

## **POLICY SOLUTIONS TO BUILD UP EXCELLENCE ORGANIZATIONS FOR SCIENTIFIC RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES**

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**Abstract:**

*Excellence organizations for scientific research and technological development play important roles for science and technology (S&T) and socio-economic development of the nation. During the recent time, the Government has issued policies to push up S&T organizations to become excellence scientific research and technological development (R&D) organizations. In Vietnam, the formation of these organizations, however, remains limited in certain aspects. This paper is to provide a global view on excellence R&D organizations; to propose policy solutions to build up excellence R&D organizations on basis of evaluation of actual status of awareness and point of view for and features of R&D organizations, the information being gathered from points of view and feed backs from S&T organizations and scientists in Vietnam.*

**Keywords:** *S&T organization; Excellence organization; Scientific research; Technological development.*

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### **1. Overview of excellence R&D organizations**

Scientific research and technological development organizations (R&D organizations) are organizations which have activities of scientific research and technological development as main functions, are established and operated according to legal regulations. However, actually in the system of legal documents of Vietnam, there is no clear definitions for “excellence R&D organizations”. In other countries as well as in Vietnam, there are

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S&T research organizations under the name of “Advanced Research Center/Institute”, “Center/Institute for Advanced Study” or “Center of Excellence”. This type of centers/institutes is considered as “excellence” due to their features which are seen through their missions, visions and potentials for development as well as their impacts to sustainable development in S&T and socio-economic aspects of the nation (*Nguyen Thi Anh Thu, 2015*).

As practice shows, excellence R&D organizations must be entities which, in their activities, produce discoveries, inventions, utilities and technical solutions, and offer pre-conditions for creation of new and advanced technologies on basis of innovations and then to give contributions to sustainable development of national economy. This vision shows well that scientific research activities must be linked closely to practical reality and industrial production activities, and produce added values for production process. Therefore, excellence R&D organizations are organizations which are, as rules, established by the Government or get its supports for establishment and have the following key features:

- Being research organizations which are application oriented and have close links with priority directions for S&T and socio-economic development of the nation to produce new, high and advanced technologies for innovation purpose;
- Being research organizations which are capable of attracting technical infrastructure, rich financial sources and high quality human resources to maintain and to secure development of the organizations. Output products must have high commercial values and propagating forces for industrial sectors, and great impacts to socio-economic development;
- Being research organizations which play important roles to support the formation of eco systems of innovative start-ups and S&T enterprises. In addition to that, excellence R&D organizations are incubators for talents which connect training activities with practical reality, have close connections to education-formation sectors, production sectors and keep key roles in the National Innovation System (NIS).

According to Shih-Chang Hung, National Tsing Hua University, Taiwan (2015), those R&D organizations which want to be qualified as excellence R&D organizations have to define their missions to satisfy needs of enterprises, particularly the ones of technological innovation. In innovation process, enterprises face high risks and expensive costs. Therefore, the Governments in many countries mobilize various incentive policies to support directly or indirectly innovative efforts by enterprises or entire industrial sectors. One of the key components among these supports is to

create technology supplying sources, namely new and high technologies produced by technology oriented R&D organizations. In order to get new and high technologies, these organizations have to establish close links to the NIS and put the purpose of service for industrial sectors in focus for development.

The above noted features show that excellence R&D organizations must have their missions to serve actively the realization of objectives for S&T and socio-economic development during every defined stage (*Project for establishment of Vietnam-Korea Institute of Science-Technology*). Up to now, there exists certain studies to deal with methods for evaluation of S&T organizations and also some organizations were established to conduct evaluation works of R&D activities on basis of different systems of indicators. Evaluation outcomes would allow to classify organizations as “excellence” or not on basis of certain sets of indicators, but, as practice shows, the conclusions made in large majority of cases may remain disputed.

The excellence R&D organizations under this study have to gather the above noted key features. Particularly, after having defined the missions, visions and development strategies, excellence R&D organizations have to orient activities to match the outputs they produce, on basis of adequate organizational structure of activities, with the input sources they get. Therefore, the indicators to build up excellence R&D organizations include (*Nguyen Huu Xuyen, Nguyen Dinh Binh, 2016*): indicators for output products and services, indicators for input resources and other actors to secure operational activities of organizations and indicators for operational organization.

- *First, indicators for output products and services*: An excellence R&D organization should commit to satisfy the indicators defined for its products and services. From long term visions, profits from products and services which made by excellence R&D organizations for social needs have to be equal, as at least, or higher than the costs invested by the State and other social resources for them. Therefore, excellence R&D organizations need to exhibit their committed output indicators and annual growth rates such as the number of published scientific works (papers, reports at domestic and international workshops, references and citations, and impacts from published research works), protected inventions and utilities, contracts of consulting service and transfer of inventions and utilities developed from their research results, successful commercialization of produced products and services as well as average incomes from them, working visits by foreign experts, involvement for research works by students of various degrees, social impacts from their

activities to the society in field of R&D, and, finally, the extent the research outputs can fit the development orientations of the national R&D system;

- *Second, indicators for input resources and other actors to secure operational activities:* To secure a good operation of excellence R&D organizations, particularly in initial stages after establishment, it is necessary to provide mechanisms for supports in terms of finance, human resource and infrastructure aspects. The indicators for input resources and other actors to secure operational activities include: adequate distribution and use of financial resources according to well-defined road maps, level of attraction and development of support resources (from State budgets, non-State supports, supports from abroad resources), quality and structure of human resources to serve R&D activities, incentive measures by the State for development of finance, human forces and infrastructure resources, investment sources for development and annual development rates of infrastructure by organizations;
- *Third, indicators for operational organization:* Excellence R&D organizations should be built up according to certain organizational models to orient activities to serve enterprises, communities and the entire society on basis of equal links between scientists, experts, managers and particularly, research teams from different organizations. Therefore, during the process to set up the operational organization, it is necessary to pay attentions on professionalization level in research activities, modes and models for organization of research activities to target the production of market accepted products and services, state of coupling of self-management rights and decision-making rights, management qualification level of managers in field of research activities, extent of centralization/decentralization of rights in research activities, and extent of coordination between units inside research organizations.

Therefore, excellence R&D organizations need to define rightly their missions, visions and strategic objectives as well as to get tough supports from high rank leaders to secure self-management position and resources for operation. Particularly, excellence R&D organizations need to keep important roles in the NIS, to be closely linked to industrial production activities, to offer good environment for training of talents, to push up the set-up of enterprises and the formation of eco-system for innovative start-ups, to give contributions to economic development and to enhance national competition positions.

## 2. Actual status of awareness, points of view for and features of excellence R&D organizations in Vietnam

### 2.1. Actual status of awareness and points of view for excellence R&D organizations

According to data made public by Ministry of Science-Technology (MOST) by 2016, actually, Vietnam has 16 national key laboratories, 9 incubators for high techs and high tech enterprises, 1,111 public S&T organizations (including 594 central level organizations and 507 local level ones), 2 Academies (Vietnam Academy of Science and Technology and Vietnam Academy of Social Sciences), 2 national Universities (Hanoi National University and Hochiminh City National University) and about 210 universities/academies, 1,389 non-public S&T organizations (including 665 central controlled organizations and 724 local controlled ones) which make more than 52% of the total number of S&T organizations. The question is: How many among these public and non-public organizations in the R&D sector are qualified as excellence R&D organizations? The reality shows there exist different views to concepts for excellence R&D organizations. Namely, as answers to the question “Did Vietnam build up excellence R&D organizations?”, the results of a survey conducted among 102 organizations and scientists in S&T sector show: 62.8% of replies say “not yet”, 19.6% say “not clear” and only 17.6% say “yes”.

**Table 1.** Points of view to the concepts for excellence R&D organizations

Deciding actors	Agree	Disagree
Capital scale	41.2%	58.8%
Human force scale	51%	49%
Management level	25.5%	74.5%
Productivity rate	92.2%	7.8%
Points of view and willing by leading bodies	75.5%	24.5%

*Source: Nguyen Dinh Binh et al., 2016*

This fact is seen clearly through some indicators such as capital scale, human force scale, management level, productivity rate and points of view, willing and expectations by high rank leading bodies. More than that, the survey results from the 102 organizations and scientists in S&T sector show some more details (Table 1):

- For capital scale (capitals from State budgets and other mobilized sources): 41.2% said that the capitals play the deciding role for a R&D

organization to be qualified as excellence or not, and 58.8% disagreed with this view;

- For human force scale (the ratio of professor/associate professor titles to the whole human staffs and the ratio of staffs with doctor and master degrees to the whole human staffs): 51% said that the qualification of human staffs plays the deciding role for a R&D organization to be qualified as excellence or not, and 49% disagreed with this view;
- For management level (central controlled or local controlled): only 25.5% said that the management level plays the deciding role for a R&D organization to be qualified as excellence or not, and even 74.5% disagreed with this view. This rate fits well the rate of replies to the question “Which level agencies should be the authority to manage directly excellence R&D organizations?”. The replies are almost equal for all the concerned levels, namely: 15.7% said that the National Assembly should be, 27.5% said the Government, 28.4% said the line ministries, 21.6% said universities and 6.8% gave other views;
- For productivity rate (the ratio of international publications to researchers, the ratio of domestic publications to researchers and the ratio of inventions and utilities to researchers): 92.2% of replies said that the productivity rate plays the deciding role for a R&D organization to be qualified as excellence or not and only 7.8% disagreed with this view;
- For points of view and willing by high rank leading bodies toward the realization of national missions: 75.5% said that the points of view and willing by high rank leading bodies play the deciding role for a R&D organization to become excellence or not and only 24.5% disagreed with this view.

So, the productivity rate of a R&D organization and the points of view and willing of its leaders play the deciding role for evaluation, formation and development of an excellence R&D organization; the capitals and high qualification human forces are only necessary conditions but not enough for a R&D organization to be qualified as excellence, the managing authority level is only a condition to favor the formation of an excellence R&D organization during implementation stage of research projects and plays a little role for an research organization to be qualified as excellence.

## ***2.2. Actual status of features of excellence R&D organizations***

For formation and development of excellence R&D organizations, it is necessary to have a right platform of view and an adequate set of evaluation criteria of their features which include: (i) professionalization level in R&D

activities; (ii) modes/models of establishing the R&D organizations for production of market accepted products and services; (iii) state of coupling of self-management rights and decision-making rights in R&D activities; (iv) the ability of administration of managers in R&D activities; (v) extent of centralization/decentralization of rights in R&D activities; and (vi) coordination between actors in R&D activities. The results from the survey conducted among the 102 research organizations and scientists in S&T sector show (Table 2):

**Table 2.** Evaluation of the features to decide the formation of excellence R&D organizations

Features	Average scores	Standard deviation
Not high level of professionalization of research activities	4.05	0.979
Inadequate organizational modes/models	4.12	0.937
Not high level of coupling of self-management rights and decision-making rights	4.32	0.869
Limited management qualification level of managers	4.24	0.925
Inadequate extent of decentralization of rights in research activities	4.31	0.820
Inadequate coordination of R&D activities	4.25	0.727

Source: Nguyen Dinh Binh et al., 2016

(Using Linkert measuring scale 5: Score 1- Highly disagreeing, Score 5- Highly agreeing)

*First, for the professionalization level in R&D activities:* There are 79.5% among the surveyed organizations and scientists agree and highly agree for unsatisfied (not high) professionalization level in R&D activities; 12.7% rated the medium level and only 7.8% rated the high level of that (the average score is 4.05 and the standard deviation is 0.979).

*Second, for the organizational modes and models of R&D activities for production of society accepted products/procedures:* Even 85.3% of the surveyed organizations and scientists agree and highly agree that the actual modes and organizational models in R&D activities are not adequate; 5.8% rated the medium level and only 8.9% rated the good level (the average score is 4.12 and the standard deviation is 0.937).

*Third, for the state of coupling of self-management rights and decision-making rights in R&D activities:* Even 82.3% of the surveyed organizations and scientists agree and highly agree that the actual level is not high, 14.7%

of them rated the medium level and only 3% of them rated the high level (the average score is 4.32 and the standard deviation is 0.869).

*Fourth, for the management qualification level of managers in R&D activities:* 79.4% of the surveyed organizations and scientists agree and highly agree that the actual management level of managers remains limited, 15.7% rated the medium level and only 4.9% rated the high level (the average score is 4.24 and the standard deviation is 0.925).

*Fifth, for the decentralization extent in R&D activities:* Even 85.3% of the surveyed organizations and scientists agree and highly agree that the actual decentralization extent in R&D activities is inadequate, 10.8% of them rated the average level and only 3.9% rated the high level (the average score is 4.31 and the standard deviation is 0.82).

*Sixth, for the coordination of works in R&D activities:* 87.2% of the surveyed organizations and scientists agree and highly agree that the actual coordination practice is not good, 10.8% of them rated the medium level and only 2% of them rated the good level (the average score is 4.25 and the standard deviation is 0.727).

So, in a global view for the actual status of R&D activities, the conclusion can be made to state that the professionalization level is not high, the organizational modes and models of research activities are not adequate, the state of coupling of self-management rights and decision-making rights remains low, the management qualification level remains limited, the decentralization of rights is inadequate and the coordination of works is not good. Therefore, the efficiency rate of R&D activities actually remains low. Namely, the replies to the question “Globally, the efficiency rate (results/costs ratio) of activities of R&D organizations activities remains limited?”, showed that 88.2% of the questioned organizations and scientists agree with this view.

### **3. Policy solutions to build up excellence R&D organizations activities in Vietnam**

Up to now, in Vietnam, there is no special policies to build up excellence R&D organizations. The formation of this type of organizations in field of R&D depends on definition of missions, visions and strategic objectives toward S&T activities at national level in every stage of development, points of view and willing of Party and State leaders, national legal environment as well as international cooperation trends. The policies to build up excellence R&D organizations remains integrated in legal documents such as laws, decrees, decisions, resolutions, circulars,



instructions, strategies and plans, programs and projects for S&T development. The definition of missions and visions of excellence R&D organizations has a high importance in securing resources and issuing policy solutions of strategic extent for formation and development of excellence R&D organizations. In practice, the policies to build up excellence R&D organizations need to give contributions to realization of the defined objectives up to 2020, namely: the formation of 60 organizations of fundamental and applied research at regional and world level which are capable of settling national key important problems, 5,000 S&T enterprises, 60 incubators of high techs and high tech based enterprises (Decision No. 418/QĐ-TTg on 11<sup>th</sup> April 2012 by the Prime Minister for approval of Strategies for S&T Development, 2011-2020 period). In order to achieve these objectives, in the next time, the State needs:

*First*, to enhance the productivity rate and the professionalization level in R&D activities, and to link closely scientific research activities with practical production activities in industrial sectors. The formation of excellence R&D organizations should not be fully for benefit gaining purposes but target scientific publications of high social impact level such as papers published in prestigious domestic and international science magazines, inventions, utilities, innovations, technical solutions, products of consulting services and technical transfer supporting services. Therefore, it is necessary to formulate a set of evaluation indicators for excellence R&D organizations. Excellence R&D organizations should have to define clearly the orientation of applied research, to link research activities with market needs, and to support enterprises, particularly SMEs, to enhance their R&D capacities in conformity to the objectives of Strategies for Socio-Economic Development, National Strategies for S&T Development in actual stages.

*Second*, to offer financial supports and to push up the process of assignment of self-management rights to S&T organizations. For purpose to form and develop excellence R&D organizations, the State should issue policies for financial supports and mobilize non-State investment sources in a well-defined road map, namely:

- *Initial stage* (about 5 years after establishment), the State is to define the orientation of R&D activities which should be linked closely to strategies for S&T development, socio-economic development without considerable intervention for R&D activities and, at the same time, to provide supports for the full operational costs. The survey results from

the 102 organizations and scientists in S&T sector show 78.4% of them agree with this solution;

- *Second stage* (about 10 years after establishment), the State is to assign the self-management rights and to provide budgets for key important products and services in the sector which the State makes orders for. The survey results from the 102 organizations and scientists in S&T sector show 88.2% of them agree with this solution;
- *Third stage* (about 15 years after establishment), the State is to assign the full self-management rights and to encourage public-private partnership, diversity of investment forms, introduction of products and services of R&D organizations into transaction markets to link closely research works with market needs and the NIS. It is necessary to use the profits gained from this and the support resources offered by outside organizations to maintain, improve and develop R&D activities. The survey results from the 102 organizations and scientists in S&T sector show 84.3% of them agree with this solution.

*Third*, to enhance the management qualification level of heads of S&T organizations and, at the same time, to build up the system of criteria for selection of heads of excellence R&D organizations. It is necessary to be consistent for concepts of development and implementation of policies as well as commitment of high rank leaders for S&T development and for the roles of S&T activities as driving forces for sustainable national development.

Here we have some comments, namely:

- Heads of excellence R&D organizations play very important roles, particularly in initial stages after establishment. Practice shows that the success or failure of excellence R&D organizations depend greatly on their heads. Industrial Technology Research Institute (ITRI), Taiwan can be noted as example. The full history and development stages of ITRI reflect well the role of its heads and this made ITRI become an important research institute with large impacts to industrial development of Taiwan (*Chintay Shih, 2005*). Actually, ITRI not only participates in implementation of national S&T policies but shifts from position of executers to position of initiators of links and cooperation to meet market orientations and social needs;
- For successful formation and good operation of excellence R&D organizations, Vietnam should find out a leading scientist who gathers the full quality of dedication, capability, virtue, qualification, reputation and leading capacities. Heads can be local or expatriate scientists. The

replies to the question “How the head of an excellence R&D organization should be selected?” from the 102 organizations and scientists in S&T sector show 58.8% of them say that, in the actual situation of Vietnam, it is necessary to select well reputed local scientists, 11.8% of them are for selection of well reputed scientists from countries with higher S&T development level, and 29.4% say that it is not important, local or expatriate scientists, but they need to gather the high capacities and good reputation to be leaders.

*Fourth*, the State should enhance and build up links and cooperation between R&D organizations with industrial sectors through actual R&D projects (Nguyen Huu Xuyen, 2014). Taiwan ITRI is an example where, since establishment in 1973, ITRI has played an important role to policies for links and cooperation. These activities help ITRI understand ideas and needs from industrial sectors as well as advantages and difficulties in meeting their needs on basis of incentive policies by the Taiwan Government. At the same time, ITRI conducted activities for promotion of searching, evaluating and selecting suitable technologies from world leading companies for technology transfer projects and then for establishment of strategic alliance in R&D activities for development of new inventions and utilities and then their commercialization.

Here we have some comments, namely:

- For development of close links and cooperation among sides, the State needs to support them to define clearly targets of joint works in research and development of key important technologies and high techs, particularly the ones with universities, research institutes and S&T organizations from countries with advanced S&T development level over the world;
- Links and cooperation supported by the State need to orient to conclusion of bilateral and multilateral agreements for implementation of joint S&T research projects, exchange of experts, sharing of experience, development of research facilities and technology incubators, exchange of S&T information, technology transfer, exploitation of inventions, promotion of industrial property protection practice between Vietnam and other countries. Therefore, it is necessary to have State supported works for evaluation and selection of strategic partners for realization of missions and objectives for output products and services by excellence R&D organizations.

*Fifth*, the political determination and strong supports by the Government are seen through actual actions by leaders to follow long term objectives for

scientific research and technological development. This is reflected through supports for orientation of research activities, investment efforts for technological infrastructure, attraction and respectful use of high qualification human forces and, at the same time, it is necessary to have some sources for excellence R&D organizations to realize their stated missions and strategic objectives in the best way. The survey results from the 102 organizations and scientists in S&T sector show 75.5% of them agree for the deciding roles of high rank leaders through their points of view and willing for building up excellence R&D organizations. In practice, the political determination would not be only the issuance of resolutions and decisions but, more essentially, their transfer to actual action measures for real R&D activities and creation of a research environment which should be really democratic, equal and professional. It is necessary, at the same time, to offer favorable administrative formalities for effective use of national resources for S&T development as stated in the Resolutions by the Sixth Session of the Party Central Committee.

In addition to that, for development of excellence R&D organizations, the State should offer supports for S&T organizations in purchase of scientific data and information of inventions, hire of experts and purchase of application softwares to support R&D activities, particularly post-investment supports for S&T organizations and scientists in their own efforts to produce S&T products with positive impacts to socio-economic development. Equal supports should be also made for pilot production projects, commercialization of research results and introduction of research results in local and international fairs and exhibitions. Furthermore, the State should improve policies for development of technological infrastructure, development of high quality human resources, development of technological market and promotion of intellectual property rights to support and to push up the formation and development of excellence R&D organizations./.

## REFERENCES

### In Vietnamese:

1. MOST. 2016. *Vietnam Science-Technology 2016*. Hanoi, Science and Technics Publishing House.
2. MOST. 2014. *Project for establishment of Vietnam-Korea Institute of Science-Technology*. Draft as made by 05<sup>th</sup> June 2014, Hanoi.
3. National Agency for Science and Technology Information. 2014. *Research Innovations of Excellence*. Hanoi.

4. Nguyen Dinh Binh *et al.* 2016. *Cooperation for study of Taiwan experience on policies to build up excellence R&D organizations*. Summary report for Protocol, Hanoi.
5. Nguyen Thi Anh Thu. 2015. *Overview on excellence R&D organizations*. Special report, Hanoi.
6. Nguyen Huu Xuyen, Nguyen Dinh Binh. 2016. "Building up excellence R&D organizations: Actual requirements". *Vietnam Journal of Science, Technology and Engineering*, Issue January 2016.
7. Nguyen Huu Xuyen. 2014. *Policies for Science and Technological Innovation*. Hanoi, National Economy Publishing House.
8. Shih-Chang Hung. 2015. *Sharing of visions on building up of organizations of scientific research and technological development*. Round table session held in National Tsing Hua University, Taiwan.

**In English:**

9. Chintay Shih. 2005. *Industrial technology and the Industrial Technology Research Institute - Visible brain*, ITRI, Taiwan.
10. Shih-Chang Hung and R. Whittington. 2011. "Agency in National Innovation Systems: Institutional Entrepreneurship and the Professionalization of Taiwanese IT". *Research Policy*, 40(4): 526-538.