No (have possibility in future)
	Double molding	Double molding (two-color molding) is; combine different materials and mold into one product. After molding first part, second part is combined with first part in the same mold and gotten into one product (different from Insert molding).	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) •Hoyo Seiko Co., Ltd. (Oita-pref., 280 employees) •Yamashita Electric Co., Ltd. (Shinagawa-pref., 200 employees) •Tokyo Kasei Kogyo Co., Ltd. (Isehara-city, 200 employees) 	AB	Yes
	Thin-wall molding	Process molding while vibrating the mold by ultrasound on superspeed injection molding machine. It can lower the flow resistance between wall of the mold and melted resin during molding.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Takeda Design and Manufacturing Co., Ltd. (Aichi-pref., 500 employees) •Panasonic Electric Works SUNX Tatsuno Co., Ltd. (Hyogo-pref., 450 employees) •Wako Industry Co., Ltd. (Shizuoka-pref., 300 employees) •Takara Inc. (Katsushika-ku, 285 employees) 	B	Yes
	FRP molding (Hand lay-up/Spray-up)	FRP(=fiber-reinforced plastic) molding is; prepare a mold made from FRP, plaster, wood, silicone rubber, etc. and coat it with mold release agent such as PVA, ポンリソース, silicone agent to release the mold easily. Brush gelcoat resin (normally white) mixed with curing agent on oated surface around 0.2 to 0.8mm, and cut glass fiber with scissors /knife. Add specified amount of curing agent and mix evenly, and after complete curing, take out the molded products.	<ul style="list-style-type: none"> •Nippon Molymer Co., Ltd (Osaka-pref., 380 employees) •Sivax Inc. (Yokohama-city, 300 employees) •AGC Matex Co., Ltd. (Chuo-ku, 190 employees) •Neive Co., Ltd. (Ishikawa-pref., 115 employees) •Toyo Kako Co., Ltd. (Hokkaido, 60 employees) 	B	Some
	Pressure molding	Pressure molding is; during vacuum molding, add compressed air (several bar) to get resin to mold more closely, like vacuum molding. It is efficient when making various kinds of products in small lots. Furthermore, it has higher efficiency in accurate shaping than vacuum molding. The shaping sharpness is no less than injection molding.	<ul style="list-style-type: none"> •Nippon Molymer Co., Ltd (Osaka-pref., 380 employees) •Kitano Co., Ltd. (Toyama-pref., 300 employees) •Kinjo Rubber Corp. (Osaka-pref., 250 employees) •Yoshida Denzai Kogyo Co., Ltd. (Taito-ku, 230 employees) •Sansho Kogyo Co., Ltd. (Setagaya-ku, 220 employees) 	B	Some
	Rotational/Slash/Dip molding	Rotational molding is powder molding. The mold rotates during heating and molding powder resin materials. it rotates 360° in the heating oven, and mix the materials inside to melt them evenly. After the process, cool down the resin and get it molded. Slash molding is; put powder resin into heated mold and produce hollow structure in complicated shape. Dip molding is; dip surface of mold into sol (PVC paste). Dip pre-heated mold into sol and slowly pull out with care. After that, immediately put the mold into heating oven for gelating. Release PVC from the mold after cooling down.	<ul style="list-style-type: none"> •Nippon Molymer Co., Ltd (Osaka-pref., 380 employees) •Yamashita Electric Co., Ltd. (Shinagawa-ku, 200 employees) •Toho Kasei Co., Ltd. (Nara-pref., 200 employees) •Misaki Electric Co., Ltd. (Hyogo-pref., 200 employees) •Nix, Inc. (Yokohama-city, 180 employees) 	B	Some
	Foam molding	Add foaming agent to resin to produce air-bubbled soft resin. Air bubble helps the resin volume become 2 to 50 times. Form molded products are mainly utilized as acoustic absorbent, heat resistant, shock absorbent like car bumper, for a familiar example.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Tada Plastic Industrial Co., Ltd. (Osaka-pref., 260 employees) •Fujiendole Co., Ltd. (Aichi-pref., 200 employees) •Nix, Inc. (Yokohama-city, 180 employees) •Nagaoka Sangyou Co., Ltd. (Shiga-pref., 160 employees) 	BC	Some
	Vacuum molding	Vacuum molding is; heat a resin board and make it softer, push it to concave-mold or convex-mold, and pump out the air between resin and mold from the bottom to create vacuum space, and put the resin closely to the mold and make the resin molded to the designed shape. Applicable for simple shape such as a spoiler or motorbike cowling. It doesn't cost much time and money especially when shaping one side of the product, such as prototype model.	<ul style="list-style-type: none"> •Takeda Design and Manufacturing Co.,Ltd (Aichi-pref., 500 employees) •Nippon Molymer Co., Ltd (Osaka-pref., 380 employees) •Kitano Co., Ltd. (Toyama-pref., 300 employees) •Sansen Kasei Co., Ltd (Fukuoka-pref., 250 employees) •Musashi Oil Seal MFG. Co., Ltd. (Minato-ku, 250 employees) 	C	Some
	Insert molding	Insert molding is; put an insert parts in a mold and pour resin into molding machine. The poured melted resin wraps the insert parts and solidify both of them to produce combined parts. There are various types of insert parts..metal/ceramic nut, screw, bit, net, copper wire for transmission/electricity, sometimes put different resin as an insert parts for combining.	<ul style="list-style-type: none"> •Enomoto Co., Ltd. (Yamanashi-pref., 522 employees) •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref., 500 employees) •Munekata Co., Ltd. (Osaka-pref., 500 employees) •Morioka Seiko Instruments Inc. (Iwate-pref., 473 employees) 	C	Yes
Outsert molding	Outsert molding is; insert a base board between molds, and combine pin, pushing, gear, cam, etc. required component parts with Duracon or Duranex by one-time injection molding.	<ul style="list-style-type: none"> •Tohoku Rhythm Co., Ltd. (Fukushima-pref., 500 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) •Panasonic Electric Works SUNX Tatsuno Co., Ltd. (Hyogo-pref., 450 employees) •Nippon Molymer co., Ltd (Osaka-pref., 380 employees) •Takara Inc. (Katsushika-ku, 285 employees) 	C	Some	

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Resin molding	Blow molding	Plastic molding process. Applied to hollow products such as PET bottle. The same molding theory as blowing glass. Melt and pipe pallet plastic materials (the piped material is called 'parison') in a blow molding machine. The parison come down from the upper side to the lower side. After that, clip the parison between curved molds and blow air into the inside of the molds. It is just called blow molding.	<ul style="list-style-type: none"> *Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) *Kitano Co., Ltd. (Toyama-pref., 300 employees) *Hojo精工株式会社(大分県, 280人) *Sansen Kasei Co., Ltd. (Fukuoka-pref., 250 employees) *Kinjo Rubber Co., Ltd. (Osaka-pref., 250 employees) 	OD	No
	Extrusion molding	Extrusion molding is; extrude melted resin from the nozzle and die on an extrusion machine for molding, and mold the resin to the designed shape of the products. The advantage is that this can mold complicated cross section shape and this enables to mold a fragile material as it is only subject to compressive stress and shearing stress. And also, extruded face is so smooth that it doesn't need finishing process.	<ul style="list-style-type: none"> *Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) *Takechi Co., Ltd. (Osaka-pref., 350 employees) *Kitano Co., Ltd. (Toyama-pref., 300 employees) *Kyosei Ltd. (Fukui-pref., 270 employees) *Nitta corporation (Osaka-pref., 250 employees) 	OD	No
	Injection molding	Injection molding is applied to plastic. Typical example is thermoplastic resin. Add injection pressure (10~3000kgf/c) to plastic heated to softening point and put it to mold for shaping.	<ul style="list-style-type: none"> *Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) *Nakanichi Metal Works, Co., Ltd. (Osaka-pref., 1400 employees) *Takashin Co., Ltd. (Aomori-pref., 803 employees) *Kitagawa Industries Co., Ltd. (Aichi-pref., 800 employees) *Fujiisu Kasei Limited (Yokohama-city, 600 employees) 	DE	No

A	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Rubber	Transfer molding	Pour rubber in a heated mold at a proper temperature. Put materials to 'pot' in the mold, while compression molding has curved area which is product-shaped for materials in the mold. When closing the mold under a certain pressure, the materials go to the mold through the 'pot'. After that, keep the proper cross-linking time and release the molded rubber.	<ul style="list-style-type: none"> *Fukoku Co., Ltd. (Saitama-city, 880 employees) *Yufu Gosei Kagaku Co., Ltd. (Oita-ku, 400 employees) *Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) *Ibaraki Industrial Machinery Co., Ltd. (Ibaraki-pref., 270 employees) *Kinjo Rubber Corp. (Osaka-pref., 250 employees) 	B	Some
	Compression molding	Put rubber in a heated mold at a proper temperature and close the mold. Add pressure and keep the proper cross-linking time, and release the molded rubber.	<ul style="list-style-type: none"> *Nakanishi Metal Works Co., Ltd. (Osaka-pref., 1400 employees) *Takara Inc. (Katsushika-ku, 285 employees) *Kinjo Rubber Corp. (Osaka-pref., 250 employees) *Mitsuya Co., Ltd. (Yamanashi-pref., 250 employees) *Denken Co., Ltd. (Oita-pref., 250 employees) 	C	Some
	Injection molding	Pour rubber in a heated mold at a proper temperature after fixing the injection tube to the mold. Keep the proper cross-linking time and release the molded rubber. It is similar to transfer molding, however, it needs a device for injection. The cross-linking time is much shorter than compression/transfer molding (less than 1/3 time), the cost is low and it is suitable for mass production.	<ul style="list-style-type: none"> *Nakanishi Metal Works Co., Ltd. (Osaka-pref., 1400 employees) *Fukoku Co., Ltd. (Saitama-city, 880 employees) *Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) *Fukae MFG Co., Ltd. (Fukuoka-pref., 330 employees) *Okawa Screw Manufacturing Co., Ltd. (Shinaga-ku, 320 employees) 	C	Some
	Pressing	Utilize pressure, press rubber and cut it out by pressing machine. Mainly punching machines such as Thomson/Vik type is used for pressing.	<ul style="list-style-type: none"> *Nakanishi Metal Works Co., Ltd. (Osaka-pref., 1400 employees) *IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) *Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) *Mitsui High-tec, Inc. (Fukuoka-pref., 1250 employees) *Misuzu Industries Corporation (Nagano-pref., 600 employees) *Enomoto Co., Ltd. (Yamanashi-pref., 522 employees) 	C	Some
	Punching	Press sheet materials by vik cutter and punching out designed shape. Different from NC machining/laser machining, the process doesn't cost high and we can expect quick punching. It is applied to rubber packing etc.	<ul style="list-style-type: none"> *Nakanishi Metal Works Co., Ltd. (Osaka-pref., 1400 employees) *Mitsui High-tec, Inc. (Fukuoka-pref., 1250 employees) *Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) *IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) *Misuzu Industries Corporation (Nagano-pref., 600 employees) 	C	Some

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Die-cast -casting	Evaporative pattern casting (full mold)	Full mold casting is; pour melt steel into a mold made of styrene form, and after that, melt away the mold and release the product. Also known as evaporative pattern casting/lost form/EPCprocess/FMCPprocess.	<ul style="list-style-type: none"> *Hokuriku casting corporation association (Ishikawa-pref., 70 employees) *Takasaka (Niicaga-pref., 50 employees) *Ishikawa Foundry Co., Ltd. (Osaka-pref., 20 employees) 	B	No (have possibility in future)
	Die-cast	Die-cast is one of mold casting. Inject melted metal to a mold and produce castings with high dimensional accuracy in a short time. Production volume of Aluminum is typically big as it is easy to cast and material cost is low. Mechanical property and formability is high.	<ul style="list-style-type: none"> *IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) *Parker Kako Co., Ltd. (Chuo-ku, 600 employees) *TOP Co., Ltd. (Fuku-pref., 388 employees) *Topla Co., Ltd. (Mie-pref., 370 employees) *Inatec Co., Ltd. (Aichi-pref., 350 employees) 	C	Some
	Sand mold casting (green sand mold)	Sand mold casting is; pour material into casting mold made of silica with caking agent. Green sand casting, carbon dioxide casting, self-hardening casting, for example.	<ul style="list-style-type: none"> *Kitagawa Iron Works Co., Ltd. (Hiroshima-pref., 900 employees) *IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) *Daihatsu Metal Co., Ltd. (Hyogo-pref., 416 employees) *Inatec Co., Ltd. (Aichi-pref., 350 employees) *Kyushu Mitsui Aluminium Co., Ltd. (Fukuoka-pref., 320 employees) 	C	Some
	Lost-wax	It is one of evaporative casting and utilize wax. Shape wax following product design, cover the outside with casting sand, melt away the wax and pour metal for casting to empty space which is generated by elimination of wax. The characteristic is that it doesn't need to consider draft angle/undercut. In case original casting is shaped considering shrinkage ratio in advance, as it can combine the complicated shapes into one, it can reduce production process and enable to down the cost.	<ul style="list-style-type: none"> *Kitagawa Iron Works Co., Ltd. (Hiroshima-pref., 900 employees) *Kingsparts Co., Ltd. (Hiroshima-pref., 380 employees) *Kyoto Tool Co., Ltd. (Kyoto-pref., 370 employees) *Nippo Valve Co., Ltd. (Nagano-pref., 310 employees) *Nissho Yufu (Chiyoda-ku, 300 employees) 	C	No

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Glass	Glass mirror polishing	Polish glass surface and enables light reflection and transmission. No oxide film which will prevent gloss. Polishing level of the surface is under 50nmRz.	<ul style="list-style-type: none"> •Nichiyeu Electronics Co., Ltd. (Niigata-pref., 500 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Eyeteck Co., Ltd. (Fukui-pref., 270 employees) •Okamoto Glass Co., Ltd. (Chiba-pref., 260 employees) •Hokuriku Aluminium Co., Ltd. (Toyama-pref., 250 employees) 	A	No
	Optical thin film product	It has evaporated thin film in a certain thickness at a certain reflective index. Weaken or strengthen the reflection of specified wavelength by combining several films in different reflective index and utilizing light reflection and intervention.	<ul style="list-style-type: none"> •Isuzu Glass Co., Ltd. (Osaka-pref., 170 employees) •Ceratech Japan Co., Ltd. (Nagano-pref., 160 employees) •Sekinos Co., Ltd. (Tochigi-pref., 150 employees) •Toyotec Co., Ltd. (Aichi-pref., 120 employees) •Shuwa Co., Ltd. (Toshima-ku, 25 employees) 	A	No
	Aspherical lens	The surface curve of lens is not a part of sphere. To correct the weakness (especially astigmatism and distortion) of lens in light curve angle, the lens surface is designed by combination of several different curvature radius (curve of sphere surface).	<ul style="list-style-type: none"> •Toyo Lens Co., Ltd. (Oume-city, 550 employees) •Echo Co., Ltd. (Atsugi-city, 188 employees) •Isuzu Glass Co., Ltd. (Osaka-pref., 170 employees) •Ceratech Japan Co., Ltd. (Nagano-pref., 160 employees) •Hikifune Co., Ltd. (Katsushika-ku, 150 employees) 	A	No
	Spherical lens	The shape of lens surface curve is some part of sphere, such as convex lens and concave lens.	<ul style="list-style-type: none"> •Okamoto Glass Co., Ltd. (Chiba-pref., 260 employees) •Bull Precision, Inc. (Tochigi-pref., 70 employees) •Iyama Precision Glass Co., Ltd. (Ohta-ku, 70 employees) •Hiki Optics Co., Ltd. (Nagano-pref., 60 employees) •Hitachi Jeei Tech Co., Ltd. (Yokohama-city, 55 employees) 	B	Some
	Hardened glass production	Comparing with general float plate glass, it has 3 to 5 times strength. As it will become rounded particles and relatively safe when broken, applied to windows of cars and schools etc.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Rapias Electronics Co., Ltd. (Iwate-pref., 275 employees) •Okamoto Glass Co., Ltd. (Chiba-pref., 260 employees) 	BC	Some
	Art glass production	Produce art glass mainly for home use, such as dishes.	<ul style="list-style-type: none"> •Sakai Glass Co., Ltd. (Osaka-pref., 64 employees) •Ikoma Glass (Kyoto-pref., 48 employees) •Kobun Kogyo (Shinagawa-ku, 38 employees) •Sugihara Glassworks Inc. (Sumida-ku, 18 employees) •Kansai Kakou (Hyogo-pref., 11 employees) 	D	No

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Electronic components	Cable manufacturing	Manufacturing of Cables, such as synthetic-resin-covered electric wire (cable) and UL-approved wire (cable).	<ul style="list-style-type: none"> •Shintec Hozumi Co., Ltd. (Aichi-pref., 420 employees) •Yamato Industrial Co., Ltd. (Shizuoka-pref., 300 employees) •Jokoh Co., Ltd. (Bunkyo-ku, 290 employees) •Takara Inc. (Katsushika-ku, 285 employees) •KHC (Kumamoto-pref., 265 employees) 	B	Yes
	Connector manufacturing	Manufacturing of components which is used for wiring for electronic circuit and light transmission. In case of soldering or press bonding or melt bonding, cable cutting is required when disconnecting and reconnecting is almost unavailable, however, in case of using connectors, re-connecting is repeatedly available easily by hand or simple tools.	<ul style="list-style-type: none"> •Takashin Co., Ltd. (Aomori-pref., 803 employees) •Enomoto Co., Ltd. (Yamanashi-pref., 522 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Fukui Byora Co., Ltd. (Fukui-pref., 430 employees) •Yamato Denki Ind. Co., Ltd. (Nagano-pref., 350 employees) 	B	Yes
	Code manufacturing	Manufacturing of codes which help transmission of electric or signal.	<ul style="list-style-type: none"> •Fuso Industries, Ltd. (Shiga-pref., 300 employees) •Yumex Co., Ltd. (Saitama-pref., 210 employees) •UMC Electronics Co., Ltd. (Saitama-pref., 185 employees) •Aron Denki Co., Ltd. (Kagoshima-pref., 170 employees) •Intewired Co., Ltd. (Shinagawa-ku, 160 employees) 	B	Yes
	Switch manufacturing	Manufacturing of componets for electric current switching.	<ul style="list-style-type: none"> •Schmalz K.K. (Yokohama-city, 600 employees) •Nippon Aleph Corporation (Yokohama-city, 308 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Alpha Denshi (Fukushima-pref., 280 employees) •Yutaka Electric MFG. Co., Ltd. (Shinagawa-ku, 250 employees) 	B	Yes
	Power supply unit manufacturing	Manufacturing of devices for power supply.	<ul style="list-style-type: none"> •Alpha Denshi (Fukushima-pref., 280 employees) •Ibaraki Industrial Machinery Co., Ltd. (Ibaraki-pref., 270 employees) •Kodai Hitec Co., Ltd. (Minato-ku, 180 employees) •Showa Sangyo Co., Ltd. (Yamanashi-pref., 165 employees) •Oriex K.K. (Nagano-pref., 150 employees) 	B	Yes
	Transformer manufacturing	Manufacturing of components and equipments which transform high voltage of ACby electromagnatic induction.	<ul style="list-style-type: none"> •Yoshida Denzai Kogyo Co., Ltd. (Taio-ku, 230 employees) •Tsubamex Co., Ltd. (Niigata-pref., 228 employees) •Oriex K.K. (Nagano-pref., 150 employees) •Taiyodenki Corporation. (Yamanashi-pref., 125 employees) •Taisei Co., Ltd. (Chichibu-city, 113 employees) 	B	Yes
	Coil manufacturing	Manufacturing of passive electronic components which can build up energy in magnetic field made by electric current.	<ul style="list-style-type: none"> •Sansen Co., Ltd. (Gunma-pref., 370 employees) •Aiao Aluminum Co., Ltd. (Nerima-ku, 350 employees) •Okawa screw manufacturing Co., Ltd. (Shinagawa-ku, 320 employees) •Nissho Co., Ltd. (Ibaraki-pref., 280 employees) •Hakudo Co., Ltd. (Chiyoda-ku, 242 employees) 	B	Yes
	Harness processing	It is converting process of wire harness. Put several electric wires for power supply and signal transmission, and convert them to shape or length which is convenient for handling.	<ul style="list-style-type: none"> •Tsugawa Corp. (Yokohama-city, 449 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Hayashi Watch-works Co., Ltd. (Toshima-ku, 230 employees) •Kojima (Aichi-pref., 240 employees) •Shimohira Electric MFG Co., Ltd. (Osaka-pref., 230 employees) 	D	No

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Electronic components	Flexible circuit board	One of printed board. It has thin/flexible materials as insulator board. It is applied to small electronic equipments at is thin and flexible and has high availability in embedding. Film wiring materials for connector wiring are also called as flexible board.	<ul style="list-style-type: none"> •Munekata Co. Ltd. (Osaka-pref., 500 employees) •Wabo Electronics Co., Ltd. (Shiga-pref., 465 employees) •Oyo Electric Co., Ltd. (Kyoto-pref., 450 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Tokyo Drawing Ltd. (Ohta-ku, 420 employees) 	A	Yes
	Multilayer board	It has wiring layer even in inside of insulator board. Total over 3 layers in the board including surface, reverse, over 1 layer inside.	<ul style="list-style-type: none"> •Wabo Electronics Co., Ltd. (Shiga-pref., 465 employees) •Alpha Denshi (Fukushima-pref., 280 employees) •Arm Electronics Co., Ltd. (Hachioji-city, 265 employees) •KHC (Kumamoto-pref., 265 employees) •Taiyo Kogyo Co., Ltd. (Shinagawa-ku, 257 employees) 	A	Yes
	High current board	Special board which has high current and high heat radiation for power device.	<ul style="list-style-type: none"> •Alpha Denshi (Fukushima-pref., 280 employees) •Taiyo Kogyo Co., Ltd. (Shinagawa-ku, 257 employees) •Tsuzuki Densan Co., Ltd. (Minato-ku, 250 employees) •Fuji Nameplate Co., Ltd. (Nagano-pref., 170 employees) •Kojin Co., Ltd. (Toyama-pref., 149 employees) 	A	Yes
	Rigid board	One of printed boards. Composed by insulator base materials with no flexibility. Categorized as phenol board, epoxy board, teflon board, alumina board, basing its components.	<ul style="list-style-type: none"> •Wabo Electronics Co., Ltd. (Shiga-pref., 465 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Alpha Denshi (Fukushima-pref., 280 employees) •Arm Electronics Co., Ltd. (Hachioji-city, 265 employees) •One A Co., Ltd. (Osaka-pref., 260 employees) 	B	Yes
	prototype/small lot (printed board) manufacturing	Manufacturing technology of printed board for prototype/small lot.	<ul style="list-style-type: none"> •Tokyo Electric Co., Ltd. (Chiyoda-ku, 1011 employees) •Sumitomo precision Products Co., Ltd. (Ohtsu-ku, 1000 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Takashin Co., Ltd. (Aomori-pref., 803 employees) •Rising Corporation (Osaka-pref., 600 employees) 	B	Yes
	Double-side processing	Circuit printing both on double side of printed board.	<ul style="list-style-type: none"> •Wabo Electronics Co., Ltd. (Shiga-pref., 465 employees) •Tsukiden Kogyo Co., Ltd. (Fukushima-pref., 372 employees) •Alpha Denshi (Fukushima-pref., 280 employees) •Arm Electronics Co., Ltd. (Hachioji-city, 265 employees) •Taiyo Kogyo Co., Ltd. (Shinagawa-ku, 257 employees) 	B	Yes
	Assembling and connecting of electronic equipment	Technology for assembling /connecting of electronic equipment	<ul style="list-style-type: none"> •Alpha Denshi (Fukushima-pref., 280 employees) •Arm Electronics Co., Ltd. (Hachioji-city, 265 employees) •Taiyo Kogyo Co., Ltd. (Shinagawa-ku, 257 employees) •Tsuzuki Densan Co., Ltd. (Minato-ku, 250 employees) •Axel(Taito-ku, 220 employees) 	C	Some
	One-side processing	Circuit printing only on one side of printed board.	<ul style="list-style-type: none"> •Tsukiden Kogyo Co., Ltd. (Fukushima-pref., 372 employees) •Alpha Denshi (Fukushima-pref., 280 employees) •KHC (Kumamoto-pref., 265 employees) •Arm Electronics Co., Ltd. (Hachioji-city, 265 employees) •Taiyo Kogyo Co., Ltd. (Shinagawa-ku, 257 employees) 	C	Some

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Pressing	Shaving	Shaving is; improving cut surface after punching. For concred example, making fracture surface flat, getting right angle of the board edge surface more accurate, etc. it also includes improvements of dimension accuracy.	<ul style="list-style-type: none"> •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref. 400 employees) •Nisshin Kogyo Co., Ltd. (Shiga-pref. 340 employees) •Pacific Engineering Corporation (Gifu-pref. 300 employees) 	A	No (have possibility in future)
	Fine blanking	Fine blanking means; strengthen metal plasticity by adding hydrostatic pressure, and cut materials flat and smooth in thickness, or process 3D formation at low cost. Fine blanking die is produced by this process.	<ul style="list-style-type: none"> •Takara Inc. (Katsushika-ku, 285 employees) •Nakanishi Metal Works Co., Ltd. (Osaka-pref. 1400 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref. 400 employees) •Taiyo Kogyo Co., Ltd. (Nagano-pref. 350 employees) •Nisshin Kogyo Co., Ltd. (Shiga-pref. 340 employees) •Pacific Engineering Corporation (Gifu-pref. 300 employees) 	B	Some
	Forming	Produced by a forming machine which has both of pressing part and bending part. The machine straighten materials inside of it and deliver a certain length, process cutting, holing, rib forming at the pressing part, and at the bending part, form complex shape composed by round or angle.	<ul style="list-style-type: none"> •Mitsui High-tec. Inc. (Fukuoka-pref. 1250 employees) •Nippon Kinzoku Co., Ltd. (Minato-ku, 600 employees) •Misuzu Industries Corporation (Nagano-pref. 600 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref. 400 employees) 	B	Some
	Multi forming	Multi forming is; a core bar which is set at the center of the machine at the bending part can be bent from every angle (360°) and it makes more complicated shape available.	<ul style="list-style-type: none"> •Sanyoh MFG Co., Ltd. (Tochigi-pref. 400 employees) •Nisshin Kogyo Co., Ltd. (Shiga-pref. 340 employees) •Yamamoto Seisakusho, Inc. (Saitama-pref. 298 employees) •Heiwa Hatsujyo Industry Co., Ltd. (Hyogo-pref. 260 employees) •Chuo Spring Co., Ltd. (Ohita-pref. 220 employees) 	B	Some
	Progressive die	The die is produced through some process which placed at a certain distance evenly in one machine unit. The feeder put the materials to the next pross one by one per one press cycle.	<ul style="list-style-type: none"> •Nakanishi Metal Works Co., Ltd. (Osaka-pref. 1400 employees) •Mitsui high-tec. Inc. (Fukuoka-pref. 1250 employees) •Misuzu Industries Corporation (Nagano pref. 600 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Morioka Seiko Instruments Inc. (Iwate-pref. 473 employees) 	B	Some
	Roll forming	Roll forming is; gradually process bending to rolls passing metal bare board or metal band through the rolls. It enables complicated formation of the edge face, and as it is applied in full automated machines for mass production, we can expect great cost down and short delivery time.	<ul style="list-style-type: none"> •Sanyoh MFG Co., Ltd. (Tochigi-pref. 400 employees) •Nisshin Kogyo Co., Ltd. (Shiga-pref. 340 employees) •Yamamoto Seisakusho, Inc. (Saitama-pref. 298 employees) •Heiwa Hatsujyo Industry Co., Ltd. (Hyogo-pref. 260 employees) •Chuo Spring Co., Ltd. (Ohita-pref. 220 employees) 	B	Some
	Transfer die	It is a mass-produced die set which have some converting process in it. Each process is conducted by transferring by 'gripping finger' on the pressing machine. It has better material yield comparing with progressive die.	<ul style="list-style-type: none"> •Nakanishi Metal Works Co., Ltd. (Osaka-pref. 1400 employees) •Mitsui High-tec. Inc. (Fukuoka-pref. 1250 employees) •Nippon Molymer Co., Ltd. (Osaka-pref. 380 employees) •Topia Co., Ltd. (Mie-pref. 370 employees) •Nisshin Kogyo Co., Ltd. (Shiga-pref. 340 employees) 	B	Some
	Bending	One of pressing die for car parts and electronic components. It is made by twisting metal when pressing.	<ul style="list-style-type: none"> •Nakanishi Metal Works Co., Ltd. (Osaka-pref. 1400 employees) •Mitsui High-tec. Inc. (Fukuoka-pref. 1250 employees) •Misuzu Industries Corporation (Nagano-pref. 600 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Morioka Seiko Instruments Inc. (Iwate-pref. 473 employees) 	C	Some
	Punching	One of pressing die for car parts and electronic components. Punch out profile. The punched out shape can be either directly applied to product, or sometimes intermediate process of bending or spinning. Normally the punched out products will fall down through the die.	<ul style="list-style-type: none"> •Mitsui High-tec. Inc. (Fukuoka-pref. 1250 employees) •Misuzu Industries Corporation (Nagano-pref. 600 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Morioka Seiko Instruments Inc. (Iwate-pref. 473 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref. 468 employees) 	C	Some
	Single action die	Each process has individual die. The set-up and take out of materials is made manually. Buid one die in one pressing machine and it is also conducted by hand.	<ul style="list-style-type: none"> •Nakanishi Metal Works Co., Ltd. (Osaka-pref. 1400 employees) •Mitsui High-tec. Inc. (Fukuoka-pref. 1250 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref. 468 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) 	C	Some
Spinning	One of pressing die for car parts and electronic components. It is made by Utilizing metal extensibility during pressing.	<ul style="list-style-type: none"> •Nakanishi Metal Works Co., Ltd. (Osaka-pref. 1400 employees) •Misuzu Industries Corporation (Nagano-pref. 600 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref. 500 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref. 400 employees) •TOP Co., Ltd. (Fukui-pref. 388 employees) 	C	Some	

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Painting	UV coating	UV coating is; utilize UV hard coat paint which is cured by UV. Comparing with urethane coating, it looks luxurious, glossy, and has transparency, and suitable for mirror finishing. It has high abrasion resistance, chemical resistance, solvent resistance, heat resistance. It also has efficiency to prevent slipping and appropriate to coat floor and stairs.	<ul style="list-style-type: none"> •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Daikyo Corporation (Ishikawa-pref., 300 employees) •Hoyo Seiko Co., Ltd. (Ohita-pref., 280 employees) •Eyeteck Corporation (Fukui-pref., 270 employees) •Yoshino Denka Kogyo, Inc. (Saitama-pref., 230 employees) 	A	No (have possibility in future)
	Electrostatic coating	Coating with electrocharged paint. Normally considered as being good for coating by machines. Generally applied to body of car and home electrical appliances. To make the paint misty, there is 'gun type (spray the paint by a spray)' and 'static type (utilize repulse of static paint)'. 'Gun type' is still divided as precharged type (spray precharged paint), or, after charged type (charge paint by corona discharge after spraying by outer electrode).	<ul style="list-style-type: none"> •Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) 	AB	Some
	Electrodeposition coating	One of waterbase paint and it is conductive. Soak coating object (metal) in the paint and apply electric current, and get paint film for coating. Cationic electrodeposition paint, for typical example.	<ul style="list-style-type: none"> •Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) 	AB	Some
	Epoxy coating	Epoxy paint is made up of base resin which contains Epoxy resin and coloring agent, and curing agent. It is cured at normal temperature. It has high adhesion, chemical resistance, weather resistance. Applied to pipe lining, exterior coating etc. Powder coating has powder defusion type and static coating type. It is also suitable for coating of joint of plumbs and inside/outside of the pipes of drinking water.	<ul style="list-style-type: none"> •Tokyo Eletric Co., Ltd. (Chiyoda-ku, 1011 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Yokogawa Bridge Corp. (Funabashi-city, 650 employees) •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Daikyo Corporation (Ishikawa-pref., 300 employees) 	B	Some
	Urethane coating	It utilize the curing property during chemical reaction by mixing 2 different types of painting. Different from oil coating, it forms coating film on surface of wood material, the touching texture is smooth. It can protect the coated wood from oil/water contamination and keep it clean.	<ul style="list-style-type: none"> •Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Yokogawa Bridge Corp. (Funabashi-city, 650 employees) •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Daikyo Corporation (Ishikawa-pref., 300 employees) 	B	Some
	Aqueous coating	The Paint is diluted by thinner instead of water. Normally it is baking type and compound by soluble resin as coating film form ingredients. During coating film forming, the resin is cured and become insoluble coating film.	<ul style="list-style-type: none"> •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Daikyo Corporation (Ishikawa-pref., 300 employees) •Hoyo Seiko Co., Ltd. (Ohita-pref., 280 employees) 	C	Some
	Powder coating	Powder coating is: use powder paint which has no agent such as organic solvent and water in it and compound only by film forming ingredient, it can reduce VOC 100%, the recycle/reuse is also possible, and it will help reducing industrial waste. It is highly valued as it is good for environment.	<ul style="list-style-type: none"> •Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Tsugawa Corp. (Yokohama-city, 449 employees) •Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) •Daikyo Corporation (Ishikawa-pref., 300 employees) 	C	Some
	Wood coating	Coating for wood. The purpose is protection and visual effects. Protect from deterioration and corrosion caused by substances in the air (H2O, O2 etc), and make it visually good by processing the required color, pattern, gloss, smoothness, texture. Usually wood coating mainly conducted for visual effect.	<ul style="list-style-type: none"> •Saisei Industry Co., Ltd. (Toyama-pref., 260 employees) •Hattori Industrial Co., Ltd. (Nagasaki-pref., 150 employees) •Shinpo Electronics Co., Ltd. (Kanagawa-pref., 120 employees) •Ichimura Seisakusho Co., Ltd. (Sapporo-city, 80 employees) •Hosoda Mokuzai Kogyo Co., Ltd. (Koto-ku, 70 employees) 	D	No

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Resin	ABS resin	Copolymer of Acrylonitrile, Butadiene, and Styrene. Most general polystyrenic resin applied for materials for car, construction materials, housing for electronic equipment.	<ul style="list-style-type: none"> •U-Tech Corporation (Nara-pref., 300 employees) •Kyowa Co., Ltd. (Gunma-pref., 210 employees) •Fujidenlo Co., Ltd. (Aichi-pref., 200 employees) •City Plastic Co., Ltd. (Hiroshima-pref., 170 employees) •KEDCO Co., Ltd. (Miyagi-pref., 130 employees) 	A	Yes
	EP(epoxy)	A resin in cross-bridge type, which uses curing agent. Combination of curing agent produces various kinds of resin which has different property. As the cure shrink ratio is low, it has high dimension accuracy. Also has excellence in adhesiveness, mechanical characteristics, chemical property, electric property.	<ul style="list-style-type: none"> •Toko Electric Co., Ltd. (Chiyoda-ku, 1011 employees) •HI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Yokogawa Bridge Corp. (Funabashi-city, 650 employees) •Parke Kako Co., Ltd. (Ohuo-ku, 600 employees) •Daikyo Corporation (Ishikawa-pref., 300 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) 	A	Yes
	Fluororesin	General name of polymers which polymerize olefin containing fluorine. Has high heat resistance and chemical resistance and low friction coefficient.	<ul style="list-style-type: none"> •Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Endo Manufacturing Co., Ltd. (Niigata-pref., 246 employees) •Mie Metal Industry Co., Ltd. (Mie-pref., 235 employees) 	A	Yes
	PMMA (Acryl)	Polymer of acrylic ester or methacrylate ester. High transparent amorphous resin. Transparent solid material compound of poly methyl methacrylate is called acryl glass. As there is distinct smell when rubbing, it is also known as smell glass.	<ul style="list-style-type: none"> •Kitagawa Industries Co., Ltd. (Aichi-pref., 800 employees) •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Takeda design and Manufacturing Co., Ltd. (Aichi-pref., 500 employees) •Munekata Co., Ltd. (Osaka-pref., 500 employees) •Moripka Seiko Instruments Inc. (Iwate-pref., 473 employees) 	A	Yes
	Thermosetting resin	Gradually cured by heating and not get soft by heat. Curing property is 3D structure, the bonding is activated by heat and get cured. Example of use: dishes, PCB of electronic devices, golf shaft and tennis racket, and FRP boat etc.	<ul style="list-style-type: none"> •City Plastic Co., Ltd. (Hiroshima-pref., 170 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Nitto Bultton Co., Ltd. (Nagano-pref., 250 employees) •Mie Metal Industry Co., Ltd. (Mie-pref., 235 employees) •Yamaguchi Denzai Co., Ltd. (Akishima-city, 230 employees) 	A	Yes
	Urethane resin	It is urethane bond, which hydroxyl compounds such as isocyanate, alcohol etc. are condensed. A polymer which a monomer is copolymerized. Compound by Polyol as base material, and various prepolymers as derivatives, polyol compounds, high-polymerization-controlled polyurethane etc. Paint, adhesive, car component parts.	<ul style="list-style-type: none"> •Kyosei Ltd. (Fukui-pref., 270 employees) •Yamaguchi Denzai Co., Ltd. (Akishima-city, 230 employees) •Yumex Co., Ltd. (Saitama-pref., 210 employees) •Fujidenlo Co., Ltd. (Aichi-pref., 200 employees) •Aspen (Nagoya-city, 200 employees) 	A	Yes
	Engineering plastic	Engineer plastic means polymer which reinforce a certain efficiency (mainly heat resistance). It is not that all the engineering plastic has high efficiency, however, by reinforcement, its unit price is higher than other plastics, and the production cost is also higher than usual.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref., 500 employees) •Munekata Co., Ltd. (Osaka-pref., 500 employees) •Morioka Seiko Instruments Inc. (Iwate-pref., 473 employees) •Panasonic Electric Works SUNX Tatsuno Co., Ltd. (Hyogo-pref., 450 employees) 	A	Some
	PBT (polybutylene terephthalate)	Polyester plastic which is thermoplastic and crystalline. One of 5 general engineering plastics. The base is a polycondensated polymer of TPA or DMT and 1,4-butanediol and several agent is added. Most general grade is reinforced by glass fiber. Excellent in heat resistance, chemical resistance, electric property, dimension accuracy, formability. Also easy to process non-flammability. Widely used in manufacturing sector such as electronic and car.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref., 500 employees) •Munekata Co., Ltd. (Osaka-pref., 500 employees) •Panasonic Electric Works SUNX Tatsuno Co., Ltd. (Hyogo-pref., 450 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) 	A	Some
	PES (polyether sulfone)	One of super engineering plastic and has high heat resistance than polysulfone. Its heat resistance is top level in any thermoplastic resins, and its impact resistance is excellent. High chemical resistant and nontoxic. High hydro thermal resistance and non-flammable. Purpose of use: electronic component, machine parts, medical device, food container, paint, etc.	<ul style="list-style-type: none"> •Morioka Seiko Instruments Inc. (Iwate-pref., 473 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Kataken Seiko Co., Ltd. (Kanagawa-pref., 200 employees) •Yamashita Electric Co., Ltd. (Shinagawa-ku, 200 employees) •Nix, Inc. (Yokohama-city, 180 employees) 	A	Some
	PI (polyimide)	Has imide combination as main chain. Extremely excellent in heat resistance (temperature of serial use is over 250°C). Also excellent in heat resistance, strength property, dimension accuracy. Along with recent development of electronic industry, various polymers in different chemical structure are developed by various company labo.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) •Wako Industry Co., Ltd. (Shizuoka-pref., 300 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Yamaguchi Denzai Co., Ltd. (Akishima-city, 230 employees) 	A	Some
	Elastomer	General name of industrial materials which have rubber elasticity. There are 'Thermosetting elastomer' which relatively has high heat resistance and not get soft even when heated, and 'thermoplastic elastomer' which shows flexibility when heated and come back to rubber elastic body when cooled down.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) •Kitano Co., Ltd. (Toyama-pref., 300 employees) •Kyosei Ltd. (Fukui-pref., 270 employees) •Citizen Micro Co., Ltd. (Sayama-city, 280 employees) 	A	No (have possibility in future)
	FRP (fiber-reinforced plastic)	Complex material which strength is reinforced by adding some fiber such as glass fiber to plastic. Main fiber for reinforcement is glass fiber and carbon fiber.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Yufu Gosei Kagaku Co., Ltd. (Ohta-ku, 400 employees) •Nippon Molymer Co., Ltd. (Osaka-pref., 380 employees) •Yamaguchi Denzai Co., Ltd. (Akishima-city, 230 employees) •Kyosei Ltd. (Fukui-pref., 270 employees) 	A	No (have possibility in future)

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
	PPS(polyphenylenesulfide)	A polymer which has simply straight chain structure that benzene ring and sulfur atom are combined in turn. It belongs to crystalline thermoplastic resin. In most case except fiber/film forming, filler reinforced grade is utilized. Purpose of use in electronic sector: gear, connector, insulated parts, lamp housing. Car sector: valve, carburetor parts, fuel parts, hydraulic pump parts, lamp reflector processed with mirror finishing. Machinery sector: gear, piston ring, pump impeller.	<ul style="list-style-type: none"> •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Tohoku Rhythm Co., Ltd. (Fukushima-pref., 500 employees) •Takeda Design and Manufacturing Co., Ltd. (Aichi-pref., 500 employees) •Munekata Co., Ltd. (Osaka-pref., 500 employees) •Panasonic Electric Works SUNX Tatsuno Co., Ltd. (Hyogo-pref., 450 employees) 	B	Some
	PP(Polypropylene)	Polymer of propylene. Thermoplastic resin. Industrially available and there are several purpose of use, such as packaging material, fiber, stationery, plastic parts, various reusable container, experimental instrument, speaker cone, car component, bank note. Has most smaller specific weight in general-purpose resin. Floatable on water.	<ul style="list-style-type: none"> •Hoyo Seiko Co., Ltd. (Ohta-pref., 280 employees) •Fujikako Inc. (Taito-ku, 250 employees) •Shinwa Controls Co., Ltd. (Kawasaki-city, 240 employees) •Fujidenolo Co., Ltd. (Aichi-pref., 200 employees) •City Plastic Co., Ltd. (Hiroshima-pref., 170 employees) 	BC	Some
	PVC(Polyvinyl chloride)	One of most general polymers which polymerize chloroethylene. Commonly called in abbreviation. As resin only compounds of chloroethylene monomer is hard and fragile, and it is easy to deteriorate and become yellow by decomposing of chloride when exposed to UV, it is required to add plasticizing agent and stabilizing agent for prevention of deterioration. Thermoplastic resin.	<ul style="list-style-type: none"> •Kitagawa Industries Co., Ltd. (Aichi-pref., 800 employees) •Hida Denki Co., Ltd. (Ishikawa-pref., 500 employees) •Takeda Design and Manufacturing Co., Ltd. (Aichi-pref., 500 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Kyosei Ltd. (Fukui-pref., 270 employees) 	C	Some

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Heat treatment	Austempering	Cooling treatment which transform supercool austenite into bainite at constant temperature. That means, austempering is one of hot bath quenching, process quenching of heated steel in high temperature cooling media above martensite point, complete isothermal transformation, and complete treatment by one cooling process, which can obtain equivalent effect to quenching and tempering.	<ul style="list-style-type: none"> •Heiwa Hatsujyo Industry, Co., Ltd. (Hyogo-pref., 260 employees) •Asahi Industry Property Co., Ltd. (Aichi-pref., 220 employees) •Senshu (Osaka-pref., 140 employees) •Nitto Hatsujo Co., Ltd. (Kawasaki-city, 125 employees) •Marutake Buhin Co., Ltd. (Shizuoka-pref., 103 employees) 	A	No (have possibility in future)
	CVD(chemical vapor deposition)	One of evaporation methods which forms film of various substance. Supply material gas which contains composition of film on base board heated in reaction tube made by quartz, produces films by chemical reaction on base board surface or vapor phase.	<ul style="list-style-type: none"> •Tocalo Co., Ltd. (Hyogo-pref., 503 employees) •Okamoto Glass Co., Ltd. (Chiba-pref., 260 employees) •Aspen (Nagoya-city, 200 employees) •Oriental Engineering Co., Ltd. (Arakawa-ku, 180 employees) •Asai Sangyo Co., Ltd. (Minato-ku, 160 employees) 	A	Some
	Solution treatment	Usually alloy element for mixing is easy to solve at high temperature. Apply the theory, process heat treatment as follows: heat alloy element up to specified temperature, and after that, rapidly cool it down, the element remains resolved even though originally the element doesn't not resolve at the cooling temperature. The temperature of the treatment is normally 450 to 550°C for alloy aluminum, 1000 to 1100°C for stainless.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Kyushu Mitsui Aluminium Co., Ltd. (Fukuoka-pref., 320 employees) •Sunrise Industry Co., Ltd. (Hyogo-pref., 295 employees) •Daido Precision Industries Co., Ltd. (Toshima-ku, 200 employees) •Oriental Engineering Co., Ltd. (Arakawa-ku, 180 employees) 	A	Some
	Vacuum annealing	Annealing at vacuum condition helps making the structure more even and enables to process treatment with more gloss, higher accuracy, longer life.	<ul style="list-style-type: none"> •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Ladvik Co., Ltd. (Saitama-pref., 278 employees) •Tokyo Tokushu Glass Co., Ltd. (Gunma-pref., 201 employees) •Daido precision Industries Ltd. (Toshima-ku, 200 employees) 	A	Some
	Carburized quenching	Typical surface curing method. Mix carbon on surface of low-carbon steel and get excellent hardness of surface by martensite after quenching. Used for gears, shafts, bearings of construction machines.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Hitachi Technologies and Services Ltd.(Ibaraki-pref., 650 employees) •Kyoritsu Seiki Corporation (Okayama-pref., 340 employees) •Toku Pneumatic Tool MFG Co., Ltd. (Saga-pref., 312 employees) 	B	Some
	Full annealing	Treatment which heat material around transformation point +50°C and keep the temperature basing on the weight of the material, and gradually cooling down after that. To adjust the strain inside, cooling down at the transformation point is proceeded slowly for transformation.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Toku Pneumatic Tool MFG Co., Ltd. (Saga-pref., 312 employees) •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) •Daido Precision Industries Ltd. (Toshima-ku, 200 employees) 	B	Some
	Gas nitrocarburizing	Diffuse carbon and nitrogen at low temperature. Comparing with carburized quenching, the required treatment time is short and dimension change is rarely seen. The treatment temperature is around 570°C, and ammonia gas and carburizing gas (RX gas) are used as main react gas.	<ul style="list-style-type: none"> •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) •Futamiya Co., Ltd. (Fukushima-pref., 295 employees) •Sanyo Hydraulic (Okayama-pref., 270 employees) •Nikko Techno (Hiroshima-pref., 267 employees) •Yoshino Denka Kogyo Inc. (Saitama-pref., 230 employees) 	B	Some
	Nitride treatment	Expose steel which includes nitridation elements such as aluminum, chrom, molybdenum to air with ammonia or nitrogen, heat it under austenite temperature, and cure it by permeating nitrogen to 1mm from steel surface. As a physical property, excellent in wear resistance as it has hard layers (available over 1000HV), also excellent in fatigue strength as the surface has compressive residual stress generated by nitrocompounds	<ul style="list-style-type: none"> •Hitachi Technologies and Services Ltd. (Ibaraki-pref., 650 employees) •Kyoto Tool Co., Ltd. (Kyoto-pref., 370 employees) •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) •Nikko Techno (Hiroshima-pref., 267 employees) •Yoshino Denka Kogyo Inc. (Saitama-pref., 230 employees) 	B	Some
	Strain relieving annealing	Heat treatment which heats and keeps at the temperature under transformation point applying loading after casting/forging/welding to relieve the inside strain. As inside strain can be relieved at around 450 C, normally treated at 500 to 600 C and cool it down.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Hitachi Technologies and Services, Ltd. (Ibaraki-pref., 650 employees) •Toku pneumatic Tool MFG Co., Ltd. (Saga-pref., 312 employees) •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) •Furamiya Co., Ltd. (Fukushima-pref., 295 employees) 	B	Some
	Stress relieving annealing (SR treatment)	Treatment which heat inside stress (strain staying at the material inside during conversion. In case leave it as it is, the stress will come out and cause dimension change or cracking) generated during forging and welding, and intentionally push the energy out for smooth following converting operation. Conducted at 580°C±20°C.	<ul style="list-style-type: none"> •Nisshin Kogyo Co., Ltd. (Shiga-pref., 340 employees) •Sugahara Industry Co., Ltd. (Ohita-pref., 200 employees) •Sakura Metal Plating Co., Ltd. (Yokohama-city, 200 employees) •Fujita Giken Inc. (Ishikawa-pref., 142 employees) •Senshu (Osaka-pref., 140 employees) 	B	Some
	Subzero treatment	Treatment which immediately cool down the quenched product again under 0°C (around -80°C). In case of steel, this is treated to eliminate remained austenite and promote curing by quenching (austenite to martensite). It prevents aging.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Kobayashi Industry Co., Ltd. (Akita-pref., 245 employees) •Asahi Industry Property Co., Ltd. (Aichi-pref., 220 employees) 	B	Some
	Vacuum normalization	Conduct normalization treatment in the vacuum condition by decompressing by rotary pumps, and make the structure even. It also helps the material more glossy and have high accuracy/long life surface treatment.	<ul style="list-style-type: none"> •Hitachi Technologies and Services, Ltd. (Ibaraki-pref., 650 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Ladvik Co., Ltd. (Saitama-pref., 278 employees) •Daido Precision Industries Ltd. (Toshima-ku, 200 employees) •Oriental Engineering Co., Ltd. (Arakawa-ku, 180 employees) 	B	Some
	Vacuum quenching	Vacuum the inside of vacuum furnace by pumps and heat products, and conduct oil cooling or fan cooling by nitro gas. As quenching is processed in vacuum condition and finish quenching by neutral gas convection cooling or oil cooling after heating, also thought to be one of bright heat treatments.	<ul style="list-style-type: none"> •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Kyoto Tool Co., Ltd. (Kyoto-pref., 370 employees) •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) •Takara Inc. (Katsushika-ku, 285 employees) •Moriya Cutlery Laboratory, Ltd. (Shimane-pref., 220 employees) 	B	Some

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Heat treatment	Annealing	Heat treatment which releases strain inside caused by curing and soften the structure, and improve ductility. Reduce the defect by raising crystal by gradual cool-down after heat treatment of metal material.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Hitachi Technologies and Services, Ltd. (Ibaraki-pref., 850 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Nisshin Kogyo Co., Ltd. (Shiga-pref., 340 employees) •Kyoritsu Seiki Co., Ltd. (Okayama-pref., 340 employees) 	C	Some
	Induction hardening	Heat treatment. Put coils around conductor and pass electric current. Surface of conductor gets inducted current and produces heat. The effect is mostly utilized for quenching. It is called induction hardening.	<ul style="list-style-type: none"> •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Hitachi Technologies and Services Ltd. (Ibaraki-pref., 850 employees) •Kyoto Tool Co., Ltd. (Kyoto-pref., 370 employees) •Aio precision Co., Ltd. (Iwate-pref., 300 employees) •Futamiya Co., Ltd. (Fukushima-pref., 295 employees) 	C	Some
	Normalization	Heat treatment which relieves strain inside, normalizes and minimizes steel. It enables to improve strength, ductility. It is also processed as pre-treatment for annealing.	<ul style="list-style-type: none"> •Mishima Kosan Co., Ltd. (Fukuoka-pref., 2300 employees) •Hitachi Technologies and Services, Ltd. (Ibaraki-pref., 850 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Kyoritsu Seiki Co., Ltd. (Okayama-pref., 340 employees) •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) 	C	Some
	Quenching	Heat treatment which transform steel into martensite structure by rapidly cooling down in water or oil, after heating to austenite structure. The purpose is increasing hardness of steel, however, as the treatment lower tenacity, in order to keep tenacity, usually treat tempering. Those 2 process are sometimes called 'QT treatment'.	<ul style="list-style-type: none"> •IHI Shibaura Machinery Corporation (Nagano-pref., 850 employees) •Nagasaki Ryoden Technica Co., Ltd. (Nagasaki-pref., 468 employees) •Fuso Industries, Ltd. (Shiga-pref., 300 employees) •Futamiya Co., Ltd. (Fukushima-pref., 295 employees) •Takara Inc. (Katsushika-ku, 285 employees) 	C	Some

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Surface treatment (plating)	Alodine (Aluminum chromate) treatment	It is suitable for base treatment for painting. Its film conducts electricity. On the other hand, alumite doesn't conduct electricity, however, as it gets solid oxidized film, its corrosion resistance is higher and suitable for use of exterior parts which requires high corrosion resistance.	<ul style="list-style-type: none"> -Parker Kako Co., Ltd. (Chuo-ku, 600 employees) -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Hokuriku Aluminium Co., Ltd. (Toyama-pref., 250 employees) -Mitsuya Co., Ltd. (Yamanashi-pref., 250 employees) 	A	No (have possibility in future)
	Chemical forming treatment	One of surface finishing. Add treating agent to material surface (especially effective for metal) and have chemical reaction, and give the material different property such as corrosion resistant and paint affinity.	<ul style="list-style-type: none"> -Parker Kako Co., Ltd. (Chuo-ku, 600 employees) -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Daiyko Corporation (Ishikawa-pref., 300 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Isogai (Nagoya-city, 280 employees) 	A	No (have possibility in future)
	Electroform (rack method)	Conduct electroplating to mother die which thick is at mm unit. Release it after that. As it can accurately follow original figure, it is utilized for craftwork and ritual articles mainly in art field. There are copper electrocasting, silver electrocasting, and nickel electrocasting (nickel electrocasting for industrial use)	<ul style="list-style-type: none"> -Nomura Plating Co., Ltd. (Osaka-pref., 323 employees) -Hikifune Co., Ltd. (Katsushika-ku, 150 employees) -Ueda Plating Co., Ltd. (Kyoto-pref., 150 employees) -Tsuokada Riken Industry Co., Ltd. (Nagano-pref., 140 employees) -Aione Co., Ltd. (Minato-ku, 130 employees) 	A	No (have possibility in future)
	Electroless copper	Electroless copper plating is 'self-catalytic (autocatalytic)', which means film forming repeatedly continues on the formed film after the material surface is completely coated, able to get the surface plated thick.	<ul style="list-style-type: none"> -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Kondo Kouzai (Shizuoka-pref., 200 employees) -Hikifune Co., Ltd. (Katsushika-ku, 150 employees) -Tsuokada Riken Industry Co., Ltd. (Nagano-pref., 140 employees) -KEDC Co., Ltd. (Sendai-city, 130 employees) 	A	No (have possibility in future)
	Gold plating, Silver plating	Plating by noble metal. From ancient time, utilized for harness, sword, ritual article, accessories etc. At the current moment, it is still recognized to be an excellent plating method for accessories, smoking supplies, lighting equipments, glasses frame, watch, bag parts, dishes, ritual articles.	<ul style="list-style-type: none"> -Yamato Denki Ind. Co., Ltd. (Nagano-pref., 350 employees) -Nomura Plating Co., Ltd. (Osaka-pref., 323 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Isogai (Nagoya-city, 280 employees) -Tokushu Kinzoku Excel Co., Ltd. (Saitama-pref., 270 employees) 	A	No (have possibility in future)
	parkering(phosphate film)	Treatment which chemically makes phosphate film on metal surface by phosphate solution. Mainly conducted for slowing steel surface corrosion. The treating film is utilizing corrosion, it is corroded at a certain level.	<ul style="list-style-type: none"> -Parker Kako Co., Ltd. (Chuo-ku, 600 employees) -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Isogai (Nagoya-city, 280 employees) -Asahi Industry Property Co., Ltd. (Aichi-pref., 220 employees) 	A	No (have possibility in future)
	Acid pickling	Treatment for removing welding scale or getting gray, pearskin surface. It improves corrosion resistance. It shows mat surface (like blast finish). Utilized for cleaning of wirecut face, etc.	<ul style="list-style-type: none"> -Parker Kako Co., Ltd. (Chuo-ku, 600 employees) -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Sunrise Industry Co., Ltd. (Hyogo-pref., 295 employees) 	B	Some
	Alumite (anodization)	Anodic oxide film of aluminum. The purpose is improving corrosion resistance and wear resistance of aluminum, and adding other function such as decorating.	<ul style="list-style-type: none"> -Tsugawa Corp. (Kanagawa-pref., 449 employees) -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Isogai (Nagoya-city, 280 employees) -ITEG (Fuku-pref., 270 employees) 	B	Some
	Black chromium	Plating film of black chromium is very thin. Basically it is mat black film, and the hardness of surface is not so good as normal chromium plating, however, Comparing with other method for blackening such as painting, superior in corrosion resistance, wear resistance, and adhesiveness.	<ul style="list-style-type: none"> -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Kondo Kouzai (Shizuoka-pref., 200 employees) -Union Kikou (Gifu-pref., 150 employees) -KEDC Co., Ltd. (Sendai-city, 130 employees) -Aione Co., Ltd. (Minato-ku, 130 employees) 	B	Some
	Chromate (general)	General name of chromate salt. Also, among chemical conversion treatment, chromate treatment which uses chromate salt is called only 'chromate' for short. Chromate treatment is processed to zinc, aluminum etc. Soak material into solution containing hexavalent chrom and make the material stable. It enables to have self-restoring film while having chemical polishing process at the same time.	<ul style="list-style-type: none"> -Parker Kako Co., Ltd. (Chuo-ku, 600 employees) -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Isogai (Nagoya-city, 280 employees) 	B	Some
	Electroless copper	During soaking, makes copper film on object by electron which is diffused by dioxide of restoring agent in plating solution. Or, set object on a jig (rack for applying current) and hook it to cathode stick (bus bar), and makes film by soaking the hooked object into plating solution.	<ul style="list-style-type: none"> -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Yoshino Denka Kogyo Inc. (Saitama-pref., 230 employees) -Asahi Industry Property Co., Ltd. (Aichi-pref., 220 employees) -Kakihara Industries Co., Ltd. (Hiroshima-pref., 204 employees) -Kondo Kouzai (Shizuoka-pref., 200 employees) 	B	Some
	Electroless nickel	During soaking, makes nickel film on object by electron which is diffused by dioxide of restoring agent in plating solution.	<ul style="list-style-type: none"> -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Isogai (Nagoya-city, 280 employees) -Mitsuya Co., Ltd. (Yamanashi-pref., 250 employees) -Yoshino Denka Kogyo Inc. (Saitama-pref., 230 employees) 	B	Some
	Hard alumite	Plating treatment by hard alumite which has thick and hard film. Generally utilized in industrial machinery and aerospace industry.	<ul style="list-style-type: none"> -Hokuriku Aluminium Co., Ltd. (Toyama-pref., 250 employees) -I-Techno Yajima Inc. (Nagano-pref., 160 employees) -Union Kikou Co., Ltd. (Gifu-pref., 150 employees) -Fuji Seta Co., Ltd. (Shizuoka-pref., 120 employees) -Nippo K.K. (Ohta-ku, 120 employees) 	B	Some
	Hard chrom (rack method)	Also called as industrial chrom plating. It is excellent in wear resistance as it is solid and the friction coefficient is small. It has smooth plating surface and excellent releasing property. Generally utilized in many industrial sectors.	<ul style="list-style-type: none"> -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Nomura Plating (Osaka-pref., 323 employees) -Nikko Techno (Hiroshima-pref., 267 employees) -Yoshino Denka Kogyo Inc. (Saitama-pref., 230 employees) -Aspen (Nagoya-city, 200 employees) 	B	Some
	Hot-dip aluminum plating	Surface treatment for steel, which improves corrosion resistance, climate resistance, salt-corrosion resistance, sulfide resistance, hydrogen sulfide resistance, heat resistance, and high temperature oxidize resistance. It is attracting attention as a good substitute for hot-dip zinc plating.	<ul style="list-style-type: none"> -Nippo K.K. (Ohta-ku, 120 employees) -Fukusawa Co., Ltd. (Saitama-pref., 32 employees) -Mark Kogyo (Osaka-pref., 30 employees) -Iida Plating Industry Co., Ltd. (Nagano-pref., 18 employees) -Arita Corporation (Kyoto-pref., 15 employees) 	B	Some
	Hot-dip zinc plating	Typical zinc plating. Produce alloy zinc layer on steel surface and resist corrosion of steel by sacrificial corrode reaction of zinc.	<ul style="list-style-type: none"> -Hashimoto Sangyo (Chiyoda-ku, 170 employees) -Nippo K.K. (Ohta-ku, 120 employees) -CTK corporation (Nagoya-city, 80 employees) -Gosoki Manufacturing Co., Ltd. (Edogawa-ku, 64 employees) -Tsukasa Giken Co., Ltd. (Osaka-pref., 58 employees) 		Some
	Nickel	Surface treatment by Nickel. There are 'Electrolytic nickel plating' which gets object plated with metal nickel film by electric reducing power by current in water solution, and 'Electroless plating' which gets object plated with film by electron diffused by oxidized of reducing agent in plating liquid during soaking.	<ul style="list-style-type: none"> -Tsugawa Corp. (Yokohama-city, 449 employees) -Sanyoh MFG Co., Ltd. (Tochigi-pref., 400 employees) -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Yamato Denki Ind. Co., Ltd. (Nagano-pref., 350 employees) -Nissin Kogyo Co., Ltd. (Shiga-pref., 340 employees) 	B	Some
Nickel chrome	Set object of plating on a jig (rack for applying current) and hook it to cathode stick (bus bar). Soak the hooked object into plating solution.	<ul style="list-style-type: none"> -Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) -Nomura Plating Co., Ltd. (Osaka-pref., 323 employees) -Aio Precision Co., Ltd. (Iwate-pref., 300 employees) -Isogai (Nagoya-city, 280 employees) -Takano Co., Ltd. (Nagano-pref., 250 employees) 	B	Some	

Category	Technical item	Description	Company name available in Japan	Level in Vietnam	Needs in Vietnam
Surface treatment (plating)	Trichromate	To give corrosion resistance, treat thin trichromate film on surface after zinc plating as post-treatment.	<ul style="list-style-type: none"> •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Hokuriku Aluminium Co., Ltd. (Toyama-pref., 250 employees) •Kakihara Industries Co., Ltd. (Hiroshima-pref., 204 employees) •Sakura Plating Co., Ltd. (Yokohama-city, 200 employees) •Sinwa Industry Co., Ltd. (Tochigi-pref., 160 employees) 	B	Some
	Zinc stannate alloy plating (rack method)	Add metal which is more noble than zinc in zinc, and reduce corrosion rate of plating film, and keep longer corrosion resistant time.	<ul style="list-style-type: none"> •Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) •Isogai (Nagoya-city, 280 employees) •Yoshino Denka Kogyo Inc. (Saitama-pref., 230 employees) •Kondo Kouzai (Shizuoka-pref., 200 employees) •Kawai Kako Co., Ltd. (Ohta-ku, 160 employees) 	B	Some
	Baking treatment (hydrogen embrittlement)	High carbon steel and hardfacing steel which was given heat treatment or cool treatment will need baking (hydrogen embrittlement), which means releasing hydrogen inside the metal by heat treatment to eliminate hydrogen.	<ul style="list-style-type: none"> •Parker Kako Co., Ltd. (Chuo-ku, 600 employees) •Kyoto Tool Co., Ltd. (Kyoto-pref., 370 employees) •Nikko Techno (Hiroshima-pref., 267 employees) •Mitsuya Co., Ltd. (Yamanashi-pref., 250 employees) •Asahi Industry Property Co., Ltd. (Aichi-pref., 220 employees) 	C	Some
	Chromium	Utilized for steel plating as surface of chromium rapidly gets oxidized film, become stable and has high rust resistance. It has wide range of purpose of use since it rarely gets rust. Applied to heavy industry such as cars and machines, home equipments such as sink cabinet and kitchen knife.	<ul style="list-style-type: none"> •Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) •Aio Precision Co., Ltd. (Iwate-pref., 300 employees) •Kikuchi Seisakusho Co., Ltd. (Hachioji-city, 209 employees) •Kondo Kouzai (Shizuoka-pref., 200 employees) •Oriental Engineering Co., Ltd. (Arakawa-ku, 180 employees) 	C	Some
	Copper	Copper plating for industrial use, which required a certain efficiency, is extremely important in any industrial sectors. Typical example is throughhole plating for multilayer PCB. Copper plating for industrial use can be classified into 'Acid bath', 'Alkali bath', 'Electroless copper bath' depending on kind of plating bath.	<ul style="list-style-type: none"> •Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) •Isogai (Nagoya-city, 280 employees) •Mitsuya Co., Ltd. (Yamanashi-pref., 250 employees) •Kikuchi Seisakusho Co., Ltd. (Hachioji-city, 209 employees) •Fujita Electricworks Ltd. (Kanagawa-pref., 205 employees) 	C	Some
	Zinc	One of rust-proof treatment. Prevent rusting by sacrificing zinc film plated on surface of material. Widely introduced as treatment for steel construction which is placed outside. Applied to iron electric transmission tower for familiar example.	<ul style="list-style-type: none"> •Kyoto Tool Co., Ltd. (Kyoto-pref., 370 employees) •Taiyo Industry Co., Ltd. (Nagano-pref., 350 employees) •Isogai (Nagoya-city, 280 employees) •Sansei Industry Co., Ltd. (Toyama-pref., 260 employees) •Nitto Galvanizing Co., Ltd. (Kawasaki-city, 220 employees) 	D	No

2. History of developing supporting industries in Vietnam

As the material processing industry in Vietnam is still under development; the government is promoting industrial development.

Until now, the Japanese government proposed to the Vietnamese government the importance of the supporting industries and the need for a master plan through the Vietnam Japan Joint Initiative since 2004 (Phase 1: 2004-05, Phase 2: 2006-07). In response to this proposal, the Vietnamese government mapped out the “Supporting industries Action Plan” in 2007. This plan brings the supporting industries in 2020 into view and describes the plan until 2010.

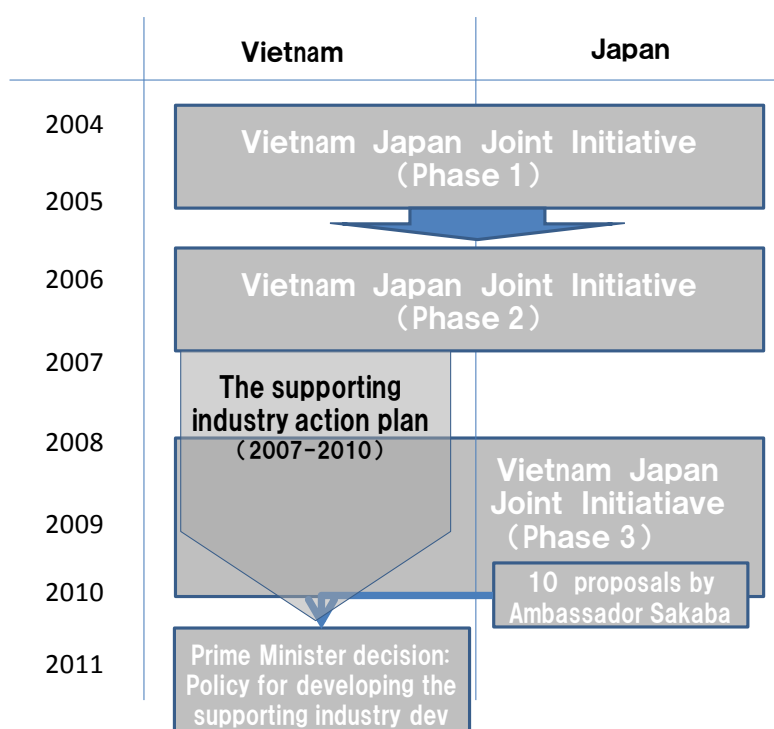
After this, the Japanese government suggested that the Supporting industry Action Plan from 2010, should be centered around the material processing industry, through Phase 3 (2008-10) of the Vietnam-Japan Joint Initiative.

Also, other than the above, the former Japanese Ambassador to Vietnam (Mr.Sakaba) made ten proposals regarding the supporting industries for the Vietnamese government (April 2010).

Considering these Japanese proposals, the new strategy for developing the supporting industry, “Prime Minister-decision: policy for the development of supporting industries.” was announced

Furthermore, the main government agency related to the development of supporting industries is the Ministry of Industry and Trade; however, as the Ministry of Planning and Investment - Enterprise Development Agency is also involved; it is pointed out that adverse effect from vertically-structured administrative system are evident.

History of policies addressing the development of supporting industries in Vietnam



①The supporting industries action plan

- The definition of the supporting industries in “the supporting industries action plan” covers a wide range of industries. The supporting industries in Japan has focused mainly on the material processing industries, such as metallic casting, metal mold, forging/hammering, metal processing, surface treatment/metallic finishing. However, on the other hand, the definitions of the supporting industries of the Vietnamese government include thread/fiber, textile/sewn products, leather, shoemaking factory, electronics/IT industry, four wheel automobile and, manufacturing machine.

Summary of Vietnam supporting industries action plan (until 2010)

Development direction by category of industry

- 1) Fiber/sewn products manufacturing industries : Production development and others such as clothing fabric for exporters, etc.
- 2) Leather/shoes manufacturer industry : Production capacity improvement for exporting shoes or others
- 3) Electronic/IT Industry : Transition from assembling to designing • development
- 4) Four-wheel automobile industry : Production of versatile four-wheel automobile parts
- 5) Manufacturing machine industry : Increased investment in manufacturing machine industry

(Source) Created based on various documents

②Ten proposals by former ambassador Mr.Sakaba and Vietnam Japan Joint Initiative-Phase3

The former Japanese Ambassador to Vietnam, Mr.Sakaba made “Ten proposals for the Vietnamese government” regarding the development of the supporting industries in April 2010 when he left his office. These proposals are concrete action plan which clarifies “Who should do what until when” for “the supporting industries action plan.” These are also related to Vietnam Japan Joint Initiative-Phase 3 which was under discussion from 2008 and 2010.

10 proposals for the Vietnam government from the former Vietnam Japanese ambassador (Mr.Sakaba) (April, 2010)

The first proposal : To clarify the definition of “the supporting industry” by law

The second proposal : To specify the administration agency overseeing the supporting industries.

The third proposal : To aggressively introduce development promotion plans & preferential treatment.

The fourth proposal : To enlighten manager.

The fifth proposal : To train and develop skilled labor force.

The sixth proposal : To enhance financial services for the supporting industries.

The seventh proposal: To aggressively attract related foreign firms.

The eighth proposal: To introduce small and medium enterprise management consultant systems.

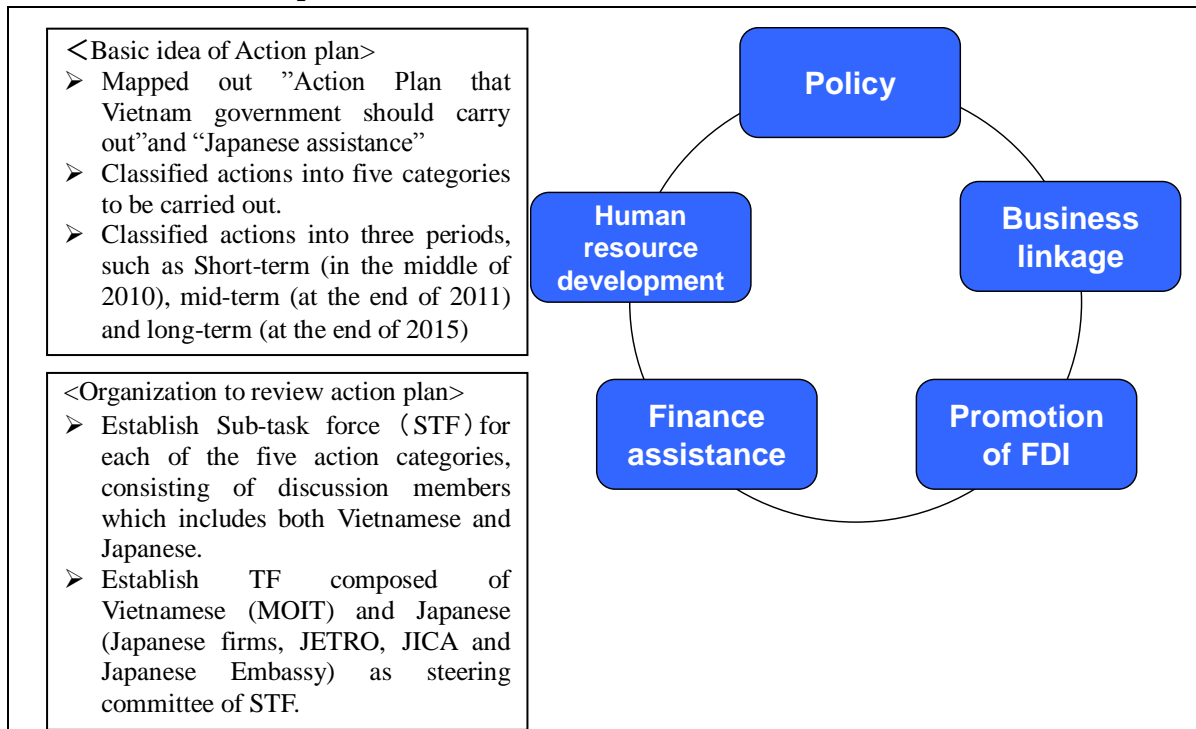
The ninth proposal: To create organization for company alliance.

The tenth proposal: To create and adopt action plan

(Source) Created by home page of Japanese Embassy in Vietnam.

With the above background, the Phase 3 of the Vietnam Japan Joint Initiative action plan, put together short-term, medium-term and long-term action plans regarding to five fields, “Policy frame”, ”Human resource development”, “Finance Assistance”, “Promotion of foreign direct investment”,and “Business linkage“

Vietnam Japan Joint Initiative Phase 3 Action Plans (2008-2010)



Action Plan for the Supporting Industries under Vietnam Japan Joint Initiative

		Action Plan of Vietnam	Assistance by Japan
Policy	Short-term	▪ Decision of specific supporting industries to be developed (MOIT)	▪ List up of the key supporting industries in detail (JBA, METI)
	Middle-term	▪ Legal stipulation of promotion of the supporting industries and SME (MOIT, MPI)	▪ Assignment of necessary experts for legal stipulation (JICA, METI)
	Long-term	▪ Evaluation and review of the action plan	▪ Necessary assistance and information to revise the action plan
H/R development	Short-term	▪ Specification of skills to be developed for each supporting industry ▪ Implementation of pilot project in	▪ Dispatch technical experts to the training centers ▪ Introduction of Japanese companies

		cooperation with training centres by means of internship (SBV, MOIT)	to receive internship (Japanese companies, JETRO, JICA, JODC)
	Middle-term	<ul style="list-style-type: none"> expansion of the pilot projects stipulation of technical certification (MOLISA, MOET) 	<ul style="list-style-type: none"> Dispatch technical experts to the training centres Information of Japanese technical certification (Japanese companies, JETRO, JICA, JODC)
	Long-term	<ul style="list-style-type: none"> Establishment of “Vietnam-Japan Monozukuri (manufacturing) University” (MOLISA, MOET) 	<ul style="list-style-type: none"> Assistance for establishment of “Vietnam- Japan Monozukuri University” (Japanese companies, JETRO, JICA, JODC)
		Action Plan of Vietnam	Assistance by Japan
Finance	Short-term	<ul style="list-style-type: none"> Framework of supportive finance towards the supporting industries to be supported (SBV, MOIT) 	<ul style="list-style-type: none"> Two Step loan by Yen Loan (JICA)
	Middle-term	<ul style="list-style-type: none"> training for FI such as credit assessment and advisory consulting (Bankers Association, Banking Academy) 	<ul style="list-style-type: none"> Case examples of training in Japanese banks and other assistance (JETRO , JICA , SME consultant association)
	Long-term	<ul style="list-style-type: none"> Introduction SME Consultant System (MOLISA, MOET) 	<ul style="list-style-type: none"> Case examples of introduction of Japanese SME Consultant system in neighbor countries and assignment of experts (JETRO , JICA , SME consultant association)
FDI	Short-term	<ul style="list-style-type: none"> Determination of strategic sectors which FDI shall be promoted Seminar for the determined sectors (MOIT, MPI, etc.) 	<ul style="list-style-type: none"> List up of the key supporting industries to be enhanced by FDI Research on industrial parks for SMEs (JETRO, METI)
	Middle-term	<ul style="list-style-type: none"> Promotion of construction of industrial park for the supporting industries (MOIT, MPI) 	<ul style="list-style-type: none"> information of the relevant policies in Japan (JETRO, METI)
	Long-term	<ul style="list-style-type: none"> Promotion of coordination between local enterprises and FDI, transfer of technology (MOIT, MPI) 	<ul style="list-style-type: none"> Information to enhance the coordination between local enterprises and Japanese enterprises (JETRO, METI)
Business linkage	Short-term	<ul style="list-style-type: none"> Development of supporting industry database Organaize Supporting Industry Exhibition (MOIT, MPI) 	<ul style="list-style-type: none"> Assistance for the database (provide information of excellent Organaize Supporting Industry Exhibition (JETRO)
	Middle-term	<ul style="list-style-type: none"> Establishment of business associations (MOIT, MPI) 	<ul style="list-style-type: none"> Case examples of Japanese business association (JETRO, METI)
	Long-term	<ul style="list-style-type: none"> Promotion of coordination and information exchange among the business associations (MOIT, MPI) 	<ul style="list-style-type: none"> Promotion of cross border coordination of business associations between Vietnam and Japan (mutual dispatch of mission) (JETRO, etc.)

③ Prime Ministers's Decision on the Policies for the supporting industries development

“Policies for the supporting industries development decided by the Prime Minister” was announced in February 2011, and a new directional movement for the supporting industries development for the future Vietnam government was clarified. Development projects which shall be enhanced were expected to be in the supporting industries (including new and additional investment), which was stated to be raw materials, parts and half-finished goods made in Vietnam. These include ◇machinery manufacturing ◇electronics and computers ◇vehicle assembly production ◇fiber/sewn product manufacturing ◇leather and shoes ◇industries that is needed for high technology industries development. Motorbikes were not described.

Summary of policies for the supporting industries development (Prime Minister's Decision announced in February, 2011)

- ◆ **Basic Policy :**
 - State the policies on developing incentives to boost supporting industries for some key sectors including mechanics • electronics • IT • automobiles • garment • textiles • footwear; and supporting industries for the development of high technologies.
- ◆ **Definitions :**
 - Supporting industries are industries which produce materials, spare parts, components, accessories, and semi-finished products to provide for manufacturing and assembly industry.
 - Supporting industrial products are the products on the list of industrial products in support of the subjects mentioned in Clause 1, Article 1 including materials, suppliers, spare parts, accessories and semi-finished products manufactured in Vietnam to provide production and assembly products.
 - Supporting industrial production projects are projects invested in Vietnam (both new and expanding projects) to produce supporting industrial products.
- ◆ **Policies for encouraging supporting industries :**
 - Market development and enhancing investment invitation
 - Support investment attraction targeting supporting industries based on investment project by supporting industries by Ministry of Industry and Trade and provincial Departments of Industry and Trade.
 - Provide financial support through trade and investment promotion program.
 - Invite and promote investment into high technology industries.
 - Give incentives of infrastructure investment
 - Give preferential priorities for land allocation and lease.
 - Support labor recruitment and training for supporting industry projects using land in industrial parks and zones and public services in those industrial parks;.
 - Give incentives stipulated in Decision No.105/2009/QD-TTg for small and mid-sized firms' investors.
 - Science and technology and human resource training incentives
 - Financial support is carried out from National Supporting Science and Technology Development Fund for hiring foreign experts and transferring technologies regarding designs, software.
 - Investors of supporting industrial projects who are small and medium enterprises are provided with assistance related to technological guidance and human resource development.
 - Providing information
 - Ministries, Departments and Provincial People's Committees under the Central Government provide information through electronic portal relating to industrial development assistance and technical assistance program.
 - Financial support
 - Assisted projects are given preferential tariffs on import and export tax.
 - Assisted projects are given priority to receive preferential loans from state investment and development funds.
 - As for auxiliary projects for development of high-technology industry, enterprise entities are given support for formation of products' distribution channel by the government.
- ◆ **Decision for preferential regulations for supporting industries :**
 - As for planning for concrete preferential policies for support project, "Appraisal Council of Policies for supporting industrial development" will draft it and report to Prime Minister for approval.
- ◆ **Members of Council :**
 - Ministries of Planning and Investment, Ministry of Finance, Science and Technology, Natural Resource and Environment, Information and Communication, Justice, and Viet Nam Development Bank (VDB) and other relevant industrial associations shall attend.

(Source) Prime Minister Decision No. 12/ 2011/ QD-TTg

3. Estimation of number of SMEs to consider new business in Vietnam

We have roughly estimated the projected number of SMEs which might seriously consider developing business in Vietnam.

“Survey on foreign business by SMEs, 2008” provides the overview of SMEs’ foreign business development, such as foreign direct investment, alliance of business/technical assistance, trading. We estimated the number of manufacturing SMEs which may probably start direct investment in Vietnam based on the data from this survey, and came up with about 850 SMEs which may start investment in Vietnam in the near future.

[Estimation] Number of manufacturing SNEs which may start direct investment in Vietnam (Unit: Number of companies)

Number of SMEs		①	Intention of enterprises which have no experience of foreign business			②	Targeted region by enterprises with foreign business experiences	
			Under consideration (A)	Necessary but not consider (B)	Total (A+B)		Vietnam with highest priority	
Manufacturing	255,131							
of which sectors active for foreign business (A)	83842		1,276	21,941	23,217		1,667	
A+α (note)	130,447		419	7,210	7,630		548	
			652	11,218	11,871		852	

(Note) “Sectors which have been active for foreign business “A”, include clothe & garment, chemical, machinery & equipment, electronics, transportation machine, precision, interpreted from the sector category from the survey to the sectors available in “enterprises census”. “A + α”, additionally, includes plastic, rubber, and metals.

1. Based on SMEs which responded by “under consideration”, 0.5%, and “think necessary but not consider yet”, 8.6%, to a question about the plan for foreign business by SMEs without experiences of foreign business, from “Survey on foreign business by SMEs, 2008”.

2. Based on enterprises which responded “Vietnam” to a question about candidate region/country with highest priority towards enterprises with foreign business experiences, from “Survey on foreign business by SMEs, 2008”.

(Source) NRI estimated based on SMRJ “Survey on foreign business by SMEs, 2008”, and periodical Statistics Bureau “Establishment and enterprises census of Japan”.

Above estimation may be biased conservative from the implied objective to find the potential SMEs in the supporting industry which may start foreign business, because the above calculation is limited to “foreign direct investment” among various types of foreign business, while the survey focused on the sectors which have often experienced foreign business.

Potential SMEs to plan to start business in Vietnam could be more than the estimated number of including other types of foreign business such as technical alliance, and including business sectors which had been not so active in foreign business and non-manufacturing sectors.

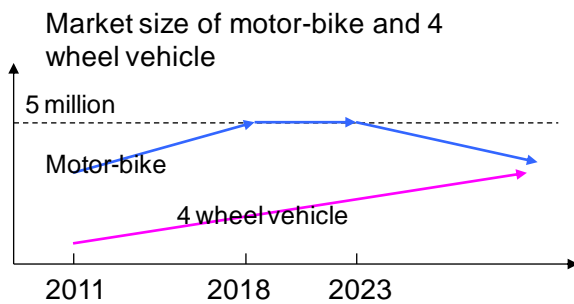
We have estimation of number of SMEs which may have potential needs of investment in Vietnam after we considered the types of finance needs and opportunities for SMEs which may implement direct investment in Vietnam.

There may be a good chance to encourage more SMEs to invest by assisting them in information for technical alliance, human resource, and financial assistance, although estimated number of SMEs are less than 1,000.

Evaluation of sample project

We have evaluated the profitability of possible projects based on an interview of an existing business structure and business plan under possible technical alliance with Japanese enterprise from Company A which is a local supporting SME.

Company A, currently produce parts for motor-bikes, plans to develop a new business for 4 wheel vehicles, which could bring 20% annual growth of sales if technically supported by Japanese enterprise.



sales	125
cost of sales	92
interest payment	5
administration cost	9
selling expense	1.5
profit	17.5

New business

investment	100	
equipment	50	
construction	factory	15
	land use right	15
working capital	20	

(Source) Interview of Company A

Cash flow projection is calculated as shown in the table below, based on the interview, of which IRR is estimated to be more than 40% annually in VND base over the assumed period of 10 years.

Investment Profitability of Company A's New Project (IRR)

Year	0	1	2	3	4	5	6	7	8	9	10
Calendar year	2011/1/1	2012/1/1	2013/1/1	2014/1/1	2015/1/1	2016/1/1	2017/1/1	2018/1/1	2019/1/1	2020/1/1	2021/1/1
NPV of Project											
Free cash flow	0	(78)	28	32	36	41	47	53	61	70	78
fixed asset after depreciation	0	82	75	68	61	54	47	40	33	26	25
Exit price											25
Cash flow for evaluation	0	(78)	28	32	36	41	47	53	61	70	103
NPV	123										
IRR	46%										

Indicators for development effects might include the followings.

Objectives	Indicators
Support foreign business of Japanese SMEs	Number of cases of starting foreign business
Develop targeted business and sectors	Sales, employees, and profits
Development of supporting industry	Number of invested projects
	Usage of non-financial assistance programs
	Number of contracts/transactions with Japan invested enterprises

4. Concerns and the needs of investors

Through interviews with domestic financial institutions, the following investment strategy for developing countries and their interest and needs for investments in Vietnam have been revealed:

- 1) Investment strategies for developing countries and interest for investments in Vietnam

Investment Funds

Managers of investment funds which have track record of investment in Asia, have confirmed the need for investment in Vietnam, while maintaining that there are challenges such as, (a) the positioning of supporting industries which does not necessarily have a high return on investment, (b) political and foreign exchange risk regarding the cash flow of public sector business, and (c) lack of sense of speed when JICA is involved. Despite these challenges, the managers of funds will study the feasibility of participating in any proposed business scheme, including an active role as a GP, should the project scheme become specific.

Nonbank and business corporations

For business corporations such as trading houses and non-banks, investment decision often assume a certain scale of business operations and a high hurdle rate (capital cost + international interest-spread, or 15% to 25%, etc.). They are also risk adverse against foreign exchange risks and political risks. For example, trading houses tend to structure projects on dollar based terms and secure the leadership of the project so that they can take quick actions on their own against political risks. Nonbanks tend to assume a joint venture with leading local companies, to cooperate against political risk in developing countries.

Financial institutions

Financial institutions (such as venture capital associated with regional banks) take the external development effects of supporting SMEs into account and understand the importance of this project. However, they also state that in order for them to participate, the financial assistance should be limited to their bank clients. On the other hand, portfolio investment in foreign projects has been active in regional financial institutions located in provincial cities which have low loan-to-deposit ratio, but these FIs take an investment stance which is very conscious on credit ratings and liquidity.

Public sector financial institution

Government financial institutions have limitation on their financing activities due to their act of incorporation, as well as demarcation with the roles of other government agencies, and thus may

have limitations to finance overseas activities or participate in JICA's project. They do have financing needs for environmental technology and infrastructure, areas that will support the growth strategy of Japanese companies in the industries which are expected to grow, but managing the investment risk in such area is new challenge for them. SME supporting organizations are hoping to have a continuous assistance network with JICA from the start of overseas deployment to the start of local business, by providing the financial support for the preparation of overseas expansion by domestic SMEs inside Japan, and expecting JICA to help financing their clients once they are overseas.

International financial organization

IFC and ADB have clarified that they can participate in the financing of SMEs and supporting industries in Vietnam, and can support FDIs in general, but also pointed out that it will be difficult to join, if the financing scheme is limited to support Japanese SMEs only.

- 2) Expected roles for JICA which will complement the financing

Investment Funds

Fund managers have stated that to finance development projects, it would be necessary to invite two types of investors; (a) pure portfolio investors who are seeking financial returns, as well as (b) strategic investors seeking effects other than just financial returns. JICA will be expected to assume the role of strategic investors, who will be satisfied with returns at the level of government bond yields. To make the fund successful, it will be necessary to invite other strategic investors, such as those who will benefit from the development of supporting industries, or engineering companies who wish to receive orders from infrastructure projects, etc.). JICA will also be expected to take up the long term financing, and moreover, will be expected to start dialogues with the local government to avoid political risks and provide information about the possible political risk.

Business corporations

For trading houses, the profitability of projects and the possibility of strategic control is required. Therefore, they expect public institutions such as JICA to (a) provide equity for a period of about three years from operation, and exit (at book value) within a period of about three years, (b) provide full support of business during their investment period (such as securing sales targets). On the other hand, for long-term infrastructure projects, which tend to be less profitable, they are expected for their contribution of long-term funding and involvement in case of political risk.

Public sector financial institution

If the government financial institutions, as described above, meet the conditions of participation in development projects in developing countries, they expect JICA to cover the investment risk by JICA's equity investment abroad and their familiarity with overseas market.

3) Example of Non-financial assistance menu expected for JICA

Investment Funds and Business corporations

Managers of investment funds and business corporations will not appreciate the development effects as much as the financial returns, and will expect direct support for the local business/project, especially "find/attract customers" for the invested company.

Financial institutions

Regional banks, usually help their clients' overseas expansion by providing advice, introducing local experts (lawyers, accountants) and consultants, as well as financing through "parent loan". To complement these efforts, JICA will be expected to offer the introduction of local people familiar with the local market situation and practical information needed to conduct and expand business in the local market. Moreover, JICA is expected to keep dialogue with the local government to hold them from setting up impediments for investment by foreign companies, such as applying stricter foreign exchange regulations and local financial regulations.

Public sector financial institution

Government-owned financial institution expects JICA to assume a similar role as JBIC, such as leading negotiations with local government for country risk issues and to contribute to mitigating country risk.