

EXCHANGE FOR POLICIES**PROMOTING APPLYING RESEARCH RESULTS INTO
PRODUCTION IN VIETNAM: SOME RESTRICTIONS OF POLICIES****Dr. Nguyen Quang Tuan¹**National Institute for Science and Technology Policy and Strategy Studies

Abstract:

Transferring research results into production and real life is a matter which is paid attention from many countries in the world and Vietnam. Awareness of applying the research results into production has great significance for socio-economic development in general and science and technology development (S&T) in particular. On the basis of analyzing studies, policies of State and some surveys of author, this article will provide some information and exchange some conceptual issues and policies related to apply research results into production, life in Vietnam.

Keywords: *Application of research results; Science and technology policy.*

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Introduction

Application of research results into production has received great attention from Party, State and society. Party and State also confirmed that S&T is the first - class national policy, a key motivation for development. Undeniably, the greatest achievements of human in general and of Vietnam in particular are the results of S&T development over the centuries. However, knowledge, information and products delivered from research is not always possible to apply into real life or consider to the contribution of S&T for socio-economic. The paper will discuss some related problems about applying research results into production which focus on some problems such as concept of application of research results as well as some constrains of relating policies to promote the application of research results into production and real life.

¹ The author's contact is at tuan_ptbv@yahoo.com

Definition of application research results into production and life

In almost English dictionaries (such as Oxford Dictionaries), the term “*application*” means that the action is put into operation or into specific purpose in practice. As the interpretation, application of research results can be understood as putting research results into practice or using research results for specific purpose of life. Other concepts of application of research results are technological transfer, knowledge transfer or commercialization of research results...

According to *Mc Nerney (2009)*, application of research results means the direct or indirect utilization of foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service. Direct utilization is done by the participant owning the foreground while indirect utilization is done by other parties. This is the common method to apply research results into production, however, not all current state management officers in socio-economic field understand or “recognize”. This method is also the most popular method in natural sciences, social sciences and basic research. The second method is to use research results to develop, create a new product/process or services. This method is the technology and knowledge transfer receiving from research into production and real life; this is the common method which Vietnam community and administrative officers identified and recognized commonly. In fact, its form is often used with a different name as commercialization of research results.

Through review of the research literature, to distinguish the form and level of applications research results into production and real life, the author believed that application of research results can divide in 03 different forms, namely: (i) research results are used for other R&D tasks (possibly deeper or wider than the scientific content, higher applicability nature/possibilities); (ii) the research results are used to serve a certain public interest; and (iii) research results are commercialized. According *DASTI (2014)*, commercialization of research results is only a small part of the wide spectrum of applications research results into production and life. A number of international studies consider that the process of applying the research results, technology transfer and commercialization of research results not only concerned about the transfer and sharing of knowledge but also is a learning process when the continuous knowledge accumulated in humans. Successful research results applications and transferring will lead to the accumulation of deeper and wider knowledge of society.

The research results can be applied in real life or not depends on many factors, firstly, it is the quality and practicality of the research tasks that

meet the requirements set by true practical. In addition, the field of research (eg, natural sciences, technical and technology sciences) and the nature of research (eg, basic research, applied research) have a huge impact on the applicability of research results. For example, the research results creating pioneering/breakthrough technologies do not mean it will be highly commercial. In other words, the technology developed at universities and research institutions are often at the starting level and need further investment and studies can be commercialized (*Zuniga & Correa, 2013*). With pioneering technology, investment is very risky because of the application as well as the ability to dominate the market as specific unproven.

The nature of research of S&T organizations also affects the ability to apply or commercialize research results of that organization. If a research organization focuses on basic research, the products will be difficult to transfer into market than other research organizations in the same industry but their research nature is applied research. In general, basic research is not aimed at specific purpose or using. According to *OECD (2015)*, the concept of “generally do not have a specific application” is an essential point in the definition of basic research. The results of basic research, according to *OECD (2015)*, basically is not commercialized; they are usually published in scientific journals and circulation in the universities and research institutes. According to the author of this article, the investment does not trigger or orientation of important public organizations focusing on research that create products/services serving market school will be an unwise policy.

Some research areas serving the poor, the difficult economic zone, the commercialization of research results is not easy. For example, the research for development of agricultural production in the developing countries, farmers in developing countries are less likely to pay for the research results of S&T organizations. Thus, even with S&T organization orienting application, if the results are not transferred into market, the intervention of the State to maintain and develop this organization is indispensable. This helps to explain why the implementation of the “autonomy, self-responsibility mechanism” for public S&T organizations in recent years in our country have failed in some areas, especially in agriculture and rural development.

Finance has a vital role for successful commercialization of research results. According to *Norris & Vaizey (1973)*, from research to successfully commercializing research results, the study period accounting for about 5-10%, stage of technological development and completion is around 10-

20%, commercialization phase accounts for 70-80% of total costs. Thus, funding percentage for the study period compared with the experimental stage and construction is relatively small. Financial analysis shows that there is no countries have the sufficient potentials to transfer research results of public S&T organization into production and real life. Due to investing for research is high-risk, funding from the State budget often mainly participates mainly in “research phase” and a part of “stages of technology development and completion”. Investments to bring research results to final users, mainly from the capital of enterprise, venture capital funds.

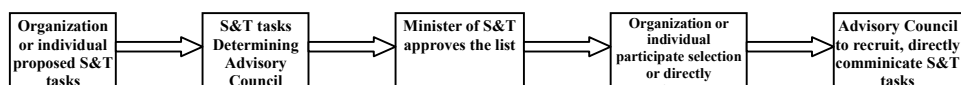
The application of research results into production and real life also depends on the development direction and policy of State. If designed and implemented well, State policy will contribute to accelerating the process of applying the research results. On the contrary, if the policies are not good enough, it can lead to obstruct the process of applying the research results. The next part of this article will discuss some basic points existing in the system of policies and regulations of Vietnam on the process of application research results into production and real life.

Implementing the tasks under the order mechanism

Order mechanism of State is an intervention to promote the application and transfer of research results into production and life. This mechanism, if designed and implemented well, can enhance the application and transfer of research results into production and life. In fact, many countries implemented this mechanism in determining S&T tasks. However, in recent years, the design and implementation “ordering mechanism” has not brought the expected effects. Law on S&T 2013 provides that “National-, ministerial- and provincial-level S&T tasks must be performed on placed orders” (Article 25). Under this provision, all the national, ministerial or provincial level S&T tasks no matter if it is basic research, applied research or experimental development must comply with the order forms.

“State order” in S&T tasks has been going into the research activities of S&T institutions in our country. For example, the S&T tasks of Ministry of Science and Technology (MOST) are ordered according to the following order: (i) the organization or individual proposed S&T tasks and submitted to the MOST; (ii) an authorized unit of the MOST will synthesize these tasks into lists of proposed tasks and submitted to the Minister of S&T then decide to establish the S&T tasks Determining Advisory Council ; (iii) on the basis of the opinion of the S&T tasks Determining Advisory Council, Minister of S&T will approve the list of S&T tasks. From here, the task is approved by Minister of S&T becoming the “order” tasks; (iv) the order

tasks will announce to select or assign directly to the specific organizations and individuals to build TOR of tasks; (v) on the basis of research proposals in the list of order tasks, MOST will establish Advisory Council for recruitment, direct assignment S&T tasks (Figure 1). Then, the task is fulfilled requirements of Evaluation Board (in the case of direct assignment) or graded better (in case of selection) will be submitted to the Minister of S&T to approve directly assignment or selection.



Source: MOST, 2014

Figure 1. Process of selection, direct assignment ministerial level S&T task of MOST

If “order” mechanism originates only from organizations and individuals then authority “decide to order” based on an assessment of the advisory council, the “order” mechanism of Law on S&T remains similar to a previously defined tasks. For example, order mechanism whether have reached the requirements of socio-economic development in general and S&T development in particular, depends heavily on the judicious, wisdom of the advisory bodies of Minister such as S&T Department of other ministries. Another question is whether the advisory body has enough capability to help the Minister order the exact and worthy tasks?

“Order” without mentioning national/industrial technology roadmap will be a shortcoming. For example, in terms of complexity and the risk of conflict in the South China Sea, Vietnam Government set a target to produce coastal defense missiles over 300 km² range for 2016-2020 period. To achieve this goal, the relevant agencies will have to develop a technological roadmap for missile production; analyze, evaluate the readiness of technologies of missile production. The technology roadmap shows that technology will be able to buy on the market and the technology needed to conduct research and development in the country. This is an important basis for State to order S&T tasks for related organizations and individuals. Thus, the order will be effective and achieve the goals when having systems of specific strategies, plans or technology roadmap. When having no specific strategies, plans or technology roadmaps, “order mechanisms” tends to come back to the

² This is an example to simulate the technology roadmap in basic of the hypothesis of author, it is not related to the national strategy and policy on security and defense

mechanisms of identifying S&T tasks as before, and the application of this mechanism only increases the procedures and complicate problems.

In addition, order mechanism will be difficult to implement for basic research which is to discover the nature and laws of natural, social and thinking phenomena. *OECD (2015)* suggests that, in basic research, scientists have a certain freedom in defining the purpose/objective of research. A number of international studies that scientific research, especially social science, mostly based on imagination and inspired thinking (*Wild & Chang, 2008*). Therefore, the author of this article would like to ask a question who can “order” to discover the law or nature of a natural phenomenon but people have not explored beyond the intellectual and passion of the scientists?

In Japan, funding for the research tasks of Ministry of Education, Culture, Sports, Science and Technology (MEXT) is implemented in two ways: top-down and bottom-up (*JST, 2014*). Funding for implementation of top-down mechanisms like “order” in our country. The tasks are ordered from top to bottom which must come from the socio-economic development goals, in line with S&T policy of MEXT. S&T policies of the MEXT are designed based on the basic plan of the national S&T (National Science and Technology Basic Plan). Tasks are launched from the bottom up depending on the scientists and not necessarily follow national socio-economic development orientations. Typically, the total budget for implementation of bottom-up tasks is much more approximately 2 times comparing with the total budget for implementation of ordered tasks (top-down).

For example, the form of performing S&T tasks in Japan is also same as the form of performing in many countries around the world. Relating to Vietnam, to promote capacity and creativity of scientists, we cannot put all the tasks at national, ministerial and provincial level in the same order mechanism. The excessive emphasis of the “order” can badly affect the creativity of the scientific community in Vietnam. For each period of socio - economic development of the country, bodies of state management of S&T should determine the proportion of funding for the tasks carried out under the orders and tasks from the bottom up, based on finding and creative demand of scientists themselves.

Ownership and usage right of research results

For developed countries such as the US, ownership of the research and development results using the state budget has a very strong impact on the ability to commercialize the research results (*Nguyen Quang Tuan, 2013*). Law on Technology Transfer 2006 stipulates that the assignment of

ownership of research results using the State budget for the research tasks chaired organization is entirely reasonable and consistent with international practices. However, the Law on S&T 2013, the ownership of research results is for the Ministers and chairman of the provincial People's Committee. Standing on the application perspective, transferring research results into production and life, according to the author of this article, is a very confusing regulations if not a setback on issuing policies in our country.

Look at the case of the United States before 1980s, technological innovation created from the Federal budget has accumulated a total of over 28,000 patents with the rate of commercialization is not exceed 5% (*Nguyen Quang Tuan, 2013*). Bayh-Dole Act in 1980 was born with the right to acquire the research results to the research tasks chaired organization (universities and companies) leading to a sharp increase in the commercialization of the results research. Currently in the world, according to the author's understanding, there are no countries transferring research results for leaders of ministries or heads of provinces/states.

Obviously, the research results using State budget as well as people's tax, the vesting of ownership research results for any citizen in the society which is not wrong, even this can vest in Prime Minister or President. However, for application or commercialization of research results, Ministers and chairman of the provincial People's Committee have to take a next step is to hand over the ownership or usage research results to individuals or research tasks chaired organization to apply or commercialize. This step should have been an unnecessary step which is inconvenience for the commercialization process. In addition, the growth pattern of Vietnam today is not a growth model based on innovation, therefore, the majority of ministers and chairman of provincial people's committees will not have much time to think about S&T.

Following the provisions of the Law on S&T in 2013, MOST issued Circular No. 15/2014/TT-BKHCN guiding the order and procedures of ownership, the right to use S&T research results using state budget. As the Circular, organizations (including S&T tasks chaired organizations) which want to assume ownership, the right to use research results have to “make documents to request the ownership, the right to use research results representing owners pay the state”. To perform the procedures of ownership, the right to use research results, representatives of organizations assigned ownership/use right must assess this result. This is a complex and unfeasible procedure. For example, research results were “stored” after a long time, a local firm desires to receive and apply the results. In this case,

the State should implement rapidly the transfer procedures for paying back people's tax or to continue to do the valuation procedures, “bargain” with industry?

Another important point related to the order mechanism and transferring ownership of research results that is responsibility for receiving and applying the research results. Under the provisions of Law on S&T 2013, responsibility for the application and transfer of research results belong to the ministers and the chairman of the provincial People's Committee (Article 40). Each Minister or Chairman of provincial people's committees has a huge responsibility in managing local and industry, coupled with the heavy responsibility of the application and transfer of research results, the representation owning research results using State budget probably will think that “I will not approve any topic without seeing the applicability of the subject”. In theory, in all studies, only a very small part of S&T tasks can find the possibilities for applications in manufacturing, life (*Dhewanto at al., 2009; Chandran, 2010*). Thus, it is likely only a small part of the research tasks are approved if every Minister or chairman of the provincial People's Committee thinks about their responsibilities under such direction. This will be a negative effect for S&T development of the country.

The author of this article considers that it is necessary to adjust the Law on S&T 2013 under the direction of ownership, the right to use the research results to host organizations, unless having other laws. The ownership, the right to use research results will stick to the conditions and responsibilities of the host organization in the commercialization of research results.

The mechanism of autonomy and self-responsibility

Decree No. 115/2005/ND-CP of Government stipulating the autonomy and self-responsibility of public scientific institutions (as amended and supplemented by Decree No. 96/2010/ND-CP) was enacted for the purpose of: (i) Strengthening accountability and improving positiveness, proactiveness, dynamics, creation of S&T organizations and heads of S&T organizations; (ii) facilitate to cement scientific research and technological development to production, business and human resources training, accelerate the process of socialization of S&T activities; (iii) facilitate investing focus on the key S&T organizations; and (iv) improve the operational efficiency of the S&T organizations, contributing to strengthening S&T potential of the country.

“Autonomy, self-responsibility” policy is a right policy and in line with the S&T development trend in Vietnam and around the world. The implementation of autonomy, self-responsibility mechanism in recent years

has achieved certain results, but the practical implementation of this mechanism also poses difficulties and challenges for S&T organizations. The autonomy and self-responsibility mechanism implementing in practice is both doing science and doing business mechanism which have proved inadequate: the quality of scientific research is not improved as well as not solving financial problems. On the other hand, another important issue of institutes/universities is that if all studies are towards to industry and then commercialized to gain profit in order to implement the autonomy and self-responsibility,... what is the public interest of public S&T organizations in the context? What is the role of the State in intervening in S&T market? Does this mechanism thwarted or even lost of the openness of science?

The autonomy and self-responsibility mechanism will be made easier for an applied research institute in the potential field (eg, construction materials); on the contrary, this mechanism will be difficult to implement for a research institute in the undeveloped field (eg, agriculture). Author with his team surveyed a number of research institutes in the field of agricultural shows that most of the research institutes under the Ministry of Agriculture and Rural Development had difficulty in implementing the autonomy, self-responsibility mechanism. For example, in the period of implementation of the Joint Circular No. 121/2014/TTLT-BTC-BKHCN, leaders of the member units of Vietnam Academy of Agriculture Science (VAAS) have difficulty in grasping the content of this Circular. For the health sector, a leading research institute under the Ministry of Health said that implement the content of Decree No. 115/2005/ND-CP is not suitable for the health sector.

With autonomy, self-responsibility mechanism, public research institutes and universities (S&T institutions) are entitled to decide on the reorganization and adjustment of the organizational structure of the unit; the head of the organization is entitled to organize, arrange and employ staff in line with capacity and qualifications of each person; decide on the transfer, secondment, retirement, resignation, termination of employment, labor contracts as stipulated by law; decide the adjustment of salaries and recruitment working in the unit; decide on the wage increase; decision on appointment of civil servants, civil servants transfer,... However, in fact, the public S&T organizations have yet to really get the autonomy of the organization's personnel. On the one hand, organizations can recruit, sign contract with the new staff and meet the requirements of the job. But on the other hand, the termination of contracts, salary adjustments,... with the staff have been working for long time are not quite simple or even impossible, especially in public institutions.

S&T organization has not really been given discretion on the management structure and manpower. The main reason is that high-level management bodies have yet strongly decentralized management for S&T institutions in accordance with regulations. In spite of decentralization, there are some S&T institutions has not yet to develop the spirit of autonomy, dare to do, dare to take responsibility. Heads of S&T institutions cannot use all the staff, or replace weak capacity one by others. Paradoxical situation in many research institutes is that the number of research supporter are much more higher than researchers; sometimes this ratio can be up to 50:50; this is a mismatch rate in a research institute.

Currently, the autonomy, self-responsibility mechanism stipulated by Decree No. 115/2005/ND-CP was replaced by Decree No. 54/2016/ND-CP. Until 11th May 2016, there is no official documents of MOST guiding the implementation of this Decree. However, in terms of scientific content, we believe, there has no significant progress of Decree No. 54/2016/ND-CP compared with Decree No. 115/2005/ND-CP. Both documents do not show clearly the public interest of the public S&T organizations, the role of the State in intervention S&T market. In addition, autonomy and self-responsibility mechanism can be made and implemented more effectively when public S&T organizations are more autonomy in terms of personnel as well as salaries for researchers. Keeping salary and wage levels method as the hierarchy of the State like whole system of civil servants and officials will make the S&T system of the country not attract good researchers, not encourage the passion of those who conducting research.

Some other restrictions of policies

A less progress financial mechanism of S&T affected to develop S&T in general and to apply and commercialize research results in particular were mentioned in many previous studies, in many reports of ministries, localities in various seminars, conferences. The previous financial mechanisms stipulated the estimated budget, allocation, expenditure and balance-sheet of S&T tasks using state budget which has been replaced by the Joint Circular No. 55/2015/TTLT-BTC-BKHCHN (hereinafter referred to as Circular 55), and the joint Circular No. 27/2015/TTLT-BKHCHN-BTC (hereinafter referred to as Circular 27). These texts are applied in S&T organizations to for the research themes, proposals and projects from 2016 onwards. The fully assessment of the effectiveness of these documents will take much time. However, some scientists and managers in central agencies and localities criticized that the implementation of Circular 55 is much more complex than the previous financial documents.

Circular 27 also brings some concern from the part of the community of researchers. This Circular stipulates that State shall take back some parts of the funds when tasks are rated “unsatisfactory” with the level of 30%, 40% or 100%. Supposing that an applied research task in the field of engineering and technology science, after studying, if the result is not becoming a development project or not apply or apply after several years (3-5 years) with high-value, Council will assess “unsatisfactory”. In this case, whether the host organization and task managers have to return to the State budget or not? Investment in scientific research is a form of high-risk investments. Therefore, the private sector will not want to invest in research in the unknown-product phase which does not realize the ability to trade.

If a staff has to think about research may be failed and refund money to the State when researching, there is certainly not one dared to proposed have bold and innovative ideas in the study. So far, author of this study has not found a developed country or any countries that having the “compensation” policy when research results are rated “unsatisfactory”.

Looking back at the overview of state policies described above can be realized in recent years, state focus on supply policies more than demand policies. To national innovation system approach, enterprises is the center of system which receiving and application of knowledge from the S&T organizations. So in the near future, we should be innovation in policy-making towards to focus on the central role of enterprises in national innovation system. In addition, in recent years, Vietnam's policies have much more emphasized on creating research results than pay attention to application, transfer and commercialization of research results.

Conclusions and recommendations

Concept of applying research results into production should be fully understood in different forms and application levels in life. Commercializing research results just considers as part and a form of applying the research results.

The process of applying research results into production is a complicated process and time-consuming (*Samenkaita et al., 2002; Swamidass et al., 2009*). Almost research tasks approved will be unable to prove the ability of successfully applying to production and life. The successful application of research results into production, life also depends on various factors, from researchers, study field, market to the policies of State. Therefore, when considering the possibility of “application” of research results, we need to define the problem logically, put them in innovation system.

Policies have an important role in promoting the application of research results into production and life. In recent years, policies have been to innovate and create favorable conditions for S&T development. However, some policies are existing shortcomings which does not promote to apply research results into production and life. This study proposes some recommendations to adjust these polices as follows:

- (1) Amend the Law on S&T under the direction of transfer of ownership of research results using the state budget for the host organizations or scientists implementing research tasks. Examining ordering mechanism to achieve the goals of the State as well as do not lost openness, creativity of scientific research activities;
- (2) Review, improve the autonomy and self-responsibility mechanism of public S&T organizations; should clearly identify principles and fields where the market mechanism cannot be applied but the State must intervene. Thereby, determining the field of investment of the state budget and investing for public S&T organizations;
- (3) Examine, amend and improve the mechanism to fund research activities. Should abandon the “compensation” mechanism for research team in case that research results are not successful. Investing in research activities is very high risk; the “compensation” will affect to the creation of scientific community and limit some scientific research breakthroughs;
- (4) Limit management S&T tasks by heavily administrative measures, policies; instead, strengthen the management of scientific research tasks by measures related to ethics and standards in scientific research
- (5) Review and reduce the number of the state management documents of S&T. S&T activities are creative activities, the issuance of too many management documents are not “creating the legal framework” for S&T activities but seem to create many barriers. Therefore, supplement, amend or retain some documents which have high value or encourage S&T activities; other amended documents which are not high value, or creating administrative procedures or unnecessary barriers should be rejected in the system of policy documents related to S&T development.

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