

## **Solution to Improve Level and Capacity of Technology in the Vietnam's Enterprises**

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**ABSTRACT:** *Improving the technological level and capability of enterprises is one of the important factors that impacting to the technological innovation activities of enterprises, affecting the productivity, quality and competitive advantages of enterprise. This paper focuses on clarifying and answering three questions as follow: (i) What are the technological level and technological capability of enterprises? (ii) How are the level and technological capability in the Vietnam's enterprise? (iii) What should the Vietnam's government do to improve the level and technological capabilities of enterprises in the Vietnam's conditions?*

**KEYWORDS:** *Technological level, technological capability*

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### **I. OVERVIEW OF RESEARCH**

#### ***1.1. On the enterprise's technological level***

To formulate policies for promoting enterprises' technological innovation and application of scientific and technological advances to production, one of the important factors is assessment of technological level and technological capability of enterprise. This issue has attracted research of individuals and organizations with different approaches. These methods are evaluated based on the development chain, complexity level, and modernity of the technological components. Components of technology are based on the technological atlas of the Economic and Social Commission for Asia and the Pacific (ESCAP, 1989).

Based on that, the Vietnam's Ministry of Science and Technology has assessed the suitability with Vietnam's conditions and issued Circular No.04/2014/TT-BKHCN dated 8/4/2014 on guiding the assessment of the technological level of enterprises. Accordingly, a technology including four components as technoware, humanware, inforware, orgaware.

- Technoware (T), this component contains in the materials such as the machines, equipments, devices, and infrastructure.
- Humanware (H), this component contains human's skills and capabilities as knowledge, experience, learning skills that accumulated in the process of technological operation.
- Inforware (I), this component contains in the documents, data are used in the technology as theories, methods, formulas, parameters and knowhow.
- Orgaware (O), this component contains in the institutional framework to build organizational structure, regulations on powers, responsibilities, the coordination between departments and individuals.

In fact, the technological components are closely interrelated to make the transformation process effectively. To know how the enterprise's technological status, it is important to conduct a technology assessment. The achieved level of technology is called technological level, and is assessed at different levels. The level of technology can be divided into three levels, which are advanced technology, average technology and outdated technology.

#### ***1.2. On the enterprise's technological capacity***

According to Fransman (1986) and Ramanatham (1995), technological capacity should be defined on criteria such as the ability to find alternative technologies, and select appropriate technologies for import; the ability to use and adapt the technology to import effectively; R&D ability to be able to upgrade and innovate imported technology. However, according to the World Bank (WB, 2001), technological capacity include the ability of production, ability of investment and ability of technological innovation. In which ability of technological innovation is the highest level of technological capacity, that showed the demonstrating the ability to master and creat new technologies.

According to S.Lall (1992), the enterprise's technological capability includes operation capacity, absorption capacity, capacity for supporting to receive technology, and innovation capacity. These four

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capabilities content two basic elements, in that suitableness for developing countries (including Vietnam), namely the ability to assimilate the imported technology, and the endogenous capacity to create new technology.

- Enterprise's technological operation capability is showed in the capability of production management, maintenance, incident prevention, incident recovery and stability technology operation.
- Enterprise's technological absorption capacity is showed in the ability to search, evaluate, select appropriate technology, negotiate contracts and study to acquire transferred new technology.
- Enterprise's capacity for supporting to receive technology is reflected in the ability to lead the project, training the human resources to receive technology, mobilize capital and identify new markets for output, as well as maintain inputs.
- Enterprise's technological innovation capacity is reflected in the ability to improve, decode technology and create new products and processes.

Thus, enterprise's technological capability is understood as the ability to develop technology effectively and face major changes in technology. This shows that, enterprise's technological capacity depends not only on the current technological level, but also on the national technology environment.

## **II. RESEARCH METHOD**

To clarify the current status of technological level and technological capability of Vietnam's enterprises, the author has conducted the collection, evaluation and selection of research projects on the technology, technology innovation, enterprise's technological capability. At the same time, analysis of Vietnam's policies on supporting, encouraging and promoting enterprises to raise their technological capabilities, especially, studying in the fields of electronics, mechanical engineering, footwear and vegetable processing, fields of Vietnam's competitive advantages.

Moreover, the author conducted in-depth interviews for the Vietnam's experts, entrepreneurs and managers in the field of science and technology. The information is one of the important basis to provide policy solutions to improve the Vietnam enterprise's level and technological capacity.

## **III. RESEARCH RESULTS**

### **3.1. The status of enterprise's technological level**

According to the results of the survey on the need for assistance of small and medium enterprises in the Vietnam's Northern provinces (30 provinces) carried out by the Ministry of Planning and Investment, under supporting from the Japan International Cooperation Agency (JICA) showed that: Of the total of 10,994 enterprises, only 879 enterprises use advanced technology (8%), 5,501 enterprises use average technology (50%) and the remaining 4,614 enterprises use outdated technology (42%). In fact, most of the enterprise's technologies used not high (from Nguyen Huu Xuyen et al., 2014, 2015, 2016), as follows:

- For the electronic enterprises: According to the survey of 43 enterprises in the Vietnam's electronic industry (2014) showed that, 27.9% of enterprises use advanced technology, 48.8% of enterprises use averaged technology, and 23.3% of enterprises use outdated technology.
- For the mechanic enterprises: According to the survey of 56 mechanical enterprises (2015) of Vietnam, when asked "Compared with the world, what level of technology is used by enterprises?", The results show that, 39.3% of enterprises use outdated technology, 48.2% of enterprises use averaged technology, and 12.5% of enterprises use advanced technology.
- For the leather and footwear enterprises: According to the survey of 28 leather and footwear enterprises (2014) showed that, 42.9% of enterprises use advanced technology for production, 32.1% of enterprises use averaged technology, and 25% of enterprises use outdated technology for production.
- For the fruit and vegetable processing enterprises: According to the survey of 32 enterprises processing fruits and vegetables in Hanoi and Bac Ninh province showed that 31.2% of enterprises use outdated technology, 59.4% enterprises use averaged technology, 9.4% of enterprises use advanced technology; At the same time, 71.9% of vegetable processing enterprises said that the technology they are using low level of synchronization.
- For the enterprise under the competitive industry of Vietnam: technologies used is still low comparison with the region and the world. The quality of products and prices have not met the market demand, the rate for importing component, spare part, raw materials for production and business activities is still high. When asked, "In general, what level of technology is used in the enterprise under the competitive industry?". The survey of 118 enterprises showed that (2016): only 11.1% of enterprises use advanced technology, 52.5% of enterprises use average technology, 36.4% of enterprises use outdated technology (average score is 2.76, and the standard deviation is 0.792).

Thus, there are different assessments of the technological level at the some production sectors because due to the size and timing of the survey. But general, the level of technology of the manufacturing enterprises achieved at average level. The research results also show that, almost of the enterprise use imported technology from abroad, and a few enterprises used technology that is researched and developed in the domestic. This is

one of the major barriers to improving the competitive position of enterprises through application, exploitation and technological innovation.

## **2.2. Status of enterprise's technology capacity**

Enterprise's capacity is successfully background for the implementation of patent exploitation and technological innovation. According to the survey results at the Vietnam's some industries, the enterprise's technological capacity is still not good (from Nguyen Huu Xuyen et al., 2014, 2015, 2016), as follow:

- The enterprise's technological operation capacity is evaluated at the good level. This showed that, the enterprises of Vietnam having of managing production, maintenance ability, prevention from accident, troubleshooting and ability to operate of stable technology (For example: electron enterprises, average score of 3.41/5; fruit and vegetable processing enterprises, average score 4.03 /5 - using the Likert scale of 5).

- The enterprise's technology receiving capacity is evaluated at the relatively good level. This showed that businesses have the ability to find, evaluate, select the appropriate technology, having the negotiate contracts and acquire transferred new technology (For example:electron enterprises, average score of 3.18/5; fruit and vegetable processing enterprises, average score 3.01 /5 - using the Likert scale of 5).

The enterprise's capacity for supporting to receive technology is evaluated at medium level. This showed that the ability to lead the project, train human resources to receive, mobilize capital and identify new markets for output, as well as maintain the inputs of the enterprise are assessed still limited (For example:electron enterprises, average score of 2.98/5; fruit and vegetable processing enterprises, average score 2.41 /5- using the Likert scale of 5).

- The enterprise's technological innovation capacity is evaluated at under medium level. This showed that the ability to improve, imported decode of technology, and create new products, new processes are still limited (For example:electron enterprises, average score of 2.52/5; fruit and vegetable processing enterprises, average score 2.25 /5 - using the Likert scale of 5).

Thus, the ability to manage production, maintenance, incident prevention, troubleshooting, operation technology stability is generally good; The ability to search, evaluate, select the appropriate technology, negotiate contracts, learn to absorb transferred new technology are assessed at relatively good level; The ability to lead the project, train human resources to receive, raise capital and identify new markets for output, as well as maintain the inputs of the business are evaluated at medium level. The ability to improve, decode the imported technology and create new products, new processes are evaluated at low level.

## **IV. CONCLUSIONS AND RECOMMENDATIONS**

To raise the level and technological capability of Vietnamese enterprises for technological innovation activities, contributing to the achievement of the target by 2020: The number of enterprises implementing technological innovation average growth of 15% / year, of which 5% of enterprises applied high technology; 100% of enterprises producing main products, product key, national products and create advanced technology to produce products; 80,000 engineers, technicians and managers of small and medium enterprises are trained in technology management, technology management and update new technology; formation of research groups to apply and develop technologies suitable to each geographical area, some models of sustainable agriculture applying advanced technologies in each ecological region of the provinces. Next time, Vietnam should have the following policies:

First, create a favorable legal environment for activities to improve the level of technology, technological capability to serve for technological innovation. To do this, the government should improve the state management of science and technology, the Ministry of Science and Technology should establish independent specialized department of science and technology, the MOST should establish independent specialized department of science and technology, where concentrate professionals with expertise, professionally trained, formal, have the ability to work independently, capable of objective judgment to make good assessment of the level, technology capacity, construct the priority technology orientation, advising the Ministry on the promulgation of policies to promote technological innovation, instead of assigning tasks to MOST.

### **Box 1: Improving legal environment for enterprises**

To improve the level, technology capacity, Vietnam should strengthen research capacity and deployment for businesses. It should focus on the application of the research results and technological development to production, promote the commercialization of intellectual property. In particular, should improve legal framework, create favorable conditions for enterprises, scientific and technological organizations to establish, protect and apply intellectual property rights, to help enterprises have appropriate orientations in raising the level and technological capability; assist in building a network of intellectual property centers and transferring technology in universities, research institutes and enterprises.

*Source: Pham Hong Quat (2017)– Director general, National Agency for Technology Entrepreneurship and Commercialization Development (NATEC)*

Second, the Government primarily supports enterprises raise the level, the technological capacity as receiver of machinery, equipment, technology lines through technology transfer, then will support enterprises to perform research activities and deployment toward technological innovation. Next, the Government supports the training of human resources for enterprises, encourage enterprises to hire foreign experts to train high-quality human resources, service of the application of scientific and technological progress in technological innovation projects; help enterprises can carry out activities to improve, decode, create new technology, new process. Third, the government should support businesses promote research capacity through the establishment of research and development departments at the enterprise. From that, the idea of research is formed. It is the premise to create inventions and useful solutions for the enterprises themselves; at the same time promote activities of propaganda, encourage enterprises to set up scientific and technological development funds in the spirit of the Government's Decree No. 95/2014 / ND-CP of October 17, 2014 on investment and financial mechanism for scientific and technological activities

**Box 2: Create a strong impetus to the enterprise application and commercialization of results of scientific research and technological development**

To promote the business to improve the level, technology capacity, the Government should focus on building infrastructure facilities engineering, support the training of high quality human resources, support the establishment of research departments serving technological development activities, apply scientific advances into production and business; create favorable conditions for enterprises to commercialize the results of scientific research and technological development

*Source: Nguyen Quang Tuan (2017) - Deputy Director general, National Institute for Science and Technology Policy and Strategy Studies (NISTPASS)*

Fourth, promote links and cooperation between the Government, scientists, entrepreneurs and investors in raising the level and technological capacity. The purpose of this activity is is the parties together to discuss, exchange and come to an agreement in technological innovation activities to maximize benefits. This linking process, cooperation will overcome the weaknesses and promote synergy in the rational use of all resources, allow to expand the market for products, technologies, contribute to the attraction of resources, especially attracting scientists, experts, attract financial resources, this is a premise for successful implementation of the long-term goal to raise the level, the technological capacity of enterprises.

Fifth, the Government should support directly, credit incentives, tax for raising the level of technology, technological capacity of enterprises. In particular, the Government should build a comprehensive tax incentive system; and establish a regular two-way communication channel between the State management agency in charge of taxation and enterprises, which will reflect the rapid, timely difficulties, as well as suggestions of the business during procedure to enjoy the incentives or the inadequacies in tax incentives. On the other hand, tax administration agencies shall timely support, consulting for business, and agencies will improve tax administration, perfect, adjust to suit the desire in improving the level, technological capacity of enterprises

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