

## **RECENT MODELS OF LINKING SCIENCE-TECHNOLOGY, EDUCATION- TRAINING AND PRODUCTION-BUSINESS IN VIETNAM**

**MSc. Hoang Van Tuyen**

National Institute for Science and Technology Policy and Strategy Studies

---

***Abstract:***

*The aspects of linking three sectors Science-Technology, Education- Training and Production-Business in Vietnam during recent time are proceeded and reflected in numerous decisions and policies of the Communist Party of Vietnam, the Government and the Prime Minister <sup>1</sup>. In addition to them, the number of research works, scientific workshops and conferences held to identify solutions to reinforce links between these sectors. This paper is to summarize some typical models of linking these sectors in Vietnam during recent time.*

### **I. LINKS AND ROLES OF LINKS BETWEEN SCIENCE-TECHNOLOGY, EDUCATION-TRAINING AND PRODUCTION-BUSINESS**

The conception of these links called in some ways as relation, cooperation and connection is used to reflect the different types of integration between three sectors Science-Technology, Education-Training and Production-Business for purpose to exchange knowledge, technologies and skills. These types of interaction can be direct or indirect ways to facilitate the diffusion of knowledge, technologies and skills. They are taken as one of the most important factors of the process of learning and innovating. The links between these sectors are beneficial for participating sides [2, 3]. The reasons are explained as follows.

***First, for the sector Science-Technology and Education-Training:*** During this process of exchange researchers, scientists and lecturers can get new ideas and proposals merging from their research works of others. Their

---

<sup>1</sup> Typically, Resolution No. 37 of the PolitBuro (IV Congress), Resolution No. 26 of the PolitBuro (VI Congress), Resolution No. 01 of the PolitBuro and Resolution of the 7-th Session of the Central Committee (VII Congress), Resolution of the 2-nd Session of the Central Committee (VIII Congress), Decision No. 134/HDBT dated 31 August 1987 of the Council of Ministers (Government), Resolution No. 35-HDBT dated 28 January 1992 of the Council of Ministers (Government), Decision No. 324-CT dated 11 September 1992 of the Chairman of the Council of Ministers (Prime-Minister), Decision No. 782/TTg dated 24 October 1996 of the Prime-Minister, and etc.

research works may provide constructive suggestion and supports from their members so that they can upgrade the level of their research works aiming at carrying out larger projects and programs. Young students may get involved into research and, by this way, they would start their research activities early and it will improve students' skills. Researchers in universities and research institutes have chances to cooperate with their colleagues in larger projects<sup>2</sup> where the coordination and mobilization of common knowledge and efforts are required. These links would motivate and encourage students in further activities of research and help them like it.

In addition to the State budgets allocated for research programs, enterprises would additional financial supports for research activities of universities and research institutes. The volumes of these supports, in many cases, are bigger than the one of the State allocated budgets. The links to activities of the sector Production-Business would encourage and offer chances of access to practical activities. Researchers would have larger rooms to test and implement their ideas and proposals.

These links increase also the effectiveness of use of research infrastructure in universities and research institutes. They would help students to set up their own proposals for research projects and develop their entrepreneur and business spirits. Students would have also chances to link their theoretical studies and practical applications (*learning by doing, learning by studying*). As result, all the research infrastructure of universities and research institutes are used with higher efficiency.

***Second, for the sector Production-Business:*** Innovative enterprises take science-technology activities as a main part of their development. By this way they try to produce high quality products, enhance their self-control capacities and technology application potential, adapt and upgrade import technologies, look for advanced technologies, save their currency budgets and extend their export markets.

*Improving technological capacities of enterprises:* The market's tough competition requires enterprises to enhance their technological capacities through the establishment of centers for research and design to produce high competitive products. These centers can be established jointly with universities and research institutes. When doing investment for science-technology, the enterprises expect not only to renovate their technological capacities but also to develop their capacities to identify, absorb and use exterior necessary knowledge. By other words, enterprises, when pushing up

---

<sup>2</sup> Research institutes mean R&D institutes or centers; Universities mean universities, colleges or academies.

their links to universities and research institutes, would target to promote their technological absorption capacities. The earned capacities would let them use efficiently the know-how they get from outside

*Strengthening the position of enterprises:* In technological market, the buyers, if getting more and better information, would take more advantages in their technological deals because they can have advanced solutions for application. They also would be better positioned in selecting technology providers and upgrading provided technologies.

*Extending export activities of enterprises:* Those enterprises which develop their science-technology potential would have better chances to sell their products in the markets which do not have equivalent products, particularly for products manufactured with new technologies. The successful investment for science-technology would lead to higher competitive products and then to higher revenues and further to higher income for re-investment for science-technology research activities. The full cycle of strategies for investment-production-income-investment would continue.

*Securing faster development and growth rates of enterprises:* Naturally the production and commercialization of new and innovative quality products would let enterprises secure a better market share and new market extension. These new capacities would help enterprises secure higher development and growth rates.

## **II. MODELS OF LINKS**

### **1. Model of organizations (“Hard” form)**

#### ***1.1. Science-Industrial union or consortium***

This form of links is established on basis of universities and research institutes and industrial production-business and service enterprises. From the point of functional targets this form is focused to shorten the path from research and training activities to production and commercialization of products. The full cycle would be Research-Training-Production-Commercialization [4].

#### ***1.2. Universities and research institutes in enterprises***

This form becomes popularly applied in developed countries, particularly in large groups or corporations. They would set up universities and research institutes to serve their own needs in domestic and overseas markets.

### ***1.3. Businesses in universities and research institutes***

The establishment of businesses in universities and research institutes targets not only to cover partially the shortage of the State budget allocation but also to become an important component in the cycle Research-Training-Production-Commercialization.

### ***1.4. Institutes in universities***

In developed countries, the research activities of institutes are conducted in their laboratories or programs. In Vietnam, this form targets closer links between research and teaching activities. In this form the institutes connects toughly scientific research activities to production-business activities.

*1.5. Science/Research parks, Technology parks, Science cities, High-tech parks, High-Tech Agricultural zones, Technology-based firm incubators, Technopolis, Innovation centers, Centers of excellence, Technology transfer organizations, Technology License organizations* are those forms which are newly applied and extended in Vietnam.

## **2. Model of exchange (“Soft” form)**

In addition to the above mentioned “hard” forms there exist some flexible forms which are regularly applied, namely the mobility of scientific staffs between regions, diffusion of scientific publications, diffusion of knowledge during workshops, conferences, IP patents, technological capacity building activities for SMEs, awareness and use of technological management techniques, innovative management practice, knowledge management and quality management. Under these forms universities and research institutes also participate in technological research and innovation projects of enterprises.

Therefore, all the models (“hard” or “soft”) of links would be oriented to enhance the exchange of knowledge, technologies and skills between the three sectors Science-Technology, Education-Formation and Production-Business. The links could be direct or indirect channels of transfer, official or unofficial, organization-based or individual-based. *Table 1* summarizes some basic incentive forms of links.

**Table 1.** Some basis incentive forms of links

<b>No.</b>	<b>Form of link</b>	<b>Description of links</b>
1.	Research cooperation of science-technology projects	Conducting scientific research activities in laboratories, universities and research institutes
2.	Order for research and training	Implementing research activities and formation of scientific staffs according to negotiations/agreements among enterprises and universities and research institutes
3.	Cooperation in technological innovation projects	Conducting the cooperation among enterprises and universities and research institutes in technological innovation projects, consulting service or information provision for enterprises to conduct their innovation activities
4.	Exchange of staffs or special mission trips of staffs	Conducting the exchange of staffs where the ones of enterprises would joint some research and training activities of universities and research institutes
5.	Joint use of equipment and other infrastructure facilities	Conducting jointly tests or analysis of samples in universities and research institutes
6.	Application and commercialization of research results	Implementing agreements for technological transfer from universities and research institutes to enterprises
7.	Other links	Joint publication of science-technology works. Joint organization of workshops, seminars, panels, round tables, scientific councils and some others.

### **III. SOME TYPICAL MODELS OF LINKS IN VIETNAM DURING RECENT TIME**

#### **1. Model of links between the sectors of Science-Technology and Education-Training**

According to this model (Research Institute-in-University model) the research institutes are established in universities. This model was developed in Vietnam since the years 1980s. It gets more popular particularly since Resolution No. 35-HDBT dated 28 January 1992 had been promulgated by the Council of Ministers (now is the Government). Actually there are more than 100 research institutes which were established in universities over the whole country. The number of these research institutes is increasing. The most typical establishment of these research institutes is seen among technological universities and regional universities, namely Hanoi University of Technologies, Ho Chi Minh City University of Technologies

(Ho Chi Minh City National University), Da Nang University of Technologies, Thai Nguyen University, Can Tho University and some others. Actually this form of research institutes demonstrates the efficient activities in implementing jointly the teaching activities and scientific research activities.

## **2. Model of links between the sectors of Science-Technology, Education-Training and Production-Business**

### ***2.1. Science-Production Unions***

The model of Science-Production Unions was established since the years 1980s. These unions cover the long range of activities from research (emerging scientific ideas) to final products. The unions are established in the following ways [4]:

*Way 1:* Research institutions linked to production-business enterprises. For example: Southern Vietnam Region Information-Television Science-Production Union which was formed on basis of the Radio-television Institute and some electronic-mechanical workshops. They have the full legal status and strong scientific research potentials. They are capable to conduct works of research, design, manufacture, installation and operation of local radio-television facilities and electronic and measurement equipment.

*Way 2:* Research institutes connected to design institutes and production-business enterprises. For example: Ho Chi Minh City Chemical Science-Production Union which was set up under Chemical Industry Research and Design Center (having the full legal status) and some chemical production-business enterprises (namely, Linh Xuan Chemical Enterprise, Phuoc Long Chemical Enterprise, Phu Nhuan Chemical Enterprise not having the full legal status). The newly set up union conducts research works in the field of natural compounds, polymers, anti-erosion compounds and micro-biology.

*Way 3:* Spin-offs of research institutes. For example: Hanoi Chemical Science-Production Union which was established on basis of Industrial Chemistry Institute. The Institute has strong production-business divisions to carry out works in fields of inorganic and organic chemistry, fertilizers, petro-chemistry and plant protection chemicals. These divisions become specialized centers with the full legal status. They operate on basis of financial self-management scheme.

Globally, Science-Production Unions are the initial pilot stage to set up the models of link with higher level of efficiency and investment. The majority of these unions have their own scopes of activities oriented to actual market needs. Actually this model stopped being applied largely. Only a few of

them remain operational, namely the ones of the Vietnam Academy of Science-Technology (VAST), the Military Academy of Science-Technology (MAST) and the Vietnam Union of Science-Technics Associations (VUSTA).

## ***2.2. Enterprises set up in universities and research institutes***

During the process of development many universities and research institutes set up their own production-business enterprises [6] depending on their actual status and fields of activities.

*First*, these enterprises have their own legal status, taxation registration and production-business license. They are under administrative management of universities and research institutes and they are to carry out production-business activities based on research results which the universities and research institutes developed.

*Second*, some universities and research institutes remain in their tertiary status but eligible to set up their own production-business divisions. These divisions have their own legal status, taxation registration and business license. These universities and research institutes can conclude production-business contracts with other entities by using the legal status of these divisions.

*Third*, technological incubators are set up as starting enterprises. These technological incubators are to implement production-business activities as pilot facilities. The universities and research institutes would provide infrastructure facilities and services to encourage their staffs to set up production-business projects based on their own research works. Councils are set up in universities and research institutes to approve the list of researcher-staffs to work in these incubators. These incubators do not have the legal status for production-business activities and therefore the universities and research institutes facilitate the joint activities (namely, joint venture enterprises) with other entities having the full legal status for production-business activities. These entities are, in fact, their partners or customers to complete the cycle research-production-commercialization. The typical example of this model is the Software Technological Zone of Ho Chi minh City National University who had set up Integrated Circuit Design-Research-Education Center (ICDREC).

*Fourth*, spin-offs are set up being based on new technologies. They are those divisions of universities and research institutes having new technologies to set up new enterprises. From organizational point of view, these spin-offs can be established as joint business entities between universities, research institutes and enterprises. These spin-offs may have

the multi-ownership status. The typical examples of this type include the Petroleum Additive and Product Development Company (APP), some spin-offs of the VAST and MAST. The number of these spin-offs grows very fast during the last decade, particularly after the promulgation of Resoultion No. 80/2007/ND-CP dated 19 May 2007 by the Government [1].

### ***2.3. Institutes developed by enterprises***

This model is among the most “optimal” solutions to link the research to production-business. This model is very popular in almost all the developed nations. In Vietnam the State authorities are in the way to set up the “legal corridors” for the favorable development of this model. The measures may have some administrative regulations to turn research institutes to enterprises (Decision No. 782/TTg dated 24 October 1996) or other incentive measures for enterprises to set up their own universities and research institutes. But this model can be applied only for corporations or big companies. According to the figures collected by the author [3], by the end of 2010 the corporations and big companies have set up 27 research institutes, 73 research centers and 4 universities. The successful examples of this model are VNPT (Vietnam Post and Telecommunication), EVN (Electricity of Vietnam), FPT and some others.

### ***2.4. Institutes set up by enterprises of universities and research institutes***

The typical example of this model is the IMI Holding Company. It is an institute working in the field of industrial machines and tools. The institute had established many dependent enterprises and these enterprises, at their turn, set up their own research centers or divisions. The typical case of this model is the Industrial Electronic Company (CDC), a member of the IMI Holding Company, who sets up its own Science-Research-Development Department.

## **3. Model of science-technology, education-training, production-business**

- a) The union of science-training-production. Ealier, the number of organizations belong to this model. However, this type almost is not maintained or replaced by other form of activity.
- b) The incubator zones set up in universities (Institutes in the incubator zones). The typical example of this model is the Software Technology Zone, Vietnam National University - Ho Chi Minh City to establish the Intigrated Circuit Design Research and Education Center (ICDREC).
- c) Enterprises set up by institutes of universities. This model presents enterprises are set up by institutes of universities. Institutes are seen as the



core factors to implement the all three functions of science research, application of research results to teaching programs and production-business.

d) Enterprises set up institutes and universities. This model shows that huge cooperations and big businesses with their strong potentials. In Vietnam, some of the typical ones are the Vietnam Posts and Telecommunications Group, Vietnam Electricity, FPT Telecom and others.

#### **4. Model of high tech zones and incubators**

The typical examples of this model are Hoa Lac High Tech Zone, Ho Chi Minh City High Tech Zone and Quang Trung Software Industrial Zone. In addition to these zones there exist some high tech application agricultural zones in some provinces including the private ones.

#### **5. Model of institutions having the direct participation of local administrative government**

The typical examples of this model are the programs to support research and technological renovation of local enterprises (namely, programs to support the manufacture of low cost equipment of Ho Chi Minh City - CT04 Program, and programs to link State authorities, scientists, farmers and businessmen of some local administrations including the production-business program of the Hanoi administration) [5].

#### **6. Model of agreements**

This model is realized under various forms: i) Enterprises and universities and research institutes closely cooperate in joint programs of research and technological renovation, ii) Enterprises support the full investment for universities and research institutes and individual scientists to carry out projects of research and technological renovation, renovation and upgrading of products of the enterprises, iii) Agreement for mobility of scientific staffs, iv) Agreement of training and supervising research works of students, and v) some other forms of agreement. The following box illustrates some typical cases of cooperation for training between universities and enterprises [3].

Intel Product Company had conducted the survey for assessment of training programs and training capacities including teaching staffs, teaching documents, laboratories. They meet and interview students of specialties electro-electronics, information technologies-communication, manufacturing-engineering of 5 universities, namely Da Nang University, Hanoi University of Technologies, Ho Chi Minh City University of Technologies, Hochiminh City Industry University and Hochiminh City

University of Technical Teachers Formation. Under the survey's results, Intel Product Company had conducted further steps of cooperation including the signature of contract with Da Nang University where it indicates the requirements of training quality, financial supports for labs, etc.

The universities, from their side, get more active in their approach to enterprises. They set up teaching programs oriented to needs of enterprises. The enterprises, from their side, give the favorable conditions and even financial assistance for practical works of students. Ho Chi Minh City University of Information Technologies (Ho Chi Minh City National University) had signed with Microsoft the agreement for joint training of human resources.

Another example is the cooperation agreement signed between Economics Department of Ho Chi Minh City National University and Hoa Sen Corporation for supply of high quality human resources and support for development. The agreement shows well the trust by end-users and the reputation of the training university. The cooperation between Hoa Sen Corporation and Ho Chi Minh City National University extends also to the field of scientific research and application, scholarships and on-site practical training for students.

Other examples include the cooperation between Kaisa Consulting, SAP and Software Industrial Zone of Ho Chi Minh City National University, the need-based training programs between Hanoi Economics University (Hanoi, National University) and 6 enterprises, namely: Nomura (Japan), GAMI, Hanoi Securities Company, Hanoi Association of Businesses, An Binh Bank and Ocean Bank. Hanoi University of Technologies concludes also many need-based training programs with the business community.

## **Conclusion**

Vietnam has made considerable efforts to set up the links between the academic sector (universities and research institutes) and the production-business (enterprises). These links cover the large range of models (hard and soft, central controlled and local managed). All of these models target the consolidation of advantages and the reduction of obstacles in the cooperation relation between the academic sector and the production-business sector.

## REFERENCE

1. Hoang Van Tuyen. (2005) *Studies of financial investment forms for science-technology enterprises*. Research Project Report, National Institute for Science and Technology Policy and Strategy Studies.
2. Hoang Van Tuyen. (2007) *Studies of factors impacting R&D activities of enterprises*. Research Project Report, National Institute for Science and Technology Policy and Strategy Studies.
3. Hoang Van Tuyen. (2010) *Studies of development policies for organization and implementation of science-technology activities in large corporations in Vietnam*. Research Project Report, Ministry of Science and Technology of Vietnam.
4. Nguyen Van Hoc. (1998) *Upgrading the management mechanism of R&D organizations in the market economy context of Vietnam*. Ministerial Research Project Report, Ministry of Science and Technology of Vietnam.
5. Hoang Xuan Long. (2005) *Studies and analysis of some models to link universities and research institutes to enterprises for development of new technologies*. Research Project Report, Ministry of Science and Technology of Vietnam.
6. Pham Quang Tri. (2008) *Studies of the development of R&D organizations in some selected countries and Vietnam*. Research Project Report, National Institute for Science and Technology Policy and Strategy Studies.