

LEARNING AND BUILDING TECHNOLOGICAL CAPABILITIES OF ENTERPRISES THROUGH LINKS WITH FOREIGN PARTNERS: SOME INTERNATIONAL EXPERIENCES AND VIETNAM PRACTICE¹

Tran Ngoc Ca²

National Institute for Science and Technology Policy and Strategy Studies

Tang Thu Thao, Dang Thanh Tung
Ministry of Industry and Trade

Abstract:

The study is focused on enhancement of national technological capabilities, enterprise technological capabilities and learning process to accumulate these capabilities. Some international experiences show that, among the channels for technological learning, the one connecting to foreign partners is on the top of the most effective ways. In the new context of fast going changes in international economic relations and technological development, the process of learning from international partners may need to change but the process remains the most effective tool as it is shown by practice of some enterprises in processing and manufacturing sectors of Vietnam through conducted surveys. The study also offers a proposal of certain policies to promote the process of technological learning applicable for Vietnam enterprises.

Keywords: *Technological capability; International cooperation; Science policy; Enterprise; Economy.*

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1. Learning of technological capabilities: some notions and international experience

1.1. National technological capabilities and enterprise technological capabilities

Technological capabilities are usually understood as abilities of individuals, organizations and communities to carry out activities and functions in relation to technologies. These capabilities are found distinguished from

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² Author’s contact email address: tranngocca@gmail.com

case to case and may be considered in different levels, namely nation and enterprise.

National science and technology (S&T) capabilities include knowledge and skills in S&T fields (*human capabilities* of individuals or groups of individuals such as the ones of enterprises) as well as *institutional systems and policies* necessary for gaining, creating, adapting and popularizing new technologies. All the above noted activities (gaining, creating, adapting and popularizing) have to be conducted together with *the process of S&T learning* in different levels - labor work forces of the nation, domestic producing enterprises and public/private organizations (e.g. the ones in sectors of education, health care, finance and etc.) and national governments. Therefore, national technological capabilities are platforms for development of enterprise technological capabilities and inversely. At the both levels, nation and enterprise, these capabilities relate to different activities in field of technologies such as absorbing, mastering, adapting, upgrading, innovating and popularizing of technologies. Some strategies/roads of learning in national scale can be noted as illustration for multiform moves of learning ways (*Watkins, 2008; Soubotina, 2010*):

- Nations not doing the learning or doing low level of learning, such as Rwanda, Bangladesh and Cameroon;
- Nations remaining dependent on foreign direct investment (FDI) in passive manner where the technology overflow effects would not occur in natural ways, such as Mauritius, Mexico and Philippines;
- Nations remaining dependent on FDI but pro-active to operate and to exploit advantages of FDI, such as Ireland and Singapore during 1970s;
- Nations following the self-controlled roads to master technologies, such as Japan during 1950s and South Korea during 1960s;
- Nations possessing capabilities to create and to develop technologies but cultivating orientations to separate from the world systems, such as the former Soviet block, Russia, North Korea and Pakistan;
- Nations possessing creative capabilities and cultivating orientations to cooperate and to develop stronger links with external systems, such as United Kingdom, Sweden and Israel;
- Nations making development in mixed ways and combining various modes for different stages or different objects and partners within a stage, such as China, India and Brazil during 1980-1990 period.

In addition to national technological capabilities, we are dealing with enterprise technological capabilities. By end of 1980s, many studies

proposed the notions and definitions for technological capabilities. The most simple one among them was “the capabilities to carry out series of different tasks in field of technologies” (Lall, 1987). Another one was “the group of capabilities in relations to activities such as: understanding of technological tasks; transformation of input materials to output products and activities of purchase, production and sale of product” (Fransman, 1986).

There exist maybe different notions and definitions of technological capabilities including the differences of technological capabilities in the levels of nation and enterprise. However, the notion of technological capabilities by UNCTAD in some studies of East Asian and South-East Asian countries can be seen as suitable and applicable for analysis of actual status of technological development of Vietnam enterprises (Ernst et al., 1997). This definition divides technological capabilities into six (06) categories of functions with the knowledge and skills found in center positions which an enterprise needs to have for purpose to gain, master, use, adapt, modify and create technologies. An enterprise is considered as to have capabilities in certain field of technologies if it is capable it-self of carrying out the following activities (mastering of capabilities).

- *Capabilities to make investments (investment capabilities)*: They include capabilities to define, prepare, design, set-up and conclude contracts for new industrial contracts or to modernize its existing facilities. These capabilities are also divided into stages: pre-investment stage and project implementation stage.
- *Capabilities to conduct production (production capabilities)*: They include capabilities to operate the project, namely production management activities, technical operations, operations of technological repair and maintenance of the project. These capabilities are divided into three sub-groups: management of production process, mastering of producing technologies and repair and maintenance of machines/equipment.
- *Capabilities to make modifications (modification capabilities)*: They include capabilities to adjust technical, technological and organizational elements of production process, to decode technological elements, to analyze designs and to re-arrange technological systems.
- *Capabilities to make marketing activities (marketing capabilities)*: They include capabilities to treat problems in relation to market demands, market trends, client needs and skills to collect market information.
- *Capabilities to make links (linkage capabilities)*: They include capabilities in organizational nature to make technology transfer in three

different levels: inside enterprise, between enterprises and between enterprises and science-technology infrastructure systems. Linkage capabilities, in its turn, are divided into three sub-groups: linking actors inside enterprise, linking actors between enterprises and actors linking enterprises with the S&T systems.

- *Capabilities to make large scale innovations (innovation capabilities):* They include capabilities to create substantially new technologies, to design new features of products and production procedures (including new ideas of products) and applicability of scientific knowledge in efforts to turn scientific ideas to patentable inventions.

1.2. Learning of technological capabilities

1.2.1. Relations between the learning and technological capabilities

One aspect observed from recent studies has some connections to the relation between the learning and technological capabilities. Some authors indicate that the learning is a process to accumulate technological capabilities (*Bell & Pavitt, 1993*). Some studies were made on topic of accumulation of technological capabilities in context of developing countries but majority of these studies discussed the accumulation of technological capabilities in national level and they rarely consider the actually used mechanism of learning. The way every technological capability gets mastered by learning may be different from others or be similar to others. Which one of them gets used depends on internal and external factors of every enterprise.

In a study by *Hobday (1995)* on capabilities of learning in electronic industry sector in new industrial countries as case of Anam Industrial (Korea), the author argued that enterprises learn from foreign partners and made modifications from simple production procedures to more complex tasks without indicating many details namely how to achieve these modifications step by step. More than that, in addition to external connections, the other mechanisms of learning such as domestic training activities were not considered properly. Therefore, it is necessary to make analysis on contributions of learning mechanisms for different technological capabilities in more details.

1.2.2. Notions of technological learning

One of the first researchers who applied the notion of the learning is *Arrow (1962)* where he presented the model of “learning by doing”. His argument was the production costs would reduce while the production experiences would increase. According to his presentation, through “the doing” (production process for accumulation of production experiences), the

production costs would reduce without needs to make capital investments since the productivity by workers increase. But the model of “learning by doing” cannot reflect the whole set of complexities of accumulation of technological capabilities. Then, it would be more reasonable for studies on the learning when they get focused more on accumulation of knowledge, skills and experiences on basis of different mechanisms of education and training. In addition to the model of “learning by doing”, some other modes of more active learning were reflected in considerable manner.

This study offers a proposal to use some forms of learning which are versions extended from the classification system by *Bell* which combines certain elements from other classification systems.

The first group is the model of “*learning by doing*” in its largest extended meaning which includes gradual modifications made before and after the realization and use of technologies. By this optics, this mode of learning deals with all the types of “learning by doing” activities which include learning by operating, using, modifying, trying, adapting and etc. In order to achieve this mode of learning, enterprises should make efforts to adjust problems, change configurations and learn from mistakes which would lead to improvement of certain objectives after every test and analysis. Briefly, the process turns out to be larger and more pro-active in comparison to passive doing. The notion of “learning by trying” by *Fleck (1994)* is suitable with this active “learning by doing”. But the “learning by doing” is not enough and enterprises need to have more active modes of learning for accumulation of technological capabilities. Other modes of active learning should be taken as compulsory.

The second group of learning includes the following activities: First of all, it is the “*learning by previous accumulation*” through education and collection of knowledge, skills and experiences before being recruited. This mode of learning helps enterprises to get new knowledge and experiences through their staffs before they start working for enterprises, and then to enhance receiving capabilities of enterprises for the next learning. Then, it would be the “*on-site learning*” which includes activities of other training and supports for workers without needs to separate them from working places since this mode of learning is organized “on-site”. These activities include the hiring of external experts for settlement of problems inside the enterprise and the sharing of their experiences with the enterprise’s staffs. This mode of learning is close to the training activities of the enterprise which, in majority of cases, are short term and non-regular. The mode of “*learning not on-site*” deals with training courses where staffs temporarily leave their working places for attending external training activities. This mode of learning is, by their nature, long term and regular which are provided by external organizations such as universities, vocational training schools, training centers or other companies.

The third group of learning is the “*learning by searching and collecting information*” (e.g. through documents, instructions and etc.) where the contacts with consultants are one of the important mechanisms of links. One example of this mode of learning is given by *Robert (1973)* where he deals with the important role of consultants in successful transfer of turn key projects from external sources. Enterprises can successfully “insert” new technologies from external sources into their activities with this mode of learning.

Finally, the mode of “*learning through foreign links*” which includes both “on-site” and “non on-site” as well as other technical supports in search of expertise and collection of information. The reason to include this mode of learning in this classification system rises from the context of developing countries where the linkage with foreign actors is the most important kicking-off source to start an enterprise, the expertise being over-handed by technology transfer or direct investment activities. In a broader meaning, the foreign links can be found already in many other mechanisms such as forms of training and collection of information in relation with foreign actors. However, in many cases, the success or failures of an enterprise are so important for an enterprise to use foreign links for enhancement of technological capabilities that this mechanism should be viewed toughly in a specific manner separated from other modes of learning.

Briefly, on basis of this theoretical framework, the study can summarize the modes of learning in the following scheme:

- Learning by doing;
- Learning by previous accumulation;
- Learning by training;
- Learning through foreign links.

Related impacting factors and policies

In the framework of this paper, the study deals with the four groups of factors which cause impacts to the process of learning to gain technological capabilities, namely:

- Global macro-economic measures such as finance, investment, trade and industry;
- S&T and innovation based measures;
- Human resource development policies;
- Policies for development of intermediate supporting systems.

1.3. Learning of technologies in 10 production sectors: some international experiences

In a study by *Chandra (2006)*, the example of 10 production sectors in some developing economies was analyzed as follows. This study is focused on analysis of software industry (India), electronic industry (Taiwan, Malaysia), palm oil production (Malaysia), salmon cultivation (Chile), wine production (Chile), cultivation of grape and corn (India), aquatic products (Uganda) and cultivation of flowers (Kenya). This study views the mechanisms through which these developing economies gets successful in gaining technologies, buiding up their own technologies, mastering technologies and production sectors up to the level of export products and finally they become the “key players” in these sectors of the world market. According to this study, the experiences of success from these developing countries in absorbing and building technological capabilities up to competitive export of certain products exhibit a proposal of some policies, namely:

- Favorable macro-economic policies such as attraction of FDI sources and focus of producing forces which may lead to inverse links to help the upgrading of sectors. These policies are pro-active in pushing FDI enterprises to have measures to support domestic enterprises to enhance their skills and capabilities. This group of policies also includes taxation policies to support activities and supports for extension of international markets as well as related international trade policies. These measures show well considerable impacts for effective enhancement of technological learning from foreign sources;
- Policies to support R&D activities in close links with needs of enterprises can include the enhancement of organizational skills and R&D implementation through training activities. These activities can promote entrepreneurship in economic sectors as well as attract expatriates to participate in cooperation activities with local partners;
- Policies to stimulate investment and development of human resources include the promotion of training of human resources up to the level enough to create technologies (instead of purchasing technologies) in both categories of technological and non-technological knowledge (e.g. management, production organization and etc.);
- Other policies can be included such as development of infrastructure, industrial zones, S&T zones, supporting industries and other supporting services.

Among these mechanisms, the supports from FDI sources and the learning from foreign partners are considered as the most important measures. It is

possible to see that the policies at national scale cause certain impacts to the ones applied for the learning of technological capabilities at enterprise scale. This study also shows some concrete observations. Namely, FDI sources are highly important channels but not the only ones to gain technologies. Nations, through their own enterprises, need to have endogenic capabilities in order to be capable to absorb foreign technologies. Among these relations, the transfer of knowledge and skills is not less important (if not to say more important) than the transfer of machines and equipment. Experiences from the above noted countries show also the combination of different transfer channels for purpose of learning, depending on specific features of sectors and development stages. Among the modes of learning, the linkage with foreign partners is seen as the one which is capable of bringing most benefits for enterprises of developing countries. Therefore, this study is focused on this channel of learning for purpose to enhance technological capabilities of Vietnam enterprises.

2. Analysis of the actual status of learning of technological capabilities through links with foreign partners

2.1. Learning from foreign partners in Vietnam: experiences of pre-2010 period

One of the questions most asked when dealing with this topic is: Is there the learning through links with foreign partners? Enterprises do not learn the capabilities of technological innovation but only learn simple technological capabilities without developing their capabilities of complex research, don't they? Another question also falls under consideration: Is there a policy or strategy by foreign enterprises targeting to prevent Vietnam enterprises from the learning?

In search of answers to these questions, a study had been conducted through analyzing some pairs of partners between Vietnam enterprises and foreign partners where the latter include Hewlett-Packard Vietnam (HPLV) (100% FDI), Intel (100% FDI), Fujitsu Vietnam (JV and 100% FDI), BP Petco (JV), Unilever Vietnam (JV), Mercedes-Benz Vietnam (JV), Sony Vietnam (JV) and joint business contract between Vietnam Airlines and Air France-Airbus Alliance. Analysis outcomes made for that period show the following remarks (*Tran Ngoc Ca, 2000*):

- Transfer of technologies and the learning were conducted at active level through relations with foreign partners;
- Properties and impacts of the technology overflow effects and the process of learning are different from an enterprise to another one: in majority of cases they can learn only simple skills and capabilities

(production and improving modifications) without coming to the extent of complex capabilities;

- No foreign company is to exhibit clearly their policies not to support Vietnam in purpose of learning while, of course, there are some foreign companies do not allow to largely popularize their core capabilities;
- Certain foreign companies carry out their active supports for Vietnam partners to learn;
- Some modes of learning through instructing and together working modes are found important, particularly for tacit knowledge;
- Some Vietnam enterprises are not ready to catch opportunities for learning, due to their low internal capabilities.

These findings of the passed period provided partially answers to the above noted questions. A deeper study of the two cases of Honda Vietnam and Alcatel Network Systems Vietnam (ANSV) also shows some more concrete lessons, namely: Joint venture enterprises conducted numerous training courses for their Vietnamese staffs and workers and the effects from this learning are clear enough. However, the technology overflow effects are not observed the same between enterprises. Other actors in the system such as research institutes/universities do not have necessary links and do not get much benefit from these activities. Among the modes of learning, in addition to regular formation systems, the learning by doing, learning through instructions and learning of tacit knowledge are very important. From position of foreign companies, there is no official limitation toward technology transfer but there exist certain barriers toward popularization of their core technological knowledge. The low level of technologies of local partners and their outdated technical facilities are difficulties for Vietnam enterprises to absorb new technologies and then they are not ready to learn.

2.2. Learning from foreign partners in Vietnam: some remarks on actual status

During recent periods, certain conditions in new contexts of learning from foreign partners experienced changes. The mode of activities by FDI enterprises gets different from the previous one which is seen through multiform status. The globalization, S&T development and the so-called 4.0 industrial revolution create a new environment of learning and, at the same time, require enterprises to have new skills to face changes in structure and specific features of labor market and technological changes. At the same time, the trade protection trends re-appear and are seen to grow up. In this new context, what features are found new in concepts of learning? A survey of some enterprises in sectors of processing/manufacturing industries would

help indicate new points in the process of learning of technological capabilities. Two series of surveys were conducted among 43 enterprises in industrial sectors and the related study allows to make the following conclusions (*Tran Ngoc Ca, 2018*).

The mechanism of *linkage with foreign partners* helps local enterprises in learning of some matters related to foreign resources, namely technologies, market matters, financial payment procedures, investment skills and etc. Therefore, this learning includes technological and non-technological aspects. However, during the previous period, this mechanism was used in a more active manner for learning of producing and investment capabilities in comparison to other aspects of capabilities. In agreements for technology transfer, foreign partners pay more attentions in helping Vietnam enterprises to master well the management of production activities for better supply of export products to overseas markets. And then, they want to offer supports for Vietnam partners to accumulate some investment skills for development of business activities in certain overseas markets where they may get certain benefits also.

The maintaining of good business relations with local partners is also another reason for foreign partners to develop cooperation with Vietnam partners in activities other than production ones. But the cooperation from foreign partners comes to this extent only. Practically a majority of local enterprises surveyed in the first round shows a low level of participation of foreign partners in helping local partners to learn knowledge and skills to change technologies, even in low level of technological modifications. The similar situation was observed in terms of marketing capabilities. The surveyed enterprises in the two sectors stated that they get awared of importance of linkage with foreign partners in learning of marketing skills but they found difficult to approach and to use them effectively. This trend makes considerable shares in weakness of marketing capabilities of Vietnam enterprises. Collected evidences are not enough to allow to state this weakness comes from shortage of good wills of foreign partners in helping local partners to learn these two categories of capabilities. However, certain lack of supports from foreign partners for local partners in learning of *technological changes and marketing skills* is observed in almost all the surveyed cases. Therefore, there is no exhaustive answers to the problem and the conclusion that foreign enterprises are not ready to make supports for learning in these two sectors might eventually remain right yet.

In addition to eventual lack of good wills from foreign partners in offering supports for Vietnam enterprises to develop their own relations beyond the simple roles of sub-contracting partners, there may be two reasons for the

weakness of local enterprises in using existing links for learning of these capabilities. *First*, the one-side use of links from foreign countries where, during long periods of time (at least up to 1980s), Vietnam had the only channels of access to learning from the countries of the former Soviet block (SEV Block). As it was underlined above, the relation between Vietnam and the countries of this block based on center-planned/controlled economy principles confined Vietnam enterprises within poor sources of chances to learn marketing capabilities suitable for exploration of new markets. *Second*, Vietnam enterprises are found to lack capabilities in receiving technological supports from foreign partners. It is necessary to remark, however, the use of links with foreign partners as a mechanism of learning is not identical between sectors.

The full picture of using mechanisms of links with foreign partners by local enterprises surveyed during the two years of 2017 and 2018 is quite different. In almost all the enterprises under surveys, the learning through links with foreign partners was taken as one of important mechanisms (if not saying the most important one) to assist local enterprises to achieve their own objectives of technological capabilities. This channel was used by local enterprises in a much higher rate and remained present in the process of learning of all the technological capabilities. For the most popular capabilities such as the one of production and investment, this channel was used by absolute majority of surveyed enterprises (namely 94.7% and 84.21% respectively)³. The only enterprise among the surveyed ones which did not use this channel of learning is a small size household-type mechanical enterprise (the family was incapable of making access to foreign partners in production of its own products). For other capabilities, the rate of use of this channel by enterprises is much higher than the one observed in the first round of surveys. Many enterprises in textile-garment sector take the channel of links with foreign partners as the key channel for almost all their technological capabilities. This trend occurs mainly with those enterprises which were successful to get into certain chains of values or into the networks of sub-contractors of foreign enterprises. Even some enterprises which get minor chances to enter the circle as the ones in chemical and electronical sectors take foreign partners as opportunities to enhance their own technological capabilities through access to and extension of learning activities.

This fact shows the international cooperation relations and links developed stronger within the last 10-15 years when the economy of Vietnam experienced a deeper and broader integration. The interesting fact is the

³ From the results of surveys under this study.

number of Vietnam enterprises which do not use this channel of learning of capabilities for technological changes had reduced considerably. 89.47% of the surveyed enterprises rely on foreign partners to build up their own capabilities to make light technological modifications and even some of them are successful to build up large innovative capabilities for their own technologies.

As results, some remarks can be made for the use of channels of learning from foreign partners, namely:

- The channel of links with foreign partners is the most effective channel of learning for almost all the types of technological capabilities (after only the “learning by doing”);
- During recent years, in context of deeper and broader integration into international economies and S&T activities, this channel is used more than it was in the previous time and not always within FDI frameworks but, in fact, Vietnam enterprises get pro-active in search of foreign partners for their learning;
- In relations toward foreign partners, Vietnam enterprises are making stronger shift from OEM status to ODM status and even higher;
- The process of learning by Vietnam enterprises is shifting gradually from simple skills to more complex ones, from producing capabilities to capabilities of light technological modifications and even large technological innovative capabilities including design segments;
- Non-commercial transfer of technology is very important for learning. The learnt knowledge starts overflow effects to include both the initial segment (design) and the final segment (package, trademark promotion and marketing activities) in the global cycle of manufacturing-producing activities (particularly in garment sector);
- The technological overflow effect occurs more dynamically, subject to different sectors.

2.3. Some policy factors impacting the use of this channel of learning

This study also provides analysis of a group of policies which impact the process of learning of technological capabilities. It is possible to say the group of *policies of supports to develop supporting industries, to build up links and systems of intermediate connecting organizations* are the topics most noted by enterprises under surveys. Many enterprises pointed out that the shortage of a system of supporting organizations for industrial development prevent much enterprises from chances of learning for enhancement of technological capabilities. They also noted difficulties

related to this group of factors. Some enterprises in electronic sector face difficulties when they do not have a system of supports for their needs of tests and checks for high precision products. Another large enterprise considers that the lack of a suitable policies in electronic sector is a big negative factor for long term orientations of their efforts of technological learning. In the meantime, enterprises in garment sector mark the lack of supporting infrastructure for research of fashion technologies which prevents also opportunities of learning to enhance their positions in relations to foreign business partners. A large enterprise even having already its own R&D unit for creation of new fashions still faces difficulties while trying to get access to home and overseas representative offices for collection of information about market needs and product trends, due to the lack of suitable State regulations of institutional nature. There are also enterprises in mechanical manufacturing sector which face difficulties due to the lack of supports for test of their complex machines.

Smaller size enterprises in private sector need supports in terms of policies for start-ups and supports from intermediate service organizations for design and production of suitable packages and production of sample products. These shortages (or, more precisely, unmatched requests) in industrial supporting infrastructure and intermediate connecting organizations would serve as hints for solutions.

The next factor relates to *S&T specific policies* such as supports for R&D development and promotion, designs and IP right protection. Since the legal systems remain low effective in implementation and enforcement areas (such as IP rights), the use of mechanism of learning through links with foreign partners remains difficult since products from foreign sources are hardly protected from violation of ownership rights. Similarly, the intentions of learning by doing of Vietnam computer companies (their proactive plans for development of software) cannot be realized due to the lack of effective legal measures of these products to cope with copyright violations. Garment enterprises face many difficulties when extending cooperation with foreign designers for development of high class fashion products. Low level of standardization and quality management are barriers to cooperation forms between Vietnam and foreign enterprises. In electronic sector there is no unified development of standards for both hardware and software products which cause difficulties to use of the links with foreign partners as mechanism of learning and then weaken effectiveness of efforts by local enterprises to integrate production network of manufacturers, suppliers and buyers in international markets. According to views by some electronic enterprises, they have to deal with so many different foreign standards in their production activities while facing the

lack of a unified and single format for Vietnam market. This situation causes difficulties to efforts of learning through links of foreign cooperation. The shortage of information and data records, in both technology and business terms, is also a cause of low use of foreign links for learning. As example, a local enterprise faces problems when doing cooperation with Control Technique Singapore (subsidiary of a UK company). Initially the cooperation passed smoothly. The problems raised when the Singapore partner wished to control some enterprises of Vietnam side. The Vietnam side did not know what to do while failing to connect the UK head quarter office of the partner. The reasons are the shortage of communication infrastructure and information (records of the relation between Control Technique Singapore and its mother company in UK, or any potential suppliers capable to substitute Control Technique Singapore). The situation leads to a deeper dependence of local enterprises from Control Technique Singapore. This case also serves as example of low organization of learning activities inside enterprise which leads to low efficiency of learning by enterprises and their knowledge management.

Garment enterprises view that the IP legal systems are low effective and not transparent which cause huge impacts to their capabilities to protect their IP rights as well as settlement of labor and business conflicts. In fact, the IP legal systems remain low developed, particularly in terms of enforcement regulations and this fact causes great impacts to development of enterprises. The greater efforts the enterprises make for learning of complex technological activities the greater problems they face in terms of IP matters (such is the case of software design) related to their own products or the ones from overseas sources.

Another point observed in the recent times relates to macro policies such as *finance, investment, training and use of human resources*. These factors cause less concerns than the ones of learning of technological capabilities, as seen through surveys of enterprises in previous times. The most concerns of private enterprises, small sized or starting-up, remain the access to capital sources and fundings for technological innovation and learning. Larger size enterprises, at their higher development level, experience also the needs of capitals for development of trademarks and extension of their learning from overseas sources.

In context of increasing application of new technologies, many novel labor skills such as analyzing skills, synthesizing skills, team works, use and operation of complex systems (called by education managers as XXI-th Century skills) put more requirements to education and formation systems to keep pace with. Many enterprises under surveys express their wishes to get more supports in this area of policies.

3. Toward the building of a program of learning of technological capabilities for enterprises

On basis of exchanges and analysis of views by enterprises impacted from the group of policies in relation to learning of technological capabilities, this study made a proposal of some groups of policies to support the learning of technological capabilities by enterprises in general and the learning through links with foreign partners in particular.

First of all, for the group of policies on *building of industrial infrastructure such as supporting industries, linking and intermediate organizations*, the solutions include:

- Strong development of supporting industries, namely the manufacture of fixture equipment in mechanical engineering sector;
- Establishment of technical support systems for enterprises to carry out checks, tests, and industrial infrastructure;
- Issuance of long term vision and stable policies for industrial development;
- Establishment of abroad representative networks to provide supports in terms of information, international marketing activities, search and analysis of development trends of related sectors (most urgent for garment and fashion industries);
- Building and consolidating of intermediate supporting organization in terms of design and production of packages and sample products;
- Building of database, designing software and technological libraries for common use among related sectors.

For the group of policies directly related to *science, technology and innovation development*, the solutions include:

- Issuance of policies for promotion and building up of links, search, building and implementation of tasks of direct settlement of concrete requirements from enterprises;
- Improvement of institutional aspects for science, technology and innovation development including IP right related problems;
- Supports for enterprises to build and implement a system of activities for organization and management of knowledge inside enterprises;
- Supports for R&D activities by enterprises in terms of organization and development of links and skill training;
- Financial supports (credit offers) for technological innovation activities;
- Supports for development of technological management skills inside enterprises;

- Strong promotion of supply of technological information including collections of technological procedures.

For the group of policies related to *macro economies such as finance, investment and trade*, the solutions include:

- Building and implementation of policies for Government purchases and bidding operation in direction to encourage technological innovation activities;
- Specific measures to support small and medium enterprises in terms of technologies.

Finally, for the group of policies related directly to *training, recruitment and use of labors*, the solutions include:

- Building of programs to support skill training activities to meet demands from enterprises;
- Building of regulations of labor management flexibly suitable to requirement of management of human resources in context of strong shifts of labor markets (draining among skillful workers and technicians, particularly in sensitive sectors such as garment, electronic and footwear industries);
- Organization of re-training courses and provision of new skills for human resources in context of fast changing technologies (called as I4.0 context).

In a global and intersectorial approach for practical implementation of these solutions, it is possible to target the establishment of a program to support technological learning of the type “hands-on instruction”. It may include numerous components but the training of technological management for enterprises would be the crucially important element. These activities would produce effective contributions to help enterprises in learning for enhancement of their technological capabilities.

There exist maybe some views to say that the learning of technological capabilities through links with foreign partners may not be highly effective now. The arguments are the economic activities gradually shift to digital modes on basis of source sharing and Internet of Things (IoT) and then the learning from foreign partners for development of technologies would not be effective. In practice, however, the things do not occur in such a simple way. The catch-up of the leading economies does not always rely on the leap based on new technologies. The technological learning will be continued in orderly alternating moves in many fields (in majority of cases) and realization of potentials for leap (in very minor rate of cases). The process of learning does not occur compulsorily in linear manner and,

naturally, the technological learning is not required to be conducted only through links with foreign partners. But in context of a poor country with low growth rate and low starting point, the technological learning through links with foreign partners remains one of effective ways in short term visions. We are not forced to have a single approach and then a multi-choice approach is possible for achievement of common goals./.

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