

IMPROVEMENT'S PROCESS OF THE NETWORK OF SCIENCE AND TECHNOLOGY ORGANIZATIONS IN VIETNAM AND ORIENTATIONS TO ENHANCE SCIENCE-INDUSTRY LINKS: HISTORICAL MILESTONES

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Abstract:

The improvement and reform process of the network of science and technology (S&T) organizations in Vietnam has passed a long period, starting by Decision No. 175/CP of the Government dated 29th April 1981. Since that time, the State and Government promulgated numerous policy measures to improve and to reform the network to make it fit the process of socio-economic development of the country. This paper is focused on analysis of policy measures to improve and to reform the network of S&T organizations in Vietnam which are oriented to link better science and industries.

Keywords: *Science network; Science-industry links.*

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1. Introduction

In line with economic reforms, the State and Government of Vietnam promulgated effective measures to enhance the effectiveness of activities of the national research system through instructions, resolutions and decisions for coordination and improvement of the network of S&T organizations. These measures were promulgated during different periods of socio-economic development and S&T development which were well defined with different objectives (some of them can be listed such as enhancement of self-management and liability of S&T organizations, maximal mobilization of potentials of S&T staff, development of national innovation system and etc.). One of the important objectives of policy measures for improvement and reform of the network of S&T organizations is oriented to link science (S&T organizations) and industries (enterprises).

2. Approaches to the network of science and technology organizations

The network of S&T organizations can be approached from different directions in numerous reform related policies. The following are the directions of approach toward the network of S&T organizations.

2.1. Science and technology sector based approach

UNESCO and OECD provided a classification of S&T organizations on basis of concepts of S&T sectors. The actual in-use S&T sector based classification is defined by a document [5] which was published by OECD in 2002 and amended in 2007 (namely *FOS classification*). The classification includes 6 sectors: i) natural sciences, ii) technical sciences and technology, iii) medico-pharmacy and health sciences, iv) agricultural sciences, v) social sciences and vi) humanities.

These 6 sectors form the “knowledge body”. In the world, there is no difference between the nations in the way they set up the network of S&T organization in conformity to this “body”. The matter is the number of organizations and the priority rate reserved for fundamental and applied research in each sector. The scale of these arrangement depends much on S&T development orientations of each nation [2].

2.2. Development orientation based approach

Duties and scales of S&T development are defined on basis of the development strategies of each nation. The development strategies are different by their nature. They can be global, selective or adaptive and then the different concepts are set up for establishment of the national network of S&T organizations to meet the defined development strategies. The global development strategies require R&D works in all possible S&T orientations and sectors. Here, the problem is where to take resources for development and what to define as objectives of development. From another side, the selective development strategies are seen through intentionally defined focuses of resources to target certain S&T sectors which are considered as spear heads, cutting edges and then get main priorities. The adaptive development strategies are based on purchase and absorption of S&T knowledge, licenses, know-hows and etc.

2.3. Linear research cycle based approach

In this direction of approach, the S&T organizations can be classified into various types of activities for fundamental research, applied research, practical development, prototype production, designs and S&T services. Global practice, however, in the world in general and in Vietnam in particular shows that there is a very minor number of S&T organizations conducting purely only one of these types of activities, namely fundamental research, applied research or practical development.

2.4. Management and ownership structure based approach

Here, the network of S&T organizations includes various types of ownership status such as Government-owned and public institutions, private universities, State owned enterprises, political organizations, socio-political organizations, socio-vocational organizations, private and foreign owned organizations and independent organizations.

2.5. Geographical and administrative structure based approach

This direction of approach is very important for those countries which have numerous regions with different features in natural particularities, socio-economic status and development orientations. In this case, regional development policies include S&T development as integrated component of the national S&T policies. Therefore, S&T organizations in a region or territory play the role of regional S&T centers. For example, in Germany, in addition to S&T organizations of associations such as Max Planck (MPG), Helmholtz (HGF), Leibniz (WGL) and Fraunhofer (FhG), there exist other S&T organizations under form of federal research institutes (which are supported by federal ministries, and have main duties to support activities of related ministries and to implement assigned works. The same situation is for research institutes of States (which are supported by State government to settle State level problems).

2.6. Activity budget source based approach

This direction of approach is popular in developed countries. Depending on the activity budget sources which may be State budget or non-State budget (called as external) sources they would have corresponding status and scope of activities. In case of Germany, as example, in 2012, the percentage rate of activity budgets between the State budgets (including federal and state ones) and external budgets for S&T organizations were as follows: 100:0 for federal and state research institutes, 85:15 for research institutes of Max Plank Association, 70:30 for research institutes of Helmholtz Association, 76:24 for research institutes of Leibniz Association, and 30:70 for research institutes of Fraunhofer Association.

3. Links between science and industries

Links, sometimes called also as connections, relations or cooperations, are to say about *interactions* between the sector of science (universities, research institutes) and the sector of industries (enterprises) for exchange of knowledge, technologies and skills. These types of interactions can be

official or non-official which are to promote the dissemination of knowledge and technologies and they are considered as one of main success factors for process of learning and innovations. There are two basic models to set up “corridors” to link science and industries [3], namely:

- Models of concrete forms (called also “hard models”) such as S&T Union or Consortium; various types of S&T organizations such as research institutes or universities inside enterprises, enterprises inside universities or research institutes, science/research parks, technology parks, science cities, high-tech parks, high-tech agricultural zones, technology based firms/incubators, centers of excellence, technology transferring/licensing organizations and some other forms.
- Models of flexible forms (called also “soft models”) which are regularly conducted such as the mobility of staffs between sectors, promotion of knowledge through scientific publications, workshops, conferences, intellectual property interactions, enhancement of capacities of enterprises (particularly for SMEs) to absorb knowledge and technologies, enhancement of awareness about and application of technological management techniques, innovations management, knowledge management and quality management, joint projects of universities, research institutes and enterprises for technological research and innovations.

Therefore, it is possible to say that these models (both hard and soft ones) are directly oriented to enhancement of exchange of knowledge, technologies and skills between the sector of science and the sector of industries. Here, the links include the direct or indirect, official or non-official channels of transfer of knowledge between organizations and individuals.

4. Policy measures for reform of the network of S&T organizations oriented to enhance science-industries links.

As noted above, the process of improvement and reform of the network of S&T organizations in Vietnam has passed a long period with various policy measures which was started by Decision No. 175/CP dated 29th April 1981 by the Government and most recently Resolution No. 115/ND-CP dated 5th September 2005 by the Government (which was revised and amended on

20th September 2010). The main policy measures related to improvement and reform of the network of S&T organizations in Vietnam can be seen in Figure 1.

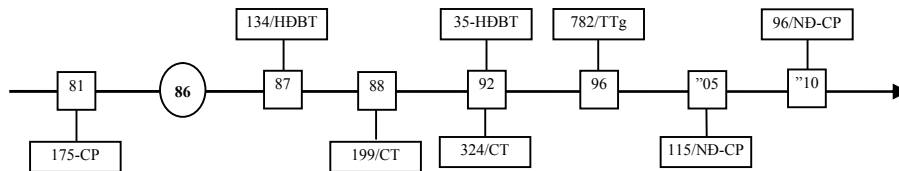


Figure 1. Main milestones of improvement of the network of S&T organizations in Vietnam

4.1. Prior 1986 period

The main matters related to S&T links in this period can be summarised as follows.

First, main activities were largely distributed among thousands different organizations and institutions and the “border lines” between them were clearly fixed according to the activity natures of organizations and institutions. For example, R&D activities were assigned to and conducted by research institutes (even they were classified clearly as institutes for fundamental research and applied research), and production-business activities were assigned to and conducted by plants and enterprises. The links between organizations were governed mainly by administrative management organizations.

Second, powers were dispatched vertically top-down and duties were defined and assigned by the pre-determined types of activities. The State Planning Committee was fully powered to govern economic activities including the development, dissemination and application of S&T achievements.

Third, criteria for evaluation of results of activities were mainly based on production volumes without paying attention to effectiveness and quality of produced outputs [6].

Therefore, in the whole socio-economic system, there were no incentives, priorities or encouragement for S&T organizations to introduce, absorb or disseminate innovations in pro-active manner. There were no market competitions. There was not absolutely any institutional scheme, different

from the State one, to encourage organizations (or individuals inside organizations) to improve activities in their scope of duties, such as, for example, development investments, technological absorption or upgrading of existing technologies. Administrative management organizations and State competence agencies governed authority powers and duties of organizations and institutions under their control. Participation of every organization was limited by “negotiated” frameworks of assigned resources and output targets without paying attention to what ever produced outcomes: S&T results and produced volumes. Everything was confined within assigned functions and duties.

So, in this context, it is possible to say that Decision No. 175-CP dated 29th April 1981 was an important “breakthrough move” which set up background for links between science and industries. It was the first decision by the Government permitting to conclude and implement economic contracts in field of scientific research and technical development between scientific research organizations, technical development organizations and economic organizations (production and business organizations) to settle scientific and technique problems.

4.2. Post 1986 period

The post 1986 period was marked by removing the “border lines” between organizations. The latter got more pro-active and directly involved with more diversified functions. State management organizations made shifts to indirect measures of control (through institutional and policy tools) to guide behaviors of organizations who conduct direct practical activities. More than that, guiding information were transmitted through so-called “horizontal directions” between organizations and institutions of the same rank.

The main contents of institutional and policy measures to improve and reform the network of S&T organizations in Vietnam in orientation to link science and industries are seen clearly through the following documents.

Decision No. 134/HDBT dated 31st August 1987 by the Council of Ministers (the former name of the Government) provided some measures to encourage S&T works. This decision confirmed the stands to link closely research and production activities. According to this decision, S&T organizations are entitled to set up and to extend pro-actively all forms of joint venture and links for effective application of scientific and technical achievements. State employees and staffs, both on duties or retired,

cooperative members, companies, corporations and individuals are entitled to conclude economic or civil contracts with S&T organizations, training organizations, production-business organizations to disseminate and to apply scientific achievements and technical advances in practice through science-technical associations, collectives or individuals.

When implementing activities (according to contracts), S&T organizations are entitled to get benefits as follows:

- Not less than 5% for authors.
- 10-15% for organizations, collectives or individuals who make transfers of advanced techniques.
- The remaining part is transferred to local and ministerial funds according to existing regulations.
- If advanced techniques are transferred to production-business organizations according to contracts then the sharing of benefits will be based on contractual commitments.
- Organizations who conduct scientific research and technical development get benefits according to the following scheme of shares: 20% for State budget, 20% for local S&T development funds, 60% for local funds of incentive bonus and social welfare (incentive funds take 2/3 of the volume).

Instructions No. 199-CT dated 25th June 1988 by the Chairman of the Council of Ministers on the arrangement and improvement of the network of organizations of scientific research and technical development (R&D organizations) targeted to enhance linking science and industries which can be seen through:

- Improving organizational aspects and studying activity regulations of the national research institute of technologies which were oriented to target establishment of science-production unions. The latter have duties to conduct specialized and inter-sectorial researches for application and development of high techs and pilot projects for fast practical application of new technologies;
- Shifting gradually institutes with functions of specific research for concrete products to direct management of unions, companies and corporations;

- Establishing science-production unions in certain ministries, sectors and localities to target researches for new techniques and technologies;
- Extending models of development organizations and pilot activities in economic organizations and in localities. These organizations have main duties to apply research results jointly produced by universities and research institutes to settle specific production problems through production contracts. These moves would target local needs of socio-economic development. These organizations would be mainly research units, experimental stations, pilot workshops, centers for application of technical advances, science-production unions and etc.;
- Extending multi-form coordination and links through contracts or joint centers of training-research organizations and enterprises to promote the roles of S&T towards socio-economic development;
- Permitting establishment of R&D organizations which operate on self-sufficiency basis in all the economic sectors.
- Encouraging flexible organizational forms of science organizations in all the economic sectors which would permit scientists to establish their own research, experimental and pilot facilities.

The process of shifting of “narrowly specialized” research institutes to direct management of unions and corporations seemed to be smoothly conducted. Institutes accept to operate as “technical department” to settle troubles and technological problems of enterprise-members of unions and corporations. Institutes would be independent in management of staffs (position appointments, salaries, assigned duties) and in financial management. Unions and corporations do not intervene the setup of research plans. Institutes submit their research plans to ministerial services and need only to forward them to leading bodies of unions and corporations for administrative formality purpose. Union and corporations, from their side, would provide necessary materials for pilot production stages and provide finances and means for tasks they need to develop. All the expenses for “big investments, minor reparations, operation costs and etc.” are covered by directly provided State budgets or by research projects. Practice showed that the targets defined by Instructions No. 199-CT were almost not achieved because of unclear moves in announcement of the policy and the big role (which can be said to be the deciding one) in governing the relation between science and industries links in all forms of links [2].

Resolution No. 35-HDBT dated 28th January 1992 by the Council of Ministers on S&T management.

Resolution No. 35-HDBT created favorable conditions for R&D organizations in activities of research, service and production. This resolution oriented them to research and commercial development of research results and to establish their own or joint enterprises. At the same time, production-business enterprises of all economic sectors were allowed to set up their own units for scientific research and technological development. This establishment had to follow regulations stipulated in Resolution No. 388-HDBT dated 20th November 1991 by the Council of Ministers for State-owned enterprises, as well as Law on Corporates, Law on Private Enterprises and other documents guiding implementation of these documents. In addition, S&T organizations were entitled to diversify capital sources including the one coming from contracts¹ and joint moves with other organizations.

In fact, Resolution No. 35-HDBT created links not only in R&D activities but also in production-business fields. Universities and research institutes were entitled to create joint units with local and foreign research-training and production-business entities.

The success of the Resolution, however, was not really achieved as expected, from vision of links. *First*, the scope of activities of R&D organizations was defined too narrow and then it could not let them extend activities of research, development, production and other links. *Second*, Resolution 35-HDBT was blocked, in fact, by the another following document, Guideline 08/CT dated 18th October 1992 which did not permit universities and research institutes to establish enterprises under all kinds of forms [2].

Decision No.324-CT dated 11th September 1992 by the Council of Ministers on re-arrangement of the network of technological R&D organizations.

- This document, concretizing Resolution No. 35-HDBT on linking science and industries, stipulates “links between science and production: offering of favorable conditions for activities of scientific research to meet needs of activities of production, re-arranging S&T organizations closer to production enterprises and shortening research-development-

¹ No taxes are imposed to contracts of scientific research and pilot production. Income taxes are imposed to contract of S&T services but turnover taxes are.

production cycles”. Decision 324-CT stated also that all sub-sectors in national economic system have their own targets and then they need to have adequate R&D organizations to achieve these targets. At the same time, the Decision stated clearly “to shift S&T organizations with functions of specific research for concrete products to management of enterprises or science-production unions”.

But, similarly to Instruction 199-CT, this Decision was almost unsuccessful to link science with industries because it was issued poorly as a policy without indicating integrated and concrete guiding measures for practical implementation.

Decision No. 782-TTg dated 24th October 1996 by the Prime Minister on arrangement of the system of R&D organizations.

In the process of renovation and development, practice of industrial production required focused supports of S&T organizations for industries and efforts of industrialization-modernization. In this context, the Prime Minister issued Decision No. 782-TTg dated 14th October 1996 which targets “to shift S&T organizations with functions of specific research for concrete products to direct management of enterprises or to turn them to science-production unions”. 6 research institutes were shifted to direct management of State-owned corporations. They get the State supports for salaries and operation costs in a time period not exceeding 5 years.

The shifting of research institutes to management of enterprises (which was stipulated in Instructions No. 199-CT) showed well the wishes to recover the gap of links between research and production activities, research and training activities. The number of S&T organizations under management of enterprises increased gradually, despite of the fact that many S&T organizations were shifted to management of enterprises on basis of administrative decision rather than on basis of real needs of S&T organizations or enterprises.

Up to that time, S&T activities of research institutes under management of enterprises were covered by State budgets including big investments and minor reparations. They set up themselves their research tasks since enterprises were, most exactly, not capable enough to control these activities. All topics of research projects were passed by Science-Technology Department of ministries and then, on basis of agreement with Ministry of Science & Technology, were submitted to State authority

agencies for approval. And also, the administrative rules made the procedure more complicated with many steps. This made rise the trends of getting out of administrative dependency among research institutes. Despite of that, many research institutes in corporations (called as Unions of Enterprises before) seemed to be smooth in their activities. The evidence of that was the fact that certain of them wanted still to establish research institutes “to get through” administrative procedures. Some of them stated necessary to have research institutes within corporations, even considered them as unavoidable needs. As fact of reality, immediately after the establishment of research institutes they started the following moves to separate them from corporations because of many causes [2].

In practice of implementation, after a short time since the issue of the Decision, the links between science and industries (on basis of administrative decision) turned out to be unsmooth. Numerous causes were shown from the two sides to demonstrate “incompatibilities” between S&T organizations and enterprises.

Resolution No. 115/2005/ND-CP dated 5th September 2005 by the Government to regulate the self-management and self-liability mechanisms of public S&T organizations (some articles revised and amended afterward by Resolution No. 96/2010/ND-CP dated 20th September 2010).

The Resolution was issued to enhance liabilities, activity and creativity of S&T organizations and their heads, to promote to link scientific research and technological development with production-business activities and human resource training, to accelerate the socialization of S&T activities, to facilitate focused investments for S&T organizations, to enhance effectiveness of activities of S&T organizations, and to rise S&T potentials of the country. Public S&T organizations and S&T service providing organizations which are capable of covering costs of regular operations were free to change their organizational status and to choose one of the two forms: either *costs self-covering S&T organizations* or *S&T enterprises*.

Resolution No. 115/2005/ND-CP dated 5th September by the Government took over and developed further the previously issued documents in efforts to improve and to reform the network of S&T organizations in orientation to link activities of research, training and production. By this Resolution, the Government demonstrated tougher efforts to turn some public S&T organizations to the new forms of costs self-covering S&T organizations

and S&T enterprises. Finances for regular activities (salaries and operation costs) were provided on basis of duties assigned to S&T organizations. With this policy, the number and the quality of S&T staffs in enterprises got improved. The whole staffs of those S&T organizations which were shifted to the new status of S&T enterprises were considered as S&T staffs of these enterprises. From another side, the new mechanism of research topic setting which was applied for costs self-covering S&T organizations (in fact, produced research results can be commercialized) would lead to certain cooperation and links with industries. Thus, this would be a process of cooperation, exchange and mobility of staffs between universities, research institutes and enterprises.

Some public S&T organizations were successful in their efforts of reforming and shifting to create good platforms to shorten the distance between research and production-business activities and to link S&T with industries. There were, however, certain public S&T organizations, particularly the ones under local management, still hesitated with this implementation. It is needed also to mention that S&T financial policies and mechanisms still have some problems which do not fit specific natures of S&T activities and, most of all, the problem of non-integrated structure of the system of policies.

5. Conclusion

The process of improvement of the network of S&T organizations in Vietnam passed different reform philosophies, from decentralization of management mechanism, through desadministration of S&T activities and commercialization of research results, to return of rights of S&T activities to civil society [1]. In any case of these philosophies, one of the most important objectives of this improvement's process is oriented to better links between science (universities, research institutes) and industries (enterprises). This objective is clearly seen through policy measures promulgated during the past time.

Even with these great efforts conducted, the improvement and reform process shows still limitations and shortages after each policy issued and implemented. They need to be assessed and studied in their context to indicate the causes and to find out measures to settle them. The next objective of improvement and reform of the network of S&T organizations

in Vietnam would be to link science and industries in context of innovation policies./.

REFERENCES

In Vietnamese:

1. Vu Cao Dam. (2008) *Contributions to philosophies of management of the Research Institute of Science Management*. Journal of Science Activities, December 2008, pp. 34-35.
2. Nguyen Van Hoc *et al.* (2000) *Improvement of management mechanism of R&D organizations in context of market economy in Vietnam*. Report of ministerial research project, MOST.
3. Hoang Van Tuyen. (2012) *Modeling of corridors to link Science-Technology, Education-Training and Production-Business in Vietnam during recent time*. Journal Science and Technology Policy and Management. Vol. 1 No. 2, 2012, pp. 51-61.
4. Hoang Van Tuyen. (2013) *Analytical approaches to the National Innovation System of Transition Nations: Case of Vietnam*. Proceedings of Scientific Workshop “Science-technology system and innovations in Vietnam under trends of international science-technology integration: some conceptual and practical aspects”. Hanoi, 2013.

In English:

5. OECD. (2007) *Revised field of science and technology (fos) classification in the Frascati manual*.
6. Liu, X. and White, S. (2001) *Comparing innovation systems: a framework and application to China's transitional context*. Research Policy 30.