DEVELOPMENT OF TECHNOLOGICAL CAPABILITIES: PROBLEMS IN DEVELOPING COUNTRIES AND SUGGESTIONS FOR VIETNAM

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Abstract:

Development of technological capabilities is crucial part of strategies for nations. It is backgrounds to get higher labor productivity and quality of products, and to offer competitive advantages in international markets. Studies and assessments conducted abroad also show well that tasks to build up and to develop technological capabilities in developing countries face more tough difficulties than developed countries do because they remain still limited in resources and institutional aspects particularly. In order to go over barriers and disadvantages for development of technological capabilities, developing countries should set up and implement reasonable and wise strategies and policies to secure enough resources and policy-based tools to offer in-time supports in process of learning and accumulating knowledge and experiences for development of technological capabilities in every sectors.

This paper would put first accents to clarify certain aspects related to technological capabilities such as: What are technological capabilities? How to get them? Which problems do developing countries should pay attentions to in their efforts for development of technological capabilities, differently from developed nations? Where are the top key aspects of attentions of Vietnam in its efforts for development of technological capabilities in close future?

Keywords*: Technological capabilities; Technological innovation; Enterprises; Developing countries; Vietnam.*

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1. Introduction

Technologies are technical solutions, procedures, know-hows and tools to turn resources into products[2]. Technologies are, at the same time, achievements and top important tools for development. They are also indicators to measure civilization level and quantitative differences between

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[2] Vietnam Law on Technology Transfer, 2006

stages of development of societies, and the ways the social welfares and assets get produced. From this global vision to technologies, efforts to push up societies to certain levels of development are of the same concepts as ones to advance them to a higher level of development in capabilities to absorb, to adapt, to master and to create new technologies.

Acknowledgement of important roles and positions of technologies towards development lead researchers to go farther in their efforts to look for mechanisms and ways technologies may cause impacts to development process of a nation, particularly for developing countries, if they wish to catch up advancing industrialized nations. In this orientation of studies, the notion "technological capabilities" was gradually established and gets admitted in numerous studies in many countries. UNIDO reports (2002 and 2004) also confirmed technological capabilities are crucial actors in process of economic development, and industrial development of a nation largely depends on capabilities of its enterprises to develop, to secure technological capabilities and to maintain competing capabilities. *Kim and Nelson (2000)* provided a statement the industrial development is in fact the process to achieve high technological capabilities and to turn them into innovation of products and production procedures in accordance to common trends of non-stopping changes of technologies. Studies by *Bell and Pavitt (1993)* indicated the accumulated technological capabilities and conducted innovations are key factors for developing countries to come to the world leading positions in various industrial sectors, not only being capable to catch up international advanced technologies (for example, South Korea in steel, automobile, semi-conductor industries and etc.) but also creating new technological trends to lead the world (for example, Japan in electronic technologies and Brasil in bio technologies, oil production industry and etc.).

The assessment and acknowledgement of roles and importance of technological capabilities in process of development provide certain points of attentions for developing countries including Vietnam. This paper targets to clarify partially some aspects related to technological capabilities such as: What are technological capabilities? How to get them? Which problems do developing countries should pay attentions to in their efforts for development of technological capabilities, differently from developed nations? Where are the most key aspects of attentions of Vietnam in its efforts for development of technological capabilities in close future?

2. Main specificities of technological capabilities

The term "Technological capabilities", though being admitted globally in international communities, remains tacit and difficult to be exactly

quantified. From another side, this term has specific meanings for individual enterprises as well as various industrial sectors. Then there is no clearly any unified concept for this term actually.

Despite of lacking such clearly unified concepts for the term, some common visions were developed in interpretation and description of the process to build up and to develop technological capabilities. Namely:

First, technological capabilities are processes of learning and accumulating of knowledge and skills. Technological learning can be understood as process where enterprises, industrial sectors and nations can accumulate their own capabilities to conduct innovative activities in different forms and levels, in connection to production activities. *Ernst et al. (1989)* had noted three forms of technological learning, namely: (i) *Regular learning* which are conducted in education and training facilities to get professional and qualification certificates as evidences of learning; (ii) *Non-regular learning* which are conducted on-work through practice in working process or cooperation activities and joint links with partners; and (iii) *Indirect learning* which are conducted through gathering of skills and experiences from activities of recruiting of new labors and implementing joint business with abroad similar enterprises and partners. *Lall (1989, reference form Aderemi et al. 2009)* made a farther classification of three types of learning, namely: (i) *Basic learning* which is conducted through practice and adaptation process; (ii) *Post-basic learning* which is conducted through designing and design modifying activities; and (iii) *Advanced learning* which is conducted through establishment of complete production systems.

Second, the building up of technological capabilities has to start from the sector of enterprises. They are central and key forces in all efforts for development of technological capabilities of a sector or of a nation. This stand of vision derives from Schumpeter's concepts when talking about innovation and economic development. According to Schumpeter and other studies which follow these concepts, the economic development of nations is based on evolutional backgrounds of technologies-industries. At the issue of every development stage of technologies-industries, the world rises to a new level of civilization and modernity. More important, the driving forces to advance these shifts get their starting points from evolutional innovations which gradually lead to great and basic changes of products and production procedures of enterprises in industrial sectors in all the countries. Up to now, these evolutional rules have still operated in accordance to their natural ways.

Third, even having enterprises in centers of activities to build up technological capabilities, the intervention from the Government are

compulsorily required to secure efforts of a sector or of a nation to be completed in "the most perfect manner" in context of permanent and objectively fluctuating movement of markets. The Government is not involved directly into efforts of enterprises but it plays important roles, as sufficient factors, to secure technological capabilities of enterprises to be implemented and give contributions to global development of the nation. In another optics, the fact that the Government can secure necessary conditions for development of technological capabilities is taken also as a type of energy contributed to development of technological capabilities of the nation. This point of vision is particularly important for developing countries which determine objectives to catch up advancing nations but not set up enough institutional backgrounds and optimal rules for a market based economy *(Litan, 2005).* It is also an important background to see more clearly related concerns and to suggest the necessity to design policies to promote development of technological capabilities in industrial sectors or in nationwide scale as indicated in studies by *Lall and Teubal (1998), Kim (1997, 1999), Erga (1987), Dasguota (1987)* and others.

Then, in global views, *technological capabilities are identified as capabilities to accumulate necessary resources for creation and management of technological changes. Technological capabilities get built up through process of learning and accumulating of technological experiences, knowledge and skills to enhance labor productivity, quality of products and competing forces of products, sectors and of the nation in a more global view.*

The involvement and interventions based on policies and investments by the Government for development of technological capabilities are to facilitate and to favor the process of learning and to reduce transaction costs without changing the practical nature of the free market mechanisms.

3. Components of technological capabilities

On basis of the above noted notions to define specificities of technological capabilities there were developed studies to determine basic components of technological capabilities which are identified actually as follows:

3.1. Capabilities for production

Capabilities for production are linked to knowledge and skills used in practice by enterprises including the important role of the ones developed from on-site activities and "learning by doing" process. Here the most attentions are paid to three types of activities: (i) Management of

production; (ii) Techniques for production; and (iii) Reparation and maintenance of material capital sources.

The management of production is reflected well in organization and control of production process and its inter-links with input, output and support activities.

The techniques of production include: control of material use, plan setting for production activities, control of quality and treatment of troubles.

The capabilities for reparation and maintenance are tested through assessment of impacts from "duration of troubled machines" and "average duration between troubles" which reflect impacts of production equipment to productivity of production activities. Another important activity sitting on border of capabilities for production and capabilities for small changes is related to techniques of adaptation. These techniques include small modifications (adjustments and improvements) arising during production process. In practice, there are many reasons to make these modifications including requirements to do better adaptation procedures to meet local environment conditions.

3.2. Capabilities for investment

Capabilities for investment deal with knowledge and skills used in determining, preparing, designing and operating new industrial projects, extension and/or modernization of existing ones. This group includes capabilities available before or appearing during implementation of investment activities.

Capabilities of preparation for investments play particular important roles for the countries in initial stages of industrial development. They include a series of activities: from pre-FS studies, FS studies, selection of site, investment planning up to searches of technological sources, negotiations of contracts and suitable terms and conditions for transfer. The implementation stage of projects requires support activities including civil construction techniques and related services, selection and purchase of equipment, recruitment and training of human resources and start of operation.

Many elements among these investment items are not realized by producers themselves but get available from external sources which are mainly foreign countries. Therefore the search of selected supply sources of external capabilities plays important roles for building up of capabilities for investment. Here, local enterprises are not required to conduct fully the above noted investment activities since certain of them can be purchased

from external sources. Some other capabilities are linked to searching of technology supplying sources, evaluating of information provided by technical consulting experts, evaluating available technologies most meeting needs of enterprises, negotiating terms and conditions of purchase transactions and deciding modes of technology transfer (including, for example, labors of enterprises before start of construction activities, use of external experts and etc.). Many positive assessments were made for the cases where enterprises, even still depending on participation of foreign experts for construction and operation works, get rich profits if they can absorb provided technological know-hows.

When local enterprises, afterwards, get capabilities to diversify their products in new sectors they would be capable to "propagate the learning skills" from gained investment experiences, in case of similarity of requirements of projects under implementation. These experiences turned to be useful to build general capabilities for organization of preparation activities for investment or search of selected supplying sources according to investment requirements. However, it is not usual the requirements to build up capabilities for new investment projects can be based on experiences of the previous ones. This remark remains particularly right when spent efforts are implemented and focused on stages of basic design, equipment design and system integration works which require an accumulation of available basic knowledge and certain creativity.

3.3. Capabilities for small changes

Capabilities for small changes are those which permit continuously to improve and adapt products and production procedures of enterprises. This type of capabilities are linked to a large scope of techniques to adapt and to adjust organizational structures in relation to gradual updating of capabilities for designing works, quality of products and technological process. Capabilities for small changes maybe are ones of the most important factors to implement successfully "catching up" strategies. Without having strong capabilities for small changes, enterprises have low chances to get benefits from largely implemented activities for technological propagation. According to *Bell and Pavitt (1993),* "enterprises need to accumulate more knowledge, skills and experiences necessary to establish road maps for continuous and progressive changes in a series of activities including an enhancement of initial standards of used technologies, adjustment of demands for input/output factors and procedures to meet fluctuations of market inputs and products".

In addition to sophisticated technology decoding techniques, enterprises can base their considerations on capabilities of design analysis and system

techniques for various arrangement of available components or adjustment of existing designs to meet requirements of new procedures/products or retain existing procedures/products in more effective ways and with lower costs.

3.4. Capabilities for strategic marketing

In context of international integration and globalization, the success in today's competition activities requires strong capabilities to distinguish products where the development depends on success of producers in establishment of close links with clients, in-time fixation or change of their demands. Therefore, marketing capabilities would be one component in technological capabilities of enterprises. This type of capabilities can be interpreted as knowledge and skills necessary for collection of information on markets, market development and establishment of channels for supply and distribution of customer services. Also, for successful transfer of knowledge on customer demands to commercializable products and services, enterprises should have a strong system of capabilities for product designing techniques. Therefore, enterprises shifted their concepts or marketing to a strategic management function. Instead of making business in fixed markets the strategic marketing activities target mainly development of new markets and improvement of competitive advantages of enterprises. The main objectives of these moves are to narrow gaps between markets, to prioritize sources for innovation of enterprises, and to reduce demands of time and costs for development of new products. Being defined in these directions, the marketing capabilities have become an important component for technological capabilities of enterprises.

3.5. Capabilities for linking

Capabilities for linking are seen through knowledge, skills and organizational abilities to establish links, both internal and external, combined with technology transfer at three different levels, namely: (i) Inside enterprise; (ii) Between enterprises; and (iii) Between enterprises and organizations of national S&T infrastructure.

Inside enterprises, capabilities for linking deal with abilities for administration of internal interactions, information sharing between various internal units and business functions, such as: research and development, designing, operational techniques, production procedures and facilities, marketing, sales and customer services.

Inter-enterprise links may be related to domestic and foreign enterprises including diversified activities such as purchase of materials, parts and

pieces, exchanges of services and supplier-related information, sharing of marketing and distribution activities, joint development of product designing, production technologies and related scientific knowledge.

Development of links with organizations of national S&T infrastructure is related abilities to attract, to absorb and to upgrade available human resources of enterprises to analyze and to select options for development of new technologies, to establish close interactions with research activities in fundamental and applied sciences. Being provided with important advantages from strong local S&T infrastructure, such links increasingly extend over national borders when R&D activities get internationalized.

3.6. Capabilities for large changes

Capabilities for large changes include the establishment of most tough and complex requirements in technological activities. Capabilities "for large changes" are understood as knowledge and skills necessary for creation of new technologies which are in fact large scale changes in designing activities and core specifications of products. Particularly, these features include ideas for new products, certain fundamental and applied science knowledge and capabilities to develop technological ideas up to granted patents. Capacities for large changes have starting points from many sources including internal R&D capabilities which are not surely unique components. Numerous studies indicated that many progresses in technological development did not come compulsorily from R&D activities. *Nelson (1990)* emphasized attentions on roles of production designing skills and techniques for renovation of production procedures and products[3]. By other words, independent R&D activities are important actors for process of investment and organization of implementation for promotion of technological development in many industrial sectors. However, it is not usual cases that R&D activities hold all the dominating positions in efforts for technological changes. Even in certain sectors, they hold only small shares[4].

For majority of enterprises, R&D activities have a much larger scope of objectives, not only for development of new production procedures and products. The most important objective is probably contributions for development of capabilities for successful technology identification.

[3] Some studies on industrial activities show well that efforts for innovation in certain industrial sectors do not fall under influence of R&D activates (*Ernst*, 1998: 22)

[4] According to studies by *Pavitt* (1984), there exist differences in technological changes and upgrading between industrial sectors. There exist various groups of industrial enterprises which are much dependent on adjustments by suppliers (terminologically called supplier-dominated firms), from adjustment of production scale (called production-intensive firms) and from adjustment of science-technology factors (called science-based firms).

Sophisticated R&D industrial labs are seen as "smart" infrastructure permitting enterprises to follow strictly the actual development of advanced technologies because they are original sources of new key technologies. R&D activities are conducted largely also to get advantageous starts for considerably better products where competitors need to spend much time and large investments to catch up or to pass over. The targets to produce products specifically designed for customers would be a catalyst for continuous and integrated upgrading of technological capabilities of enterprises.

In addition to development of capabilities for changes inside enterprise, in principle, part of knowledge which are backgrounds for capabilities for large changes may come from external sources, universities and R&D labs of both private and public status.

There exist increasingly closer interactions between scientific research activities and technological strategies of enterprises. In OECD countries, academic researches provide so many initial "discoveries", prototypes and test samples which afterwards lead to their development and commercialization by industrial enterprises.

4. Problems in development of technological capabilities in developing countries

The above presentation shows that the development of technological capabilities is highly important and plays key roles in efforts for industrial development of countries. However, in case of developing countries, studies by *Lall (2000), Jomo K.S and Felker (1999)* and others, provided suggestions for concerned problems and potential solutions when efforts will be implemented for development of technological capabilities

First, the learning of technologies is a practical and meaningful process. This is important for industrial development where the learning efforts are mainly intention full and target oriented activities but not passive and self-raised ones. It is not compulsorily required that enterprises use the same technologies in the same stages at the equal levels of skillfulness: *every enterprise would get certain level of mastering skills on basis of its own rates of efforts to build up technological capabilities.*

Second, enterprises usually do not get full information on technical and technological options. They need to accept a practical situation that technological knowledge are changing and they would not get updated of that. At the same time, there is no common standard, in information aspects, applied globally for enterprises. But one thing is sure that enterprises in

developing countries would face risks and high costs for learning efforts without being well prepared for that. In addition, *learning capabilities of enterprises get impacted by development level for every nation.*

Third, enterprises might not know how to build up necessary technological capabilities. In any developing country, traditional technological knowledge might not be good backgrounds to master modern technologies. Technological followers have to see a reality that others (yet technologically advancing nations) have passed also learning stages. This situation of technological followers needs to be seen from two aspects: benefits and raised costs. Benefits are easily seen that they may get experiences and learn much from them when keep pace in the same process (note in addition that followers difficultly enter markets dominated by technologically leading nations). *High costs and risks also accompany technological followers and cause negative impacts to them because of their limited knowledge, capabilities for development of markets and fast changing process of technological development.*

Fourth, enterprises when coping with uncertain situations of technological knowledge and market information not only face to maximization of functions which need to be clearly indicated and skillfully operated (on basis of the ones by those who advanced) but to development of skills and habitudes of specific management and organization features. These features get adjusted through the ways enterprises gather new information, learn experiences and copy other enterprises. In fact, *the learning is the ways of studying and accumulating.*

Fifth, the learning process has highly specific natures for every type of technologies since technologies have their own particular features and specific knowledge values which require different ways to access for learning purpose. Some technologies are closely bound to physical equipment in tangible forms of values while many others have intangible and hidden forms of values. Process technologies (such as chemical ones) have more intangible values than technical technological (such as machines, cars and etc.) and then they require different ways to access. Note also that capabilities built up by one in a type of activities are not easy to be transferred to other persons even in the same scope of activities. Different technologies are different also in terms of required knowledge and skills. Some technologies require deep and narrow scope of specific knowledge and skills while others may require a larger one.

Sixth, *different technologies have different rates of dependence on external information and knowledge* which may come from other enterprises, consulting experts, suppliers and research institutes.

Seventh, the building up of capabilities can start from all the levels and scopes of activities including commodity production sectors, product technologies, production procedure technologies, quality management, maintenance, purchases, control of stocks of products, external logistics and relations to other enterprises and institutions. In practical meanings of things, innovations are realized through R&D activities. The realization of an innovation means a completed series of technological activities. However, further R&D activities remain needed to target the use of more complex technologies. Accordingly, when the absorption of technologies gets effective the further implementation of R&D activities are found necessary.

Eighth, technology development can be conducted at different levels. The lowest level of operating capabilities (knowing how it is) is necessary for any start of activities for development of technological capabilities. However, it does not mean that this knowledge can lead to a development of capabilities in a higher level - knowledge of principles of technology (knowing why it is) since the wishes to step up to a higher level of technological capabilities require specific strategies for in-depth investments. The higher levels of technological capabilities would require the readiness to accept higher costs, more risks and longer time. In this long range of activities, it might be feasible for an enterprise to get an effective level on its lowest level of capabilities (knowing how it is) and then to remain at this level. But this vision is not optimal if the enterprise wants to promote a long term vision for development. This enterprise remains dependent on other enterprises in terms of large improvements for its needed technologies. The development of capabilities when achieving the level to catch higher technologies (knowing why it is) would permit enterprises to manipulate better the choice of technologies, namely they can chose technologies they need, they can reduce costs for technologies they buy, they can get more values to add to their own knowledge and they can develop technological capabilities for their independent creative projects.

Ninth, the learning of technologies links to external factors and interactive relations. This process is guided through direct interactions with input material suppliers, commodities, sources of capitals, competitors, clients, consulting services and technology suppliers. Indirect interactions with enterprises in non-related industrial sectors, technological institutes, extended services, universities, professional associations in industrial sectors and training facilities.

Tenth, technological interactions occur inside a country and abroad. Import technologies provide the most important source for learning of

technologies in developing countries. It is necessary to note that technologies are continuously changing and, more than that, the access to innovations from other countries is necessary for permanent progress of technologies. However, the import of technologies has no ways to substitute the development of indigenous capabilities which is the most effective result of import of technologies. In final accounts, the effective use of imported technologies depends on domestic efforts and capabilities. In a similar way, it is not the case all the models of practice of import of technologies leading to learning efforts by domestic enterprises. There exist many factors to impact the ways import technologies get packaged with added components, namely: If there exist other available sources for the same technologies? How fast technologies in the concerned sector change? Which are chances for domestic enterprises to enhance technology absorbing, mastering and developing capabilities? Which could be policies to be applied to promote the promotion of technological transfer and upgrading of technological capabilities?

5. Some suggestions for development of technological capabilities in Vietnam

The above conducted analysis shows that it is necessary to orient efforts on basis of development of technological capabilities to establish competitive positions in industrial production sectors. Studies show that technological capabilities in a scale of industrial sectors or national scale get established through a process of learning and accumulating knowledge, experiences and technological skills through production activities as well as R&D activities. The process to establish and to build up technological capabilities starts basically from efforts by enterprises and then propagate farther to the scale of sectors and the national one.

Efforts by developing countries to build up and to develop technological capabilities face more difficulties in comparison to developed nations. Studies made for developed countries show the situation of under-development of market institutional regulations and misbalance in accessing and receiving information on market of commodities and technologies. Then the ways to establish and to develop technological capabilities by developing countries cannot be similar to the one of advanced countries who developed almost globally market and institutional structures. In this context, it is found impossible “to trust” fully the promotion of technological capabilities to free market mechanisms. Instead of that, it is necessary to secure interventions by the Government through policies, in efforts for development of technological capabilities. They can

provide enough driving forces and resources to catch up advanced countries in certain sectors.

Practice of the process to establish and to develop technological capabilities in some East Asian countries for industrialization stages during the 1970s decade shows that these countries were highly pre-active in determination of priorities in industrial sectors which afterwards became backgrounds for development of technological capabilities to keep pace with defined industrial demands. In addition, instead of attentions for efforts to develop capabilities for fundamental sciences and internal R&D systems for a vision to compete with industrial developed countries, the Governments of East Asian countries adopted priority policies of resources for efforts to develop technological capabilities in industrial enterprises through supports designed to access sources of new and advanced technologies from external sources in combination with a suitable rate of measures to protect locally made products locally developed technologies. On basis of wise policies by the Government and hard works and high determination to learn by enterprises, the position and technological capabilities of these countries get gradually accumulated and upgraded which permit them to enter competition and to fight for international markets in many industrial sectors.

For Vietnam, the objectives to accelerate the industrialization process of the country were recorded in numerous documents by the Party and the State for long periods. The State also focused resources for realization of objectives of industrial development as well as to establish technology based competing capabilities in many industrial sectors. However, it is possible to note that the orientations of industrialization of Vietnam were not found consistent and clear in determination of industrial priorities which would permit to focus resources for purpose to follow up to ends. Due to these reasons, despite of positive economic growths during recent decades, the quality of economic growths was not high. Being compared to policies made by East Asian countries during the past, Vietnam is found to rest actually in stages to take considerations and to set up plans for that but the finally obtained results were not observed as positive as it was the case of those advanced nations.

However, a closer insight in essential aspects of development of technological capabilities as above presented, as well as useful experiences by East Asian countries as described in numerous related studies, would let see many policy related problems to be assessed and added to road maps of future technological policy making activities in Vietnam. Some suggestions can be proposed as follows.

First, in addition to attentions and investments for R&D activities in universities and research institutes, it is necessary to offer channels to support and to make investments for technological development activities by enterprises (including implementation of activities to receive, to study and to master external technologies). In reality, enterprises may not have enough resources to carry out R&D activities (which are full of risks and high costs) but they always have wishes, demands and targets to receive available, but credible enough, technologies and equipment from external sources. It is also a large practice that users of imported technologies give priorities first to get economic benefits and pay less attentions to explore and to learn potential knowledge values. So, if next following these trends, in long term visions, producing sectors in Vietnam would be only, in the best case, "skillful users of technologies and equipment" and then remain dependent on original technology supplying nations or organizations. Therefore, the most concerns for changes are to provide additional supports and incentives by the State for enterprises and scientists to get more chances to explore and to get more knowledge values bound with transferred technologies in a longer road map. Following this vision, the establishment of a research program for technological decoding activities for certain groups of products or industrial sectors where Vietnam is advantageously positioned should be included in policy making road maps in national or local scales. When the program designed in these directions gets implemented it would open opportunities not only for enterprises but also for local and foreign scientists to participate in these development activities.

Second, investments made by social resources and State budgets for activities to develop technologies need to be well target oriented and focused. East Asian countries, in their efforts to import and to master technologies, determined their priorities. Japan and South Korea put priorities for electronics and car manufacturing industries while Taiwan concentrated efforts for semi-conductor industry. On basis of these industrial priority orientations, these countries had determined suitable realization stages as well as secure financial resources for exhaustive implementation of designed missions, from imitating and copying received technologies to mastering and creating new technologies in these sectors. For promotion of industrialization, Vietnam determined many industrial priorities in many various sectors. However, from science and technology point of view, it is highly necessary to determine priorities for specific industrial sectors which would become the backbone of national economy and the backgrounds for development of technological capabilities in efforts to achieve international competition levels. The growing

development of an industrial sector in international markets would provide propagation effects for other sectors.

Third, together with efforts for technological development, the factor of human resources should get developed to be capable to receive and to absorb new technological knowledge. As experiences from East Asian countries show the formation of high qualification human resources in natural science and technical fields can be conducted through domestic education and training programs. Also industrial production sectors can get benefits from external partners where they may get maximal efficiency from imported technologies and then master them and develop new technologies with lower costs. By these direct ways, technological capabilities of domestic enterprises get enhanced and then lead to higher competitive capabilities of domestic enterprises. Here another recommendation is proposed which is to establish research programs or study scholarships in certain natural science and technical fields (similarly to the ones applied actually in West European countries) to attract and to stimulate scientists and engineers to follow in-depth technological studies and researches at higher levels. These research scopes need to be bound to industrial production demands raising from enterprises. At the same time, it is necessary to change the system of recruitment, use and remunerations for foreign high qualified researcher who come to work in Vietnam.

Fourth, together with efforts for development of technological capabilities as backgrounds to enhance local labor productivity and product quality, the establishment of competition advantages is also important. Policies for public purchases and mechanisms for establishment of local technical barriers need to be reconsidered and then designed integratedly with efforts for development of technological capabilities in prioritized industrial sectors and production fields in nationwide scale.

Conclusions

Development of technological capabilities is one of the most crucial tasks of every nation which leads to establishment of competition advantages in international markets. Efforts to push up the development of technological capabilities always rest in center focus of attentions from the top level of national interests down to benefits of enterprises. External research works and analysis also show that the tasks to build up and to develop technological capabilities in developing countries are facing with more difficulties than developed nations do because of their limitations in aspects of human resources and institutional regulations in particular. In order to overcome these limitations and barriers, developing countries have to make reasonable and wise policies to secure enough concentrated efforts and

policy based tools to provide in-time supports for learning and accumulating knowledge and experiences for technological development in every sectors.

As many other developing countries, Vietnam, from early stages, determined objectives of industrialization and modernization for purpose to catch up developed nations. Accordingly, Vietnam implemented great efforts for promotion of science and technology backgrounds in general and for development of technological capabilities in particular. The consideration of problems in relation to development of technological capabilities is found important to provide suggestions for related policies. This move is expected to give contributions for a faster process of establishment of technological capabilities in Vietnam./.

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