RESTRUCTURING THE NETWORK OF PUBLIC SCIENCE AND TECHNOLOGY ORGANIZATIONS

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Abstract:

The network of public science and technology (S&T) organizations of Vietnam is very big in quantity. However, the structure of the network, organizational and operational mechanism remains to have problems to recover. Therefore, the network of public S&T organizations needs to be restructured in direction of maximal reduction of the number of these organizations. Three measures are to be applied: mergence to universities, mergence to enterprises and dissolution. Only those public S&T organizations which operate in priority and key important sectors or which other economic non-public sectors do not want, have no investment capacity or are not allowed to make investment for can be retained.

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1. Introduction

According to the 2013 Law on S&T, the network of S&T organizations includes all the S&T organizations which have main functions to conduct activities of scientific research, technology development research and S&T services. The network of S&T organizations have important roles for socio-economic development where the network and its operation are one of indicators to exhibit the strength, development level as well as sustainability of the national economy of the country.

The network of public S&T organizations is a component of the network of S&T organizations. The network of public S&T organizations is set up by the State, gets operational finances from the State budget for realization of the State assigned functions and tasks. In addition, the network of public S&T organizations may realize other tasks to meet demands from enterprises, organizations, individuals and social communities.

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The restructuring of the network of public S&T organizations gets attentions from the Party and the Government organizations which provide very early guidelines and implementation instructions of which some important documents can be made for illustration, namely: Decision No. 324/CT dated 11th September 1992 by the Chairman of the Council of Ministers (now the Prime Minister) on the restructure of technological research and development organizations, Decision No. 782-TTg dated 24th October 1996 by the Prime Minister on the shuffle of research and development organizations in S&T sectors.

In addition to that, many organizations and individuals[2] conducted studies and proposed solutions for restructure of the network of public S&T organizations. However, up to now, the public S&T organizations remain very big in quantity (more than 1,400 organizations) making about 50% of the total number of S&T organizations in the network.

Recently, on 27th October 2016, the Prime Minister issued Decision No. 171/QD-TTg on approval of the Master plan of the public S&T organizations up to 2010, vision to 2030. This Decision puts the objectives: (i) Arrangement, improvement and strong push-up of restructuring works to enhance capacities and efficiency of activities of public S&T organizations, and to reduce, by 2030, the number of public S&T organizations by 30%; and (ii) Focused investments for development of organizations operating in priority and key sectors of S&T where Vietnam has advantageous positions so that Vietnam will have 15 public S&T organizations of the regional and world level by 2020 and 30 of them by 2030.

Almost two years already passed from the issuance of the Decision by the Prime Minister for approval of the Master plan for restructuring the network of public S&T organizations but basically there is not much change and the structure and the organizational and operational mechanism of the network remain still to have many shortages. The results of activities of the network of public S&T organizations are evaluated as not worth to the State investment volumes.

Therefore, the analysis and evaluation of the actual status of the network of public S&T organizations and then the proposal of solutions for restructuring the network of public S&T organizations for realization of the objectives of the Master plan of the network of public S&T organizations by 2020 and vision to 2030 (shortly called afterward as the Master plan) is quite necessary.

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[2] Nguyen Van Hoc (2000), Dang Duy Thinh (2000), Vu Cao Dam (2000), Nguyen Thi Anh Thu (2000), Pham Huy Tien (2003), Bach Tan Sinh (2005), National Institute for Science and Technology Policies and Strategic Studies (NISTPASS) (2011).

2. Actual status of the organizational and operational mechanism of the network of public S&T organizations

2.1. Quantity of public S&T organizations

According to the data by the Office of registration of S&T activities, by 31st May 2016, there are 1,432 public S&T organizations among the total of 3,088 S&T organizations (making 46%) and the remaining number of 1,656 are non-public S&T organizations (making 54%) (see the details in Table 1).

Table 1. Actual status of the S&T organizations of Vietnam as by 31st May 2016

Type of organizations	Quantity	Level of management	
		Central	Local
Total	3,088	1,606	1,482
Public S&T organizations	1,432	811	621
Non-public S&T organizations	1,656	795	861

Source: Office of registration of S&T activities

2.2. Operational mechanism of the network of public S&T organizations

All the 1,432 public S&T organizations under management by ministries and local governments are established by competent State agencies. They get the State investments for material infrastructure, machines, equipment, budgets for regular operations (salary of staffs, labor costs and costs of administrational operation) and finances for realization of S&T tasks assigned by various management levels (national, ministerial, provincial and etc.). Therefore, the network of public S&T organizations is classified as tertiary institutions and then have the organizational structure and operational mechanism in conformity to the State regulations applied for tertiary institutions, namely: (i) The public S&T organizations are established in conformity to the regulations defined by Resolution No. 55/2012/ND-CP dated 22nd June 2012 by the Government on establishment, re-establishment and dissolution of tertiary institutions; (ii) The self-governance mechanism of public S&T organizations is governed in conformity to the regulations defined by Resolution No. 16/2015/ND-CP dated 14th February 2015 by the Government on self-governance mechanism of public S&T organizations; (iii) The management and use of assets are governed in conformity to the regulations defined by the Law on management and use of State assets; (iv) The investment, capital construction, purchase of assets of public S&T organizations are governed in conformity to the regulations defined by Resolution No. 59/2015/ND-CP dated 18th June 2015 by the Government on guidelines for implementation

of some articles on selection of contractors of the Law on Bidding; and (v) The management and use of S&T human resources are governed in conformity to the Regulations defined by Resolution No. 29/2012/ND-CP dated 12th April 2012 by the Government on recruitment, use and management of staffs, Resolution No. 41/2012/ND-CP dated 8th May 2012 by the Government on working positions in tertiary institutions; (vi) The salary schemes are governed in conformity to the regulations defined by Resolution No. 204/2004/ND-CP dated 11th December 2004 by the Government on the salary schemes of State servants.

Being governed by numerous legal regulations applied to tertiary institutions, the public S&T organizations face many difficulties in practice of their rights to self-governance mechanism, namely: the self-governance in organizational structure, recruitment, management of personnel and implementation of policies for S&T human resources, management and use of finances, investment and purchase, management and use of assets.

2.3. Results of activities of the network of public S&T organizations

The results of activities of the whole the network of public S&T organizations in general remain low in comparison to the other countries in the region and in the world. During the 2010-2014 periods, Vietnam has 9,976 publications in S&T journals in the world (where the main share is from public S&T organizations) which is 59th ranked over the world and behind Singapore, Thailand and Malaysia in the ASEAN community (see details in Table 2).

Table 2. Number of S&T publications of some countries and territories

Countries/territories	2010-2014 period		
	Number of publications	The world percentage (%)	Rank
The world	9,399,682	100	
US	2,683,060	28.544	1
China	1,027,087	10.927	2
England	648,947	6.904	3
Germany	622,225	6.620	4
Japan	473,540	5.038	5
Singapore	63,193	0.672	32
Malaysia	47,600	0.506	38
Thailand	36,910	0.393	43
Vietnam	9,976	0.106	59
Indonesia	8,953	0.095	62

Source: Ministry of Science-Technology (MOST), 2015c, p.96

The total number of application for patents submitted to the National Office of Intellectual Property of Vietnam by 2014 was 3.658 where, however, the ones of Vietnamese owners are only 394 applications (making 11%) and the remaining 89% are from foreign owners. In addition, the quality of patent applications of Vietnamese organizations and individuals remain low with the rate of refuses to grant patents of 45.96% while the one of foreign organizations and individuals is only 23.38% (Data by *MOST, 2015*, p. 101).

The efficiency of activities of public S&T organizations in the network is not even distributed in the network with the large majority of scientific publications in international journals and inventions of leading S&T organizations such as Hochiminh City National University, Hanoi National University, Hanoi University of S&T, Vietnam Academy of S&T and some other large S&T organizations in ministries. S&T organizations in provincial level basically do not have scientific publications in international journals.

The other sectors of S&T activities including application of research results in production-business practice, technological transfer and S&T services are concentrated mainly on large S&T organizations in ministries (some organizations may have the total turnover generated from activities of technological application, technological transfer and technological services up to hundreds billion VND per year). As the survey conducted by the author of this paper (among about 400 public S&T organizations) shows, the activities of technological application, technological transfer and technological services by public S&T organizations in provincial level remain very limited. As rules, the total of turnovers generated from these activities do not exceed VND2 billion per organization, some of them even gain less than VND1 billion.

Actually, Vietnam does not have many strong S&T organizations which are at the level of the region and the world. According to classification by *SCImago, Year 2016*, Vietnam has only 4 S&T organizations named in the world rating list including Vietnam Academy of S&T, Hochiminh City National University, Hanoi National University and Hanoi University of S&T. Note that Singapore has 12 S&T organizations, Malaysia has 17 S&T organizations and Thailand has 17 S&T in the list.

2.4. Scale of public S&T organizations

The scale of public S&T organizations in the network is not even also. Only some S&T organizations in ministries have a large scale while the big majority of S&T organizations have a very small scale, particularly the ones

in provincial level. The survey by the author showed that among the surveyed 440 public S&T organizations, only 80 S&T organizations have a personnel to exceed 100 staffs per organization and 217 S&T organizations have the personnel of less than 30 staffs per organization.

Also, the scale of the global finance sources of S&T organizations is limited. Only a few strong S&T organizations of central level have good research and development capacities then they are capable to attract finance sources for S&T activities. Among the 440 S&T organizations surveyed in the 2014 study only 36 S&T organizations are capable of collecting the annual finance sources to exceed VND50 billion. A big majority have very low sources of finances for S&T activities (219 S&T organizations have the sources of finances lower than VND5 billion per year), particularly the ones at provincial level.

It is a large practice that S&T organizations lack of material infrastructure and equipment for S&T activities and the latter is not even distributed among S&T organizations. Only some S&T organizations in ministries and large cities have full material infrastructure and modern machines and equipment for S&T activities.

2.5. Regional and sectorial structure of S&T organizations

The structure of public S&T organizations as seen from regional view has still many shortages. The public S&T organizations are concentrated only on the two big cities Hanoi and Hochiminh City. North Vietnam is the region having the highest number of public S&T organizations with a share of 81% of the total number of the country. Hanoi makes already 96.5% of the total number of public S&T organizations in North Vietnam. Then comes South Vietnam with a share of 16% of the total number of public S&T organizations. Hochiminh City makes 78% of the total number of public S&T organizations in South Vietnam. Other provinces have a minor part, only from 3 to 5 organizations.

In addition to the shortages in regional distribution of public S&T organizations, the structure of the network of public S&T organizations experiences the same situation in sectorial distribution. The survey by the author also shows the highest number of S&T organizations in technical and technological sectors at the central level (38%) and then in social science sector (30%). The agricultural sector, despite of its important roles and high contribution for economic growth rates, makes a share of only 10% of public S&T organizations. At the provincial level, the main scope of activities of public S&T organizations is in agricultural sector and technical sector, and particularly there is not public S&T organizations operating in natural science sector and medico-pharmaceutical sector.

It is particular to note that in some ministries many public S&T organizations have overlapping fields of activities then make the State investment sources dispersed which cause negative impacts to the State policies to focus development investments on priority and key sectors.

2.6. Links between public S&T organizations with enterprises and universities

The links between public S&T organizations with enterprises and universities can be taken as one of the highest important factors which may cause great impacts to efficiency of activities ò the network of public S&T organizations.

In Vietnam, according to data by the Office of registration of S&T activities, the number of S&T organizations in enterprises is very limited. There are, at the actual time, only about 30 organizations of this type and they are mainly in large enterprises and economic groups[3] and about 120 S&T organizations in universities and academies, the latters are mainly big sized ones[4]. Therefore, in the total number of 3,088 S&T organizations in the whole country there are 150 S&T organizations in enterprises and universities making only 4.85% (too low rate). The unsuitable distribution of S&T organizations leads to low effective links between scientific research and production-business activities, and between scientific research and higher education training activities. As results, many results of scientific research activities cannot find application in production-business practice or service in training activities which cause waste of investment sources for S&T development and do not turn S&T into an effective tool for socio-economic development.

There exist many reasons which cause the negligence by enterprises and universities in scientific research activities where the most of them is the low level of awareness by the community of enterprises and universities of necessity and roles of scientific research activities and innovations for production-business activities and training activities. Also, part of the reasons comes from the community of domestic scientists which do not exhibit clearly their capacities and roles for activities of technological innovation by enterprises and the training activities by universities. At the same time, domestic scientists do not gain the credibility on their capacities

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[3] Vietnam Coal-Mining Group, Vietnam Rubber Industry Corporation, Vietnam National Oil-Gas Corporation, Vietnam Garment Corporation, Vietnam Airlines Corporation, Army's Communication Corporation Viettel, Vietnam Steel Corporation, Vietnam Paper Corporation, Vietnam Post and Telecommunication Corporation, Vietnam Tabac Corporation and others.

[4] Hochiminh City National University, Hanoi National University, Hanoi University of S&T, Hochiminh City University of S&T, Can Tho University, Thai Nguyen University and University of Transport Technology.

from the communities of enterprises and universities. Therefore, there are a very low number of enterprises and universities ready to make investments for research activities through establishment of S&T organizations. Many enterprises import regularly technologies, machines and equipment from abroad. According to data collected through the survey by the author, among about 440 public S&T organizations, by 2014, the total turnover from technological transfer and S&T service between S&T organizations and producing sectors is VND2,145 billion (of the total of 14,185 contracts) while actually Vietnam has about 400,000 operating enterprises (the data taken from *General Statistic Office of Vietnam, 2014*). This fact shows well that a very high number of enterprises does not develop cooperation activities or receives technological transfer from domestic S&T organizations but do technological transfer from foreign partners.

In addition, the results of research activities by universities and academies of Vietnam remain very limited. During the 2011-2015 period, among the total number of 12,089 international publications of Vietnam (the data taken from *MOST, 2017*, *p.130*) only 5,738 of them are made by researchers from universities and academies (making 47.46%) and they are mainly concentrated on large universities and academies[5] *(Ministry of Education and Training, 2017, p. 14).* As it is noted there by Ministry of Education and Training, "the number of research papers made as international publications remain still modest and does not meet the potentials of universities; and the number of international publications in ISI journals is low".

3. Experience of restructuring the network of S&T organizations from some countries

The restructuring of the network of S&T organizations has been conducted by many countries in the world during the long history of S&T development. The experiences of restructuring of the network of S&T organizations by some countries in the world will be introduced as practical background to justify the recommendation for a restructuring work of the network of public S&T organizations.

In the Russian Federation, by end of 2008, there were 865 research organizations in academies of sciences, namely: the Russian Academy of Sciences (RAS) has 468 research organizations, the Russian Academy of Agricultural Science has 304 research organizations, the Russian Academy of

[5] Hanoi National University, Hochiminh City national University, Hanoi University of S&T, Hanoi Pedagogic University, Hanoi Medical University, Can Tho University, Hue University, Vinh University, Hochiminh City Medico-Pharmaceutical University, Vietnam Academy of Agriculture, Hanoi University of Public Health, University of Agriculture and Forestry, Ton Duc Thang University and others.

Medico-Pharmaceutical Sciences has 68 research organizations, the Russian Academy of Education has 18 research organizations. During the 2004-2005 period, the Government of the Russian Federation started the reform of S&T organizations including the RAS. By 2008, the Russian Federation continued again the reform of the organizational structure of research organizations by cutting down 25% of the total research staff. From 2010, the reform was continued with the RAS (Law on Reform of the Academy of Sciences), Academies of Sciences of the Russian Federation, the Academy of Medico-Pharmaceutical Sciences and the Academy of Agricultural Sciences of the Russian Federation merged to make a new organization named the United Academy of Sciences (436 research institutes and 45,000 research staffs) which is under management by a federal organization and are have duties to submit reports directly to the Russian President. It is probably the markstone of a strong restructuring work of the system of S&T organizations in general and of the RAS in particular of the Russian Federation *(Kenneth L. Simons, 2009; OECD, 2011)*.

China is also a typical case of decisive efforts of reform and improvement of the system of public S&T organizations in a strong and radical way. The process of reform and improvement of public research institutes in China started by the year 1970s. However, the most strong and comprehensive reforms had place from the years 1990s to the years 2000s. China had about 6,000 public S&T organizations under management of central ministries and institutions. However, a considerable part of these 6,000 public S&T organizations was turned to enterprises since 1998 (the start of important restructuring efforts). By 1998, the State Council started a great reform which removed 10 ministries including Ministry of Electricity, Ministry of Coal, Ministry of Machine Industry and Ministry of Chemistry. The Government had set up a plan to transfer 242 public S&T organizations under the 10 ministries to enterprises with the Government provided supports *(Ping Lin, 2002)*.

In Japan, since 2004 to 2007, all the public universities (89 universities in total) and S&T organizations in sectors of natural sciences and social sciences (18 organizations in total) were transferred to the "company" status of operation *(Dao Tien Khoa, 2007)*.

As the experiences of some countries with developed S&T systems (USA, Germany and others), the network of S&T organizations are usually set up by enterprises and economic corporations for S&T research and development activities to serve production-business activities by enterprises, economic corporations or S&T organizations under management of universities and academies where they can conduct scientific research

activities together with teaching and training activities in universities and academies.

4. Some solutions for restructuring the network of public S&T organizations

As the above provided data and analysis show well, the network of public S&T organizations of Vietnam actually is much bigger than the economic resources are in terms of size and potentials. Many S&T organizations were established not on basis of practical needs or demands of the society and enterprises but, in some cases, of subjective views of State agencies. In Vietnam, the public S&T organizations have the organizational mechanisms like the management of public tertiary organizations does and this practice causes negative impacts to the self-governance rights of S&T organizations.

From another side, S&T organizations (the case where S&T organizations are not higher education organizations) somewhere have an isolated position without having links with enterprises and universities. Many research results of S&T organizations get wasted or cannot be applied in production - business practice or teaching - training activities.

Taking references to the solutions proposed by previous studies and experiences of restructuring works of the network of S&T organizations in some countries and using the approach of the national innovation system (NIS), it is obvious that the S&T organizations need to have the start platform from demands by enterprises and social demands as well as the close interaction and relations between S&T organizations with enterprises and universities to create market and society accepted products. Here the author proposes some solutions for restructuring the network of public S&T organizations in direction of compactness, reduction of contact hubs and enhancement of close links with enterprises and universities, namely:

First, transferring some public S&T organizations which operate in sector of applied research to enterprises or transferring public S&T organizations under direct management by enterprises or under mechanism of self-assurance of the total operational finances so these S&T organizations are to conduct scientific research functions to serve production-business activities by enterprises and to give contributions to establishment of tougher links between scientific research activities and production-business activities. The dissolution and mergence measures may be applied for those S&T organizations which operate inefficiently or do not operate in priority and key sectors that the State needs to maintain operation of or to make financial investment for.

Second, transferring public S&T organizations which operate in sector of fundamental research to direct management of universities and academies so these S&T organizations will conduct the scientific research functions to serve teaching and training activities and give contributions to push up links of research activities with teaching and training activities.

Third, renovating the actual scheme of provision of state budgets for public S&T organizations which is based on their personnel size to the scheme of finance supports from state budget for public S&T organizations which is based on assigned S&T tasks through S&T funds. It is necessary to avoid the practice of egalitarianism in finance provision and, at the same time, to avoid the practice of equal finance provision even for inefficiently operating S&T organizations. This type of practice would lead to inequality between S&T organizations and do not stimulate efforts by S&T organizations to complete S&T tasks. This practice also may lead to negative consequences in competition between public S&T organizations and non-public S&T organizations in their efforts to search and to develop S&T tasks of high scientific and practical values which would lead to higher quality of S&T tasks and higher efficiency of investment activities from State budgets for S&T activities.

Fourth, the mechanism of management of public S&T organizations needs to be changed. It is not necessary to apply the management scheme of tertiary institutions for S&T organizations. The one applied for tertiary institutions includes too complex measures and tough procedures while S&T organizations need a full implementation of self-governance mechanism in management and use of finances and assets, management and use of S&T human resources. Once this scheme is applied for S&T organizations it is believed the S&T organizations would do their best efforts to find out the most optimal way to use their available sources and to give contributions to achieve the quality and efficiency of scientific research activities higher than they would do in the actually applied schemes. The public S&T organizations would practice self-governance mechanisms in salary payment for their research staffs and working personnel which deserve contributions of their S&T human resources.

5. Conclusions

Actually, Vietnam has limited sources of investment for S&T development. If Vietnam wants to focus the investment sources on certain priority sectors and fields, the network of S&T organizations needs to be restructured in direction to reduce maximally the quantity of public S&T organizations and

to retain only those public S&T organizations which are in priority and key sectors or other non-public economic sectors do not want, do not have capacities or are not allowed to make investments for. In fact, the public S&T organizations to be retained are the ones which have missions to serve public interests and national security and defense. This type of public S&T organizations does not put the prime target to earn benefits but requires huge investment sources and only the State budgets are capable to make investments for their establishment and operation. This group of proposed solutions meet the development theory since, from one side, the State could reduce the burdens of investment and, from another side, it could have chances to focus investments for priority and key S&T sectors and fields for development.

The proposal of restructuring the network of public S&T organizations in the actual time meets well the policies of the Party and the State for strong renovation of the organizational and managerial systems, for enhancement of quality and efficiency of activities of public tertiary organizations./.

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