THEORETICAL CONCEPTS AND PRACTICAL IMPLEMENTATION IN ENHANCEMENT OF CAPACITIES FOR SCIENCE-TECHNOLOGY POLICY MAKING

PhD Candidate. Nguyen Viet Hoa[1]
National Institute for Science and Technology Policy and Strategy Studies
Ministry of Science and Technology

Abstract:

Enhancement of capacities for science and technology (S&T) policy-making is the necessary requirements of many nations, particularly in context of the world's economic crisis and tough competition between nations and regions. This paper deals with some basic aspects: theoretical concepts of capacities for S&T policy-making, objects for the enhancement of capacities for S&T policy making at macro and micro levels, and criteria of enhancement of capacities for S&T policy making.

Keywords: *Capacity; Policy-making; Science-technology policy.*

Code: *14091702*

I. THEORETICAL CONCEPTS OF CAPACITIES FOR SCIENCE AND TECHNLOGY POLICY MAKING

1. Notion of science-technology policy

Actually, there exist numerous different points of view on the position and roles of S&T policies which are subject to practical context, institutional framework, position, roles and scope of concretely defined S&T policies. S&T policies, as all other policies, are management tools of the State or the private sector. Up to now, S&T policies are basically viewed from a restrict scope (being part of strategies) to larger scopes (including strategies, master planning, plans and policies) for S&T development on the legal basis of S&T related documents issued by various levels including the National Assembly, the Government, the Prime Minister, Ministry of Science and Technology (MOST) and other competent organizations.

The notion of S&T policies in restrict scope includes policies which are parts of strategies. S&T policies are tools for implementation of activities to achieve the objectives of strategies for S&T development. There exists a hierarchy of notions. Below strategies, there are programs which are followed by 5-year

[1] The author's contact is at hoanistpass@gmail.com

plans, annual plans and then projects [2]. The notions indicate well that policies are subject to strategies and for strategies. This concept is right defined when the State or the private sector build up strategies. Once the strategies established, policies would be built up for effective implementation of strategic objectives. In this stage the following notions, namely for large scopes, will give some additional and clear explanations.

The notion of S&T policies in large scopes includes the development of the restrict notion of S&T policies in more details. It can be understood that "S&T policies are the set of documents of legal regulation nature which indicate the concepts, principles, regulations and rules of the State in relation to S&T activities; the set plays the roles of background for State management works" [22]. This definition shows that S&T policies exist in various forms and types which may be strategies, master planning, plans (Decisions), guidelines (Circulars); all of them are here the background for S&T management backgrounds.

Many other notions of S&T policies can be listed. In this paper, the attentions are mainly focused on the notion in restrict scope and the one in large scope, being subject to every actual circumstances for purpose of objective definition of position and roles of S&T policies.

2. Capacities of science and technology policy making

2.1. Notion of capacity

For effective implementation of policies, the most important requirement is to have capacities of policy making. Capacities are considered as "fundamental capabilities based on knowledge, experiences, values and orientations of the human which are developed through practical activities". When talking about *"capacities",* we need to underline "*capacities to realize"* which means *"know to do"* but not only *"capacities to learn"* and/or *"capacities to understand"* [13, p.26].

"Capacities are understood to include a system of capabilities, qualification or main skills which are to help people gather necessary conditions to achieve an actual target" [18, p.45]. According to definitions by OECD/DAC [28], the term "capacity" is interpreted as "the full set of capabilities of peoples, organizations and the whole society for successful implementation of works".

In an effort to clarify the meaning of "capacity", the most important and starting aspect is related to the capacities *of whom* or *of what.* Though there exists still a different interpretation of the terms between texts, there is a common acceptance that the capacities are exhibited in three levels: individuals, organizations and surrounding environment.

The classification of capacities is a very complex work with the results which are much subject to the concepts and criteria of classification. Up to now, there are basically three main classifications: (i) Global capacities; (ii) Personal capacities; and (iii) Capacities of organization.

Global capacities: *They are established and developed through process of education and training.* According to an EU definition, they are called "main capacities" which require the provision of:

- Contributions to make valuable results for the society and communities;
- Assistance for individuals to meet requirements of a broad and complex contexts;
- Important roles for all people (but not compulsorily needed to be important for experts).

In order to identify clearly the global capacities, the following three criteria were issued:

First, the utility of the capabilities for all the community members. They need to be related to all people, independently from sex, class, race, culture, language and familial situations.

Second, the conformance to aesthetic, economic, cultural values and social rules.

Third, the decisive role of the context where the basic capabilities are applied.

In capacity-based approaches, actually there defined 35 different capabilities where the intellectual capability is critically important. It is the core element of many intellectual activities including the settlement of problems, decisions, criticizing views, argument development and use of argument supporting evidences.

Personal capacities: UNDP, in 2006, provided an explanation of that. In individual level, the capabilities are the skills and knowledge of each person.

Differently from the global capacities, the personal capacities are exhibited through the skillfulness level, which means the level the one can carry out the certain scopes of works in a fast, proper and sure manner. The capacities can be developed on basis of individual aptitudes. They are not necessary to be inborn ones but *the results of development of society and people (social life, education, training practice and activities of every individual). The high capacities* which produce complete, outstanding, novel and society-rated achievements *are called "talents". Exceptional talents* which produce outstanding achievements in creative activities *are called "genius".*

Capacities of organization: WHO, in 2009, defined there main scopes which need to be considered by every organization: leading and managing aspects, human resource aspects, and communication and networking aspects. Leading and managing aspect mainly deals with the management operations including internal management mechanisms (finance, human resources, information, etc.) and external management duties (based on mechanisms). The both leading and managing activities cause impacts to capacities of the organization to develop, maintain and be accountable. Therefore, leading and managing capabilities in an organization contain many components of the life of the organizations which include the common vision, behavior and uniformity of the organization. All of them are important for the organization to recognize itself and to be recognized by other organizations [6].

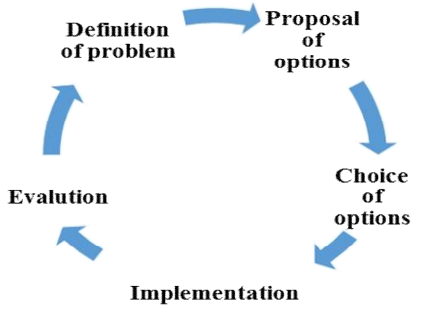
Suitable and sustainable resources in an organization are found a very important aspect including the staff which are required to be fully integrated, trained, motivated and properly supported. The resources should be available and credible.

Communication and networking aspects include capabilities of the organization in communicating its works, developing and maintaining its links with other organizations, conducting its activities and developing its networks (real or virtual, local or global).

2.2. Capacities of science and technology policy making

Policy making is understood as the work to design the objectives, the ways to achieve them, to impact or to change the subjects in a clear manner.

The procedure-based approaches of public policy making in general and S&T policy making in particular show five important steps as shown in Fig. 1.



Source: Leslie A. Pal. (2011). Effective analysis of policy - Basic problems

Fig. 1. Five important steps in procedure of policy making

Policy making is the activities to issue new policies. The components of capacities of S&T policy making include: intellectual background, technical capabilities, problem predicting capabilities, roles and functions in the organization, decision making capabilities and policy implementing capabilities.

Capacities of S&T policy making are interpreted as new policy making capabilities. Up to now, the notion of capacities of S&T policy making is not dealt much in practice. In 2003, Dr. Nguyen Danh Son [4] proposed the notion of S&T endogenous capacities which has two components: macro level endogenous capacities and micro level endogenous capacities. In this interpretation, the decision-making capabilities for S&T development is the macro level endogenous capacities. He stated: "Decision making capabilities for S&T development is an important internal content of endogenous capacities for S&T which shows the capacities of a nation itself to make right and proper decisions for S&T development to serve best the needs of sustainable development of the country". At certain extent, the capacities of S&T policy making are interpreted as macro level endogenous capacities for S&T.

3. Objects for the enhancement of capacities of science and technology policy making

The talk here is about the level of planning organizations which are required to enhance their capacities S&T policy making.

The State management mechanism is set up to include various levels of organizations to carry out State duties and functions. By classification, there are three systems of State management, namely: legislative, executive and judiciary.

Up to now, the legislative and executive organizations play the main roles in relation to S&T policy making. The legislative system includes the State power institutions, namely National Assembly and local councils. The executive system includes State administrations, namely the Government, ministries and ministerial level organizations, Government agencies and local administrations.

Policy makers are those people who are responsible for the system of important policies in the State sector (public policies) and the non-State sector. The institutional approach shows that the national S&T policies are divided into two levels: macro level and micro level. On this basis of classification, there exist two main groups of objects:

- *Macro level S&T policy making group:* It is related to the issuance of policies of national level which has the global impacts to the whole national system of policies. Here, the National Assembly and the Government have the deciding power.

There is a level of organizations which carry out the works of preparation and management of S&T policies which include Government departments/units, ministries and national S&T policy steering committees. There is also a level of Government and non-Government organizations which promote S&T policies, and a level of organizations which implement S&T policies. They (including research institutes, universities, enterprises and etc.) carry out research and production activities in all the social economic sectors.

***- Micro level S&T policy making group*:** It is related to policies for S&T organizations and enterprises in the national systems. These members are also components of the macro level system but they have certain level of independency and autonomy.

Up to now, there exist many studies conducted for classification of S&T policy making procedure which includes the decision making level and the decision executing level. According to Dr. Dang Duy Thinh [5], the unified approach shows that the procedure of S&T policy making is realized in the following levels: (i) Decision making roles which are under the duties of the Government (who solely has powers to conduct large choices and to issue indications to define global policies in S&T sector) and the National Assembly (who considers and promulgates decisions); and (ii) Decision preparing and managing roles which are under duties of ministries and steering committees of national S&T policies (preparing plans and budgets to indicate the objectives and to suggest resources to achieve the objectives). This level also includes National S&T Councils which are to provide advising service and which include scientists, and representatives from scientific organizations and scientific associations. They are practical actors from different S&T related organizations. The organization of promoting level is also included here and plays sponsoring roles. Subject to actual context of the countries, it is possible to assign duties of implementation studies to administrative organizations, associations, academies, research councils and duties of implementation to research organizations such as research institutes, universities and enterprises of all the economic sectors.

II. PRACTICE OF ENHANCEMENT OF CAPACITIES: FRAMEWORK OF CRITERIA AND OBJECTS FOR THE ENHANCEMENT OF CAPACITIES OF SCIENCE AND TECHNOLOGY POLICY MAKING IN NEW CONTEXT

1. Enhancement of capacities for macro level organizations (decision-making level)

The actual new context shows that organizations from many levels get involved in the priority defining and orienting process of S&T activities,

namely international organizations, international experts, regional and international networks, and national macro level and micro level organizations. In the national scale, the attention is focused on macro level and micro level policy makers as objects for the enhancement of priority defining and orienting capacities of S&T activities. Actually, majority of researchers consider that the priority defining and orienting works for S&T activities require the involvement of many actors. According to WHO (2009), it is necessary to develop the so-called Triple actors: researchers, council members and policy makers to build up the road map for S&T development.

1.1. Leading capacities

Strategic vision: John Adair [31] considers that the strategic vision is the capacity to foresee the trends of new environments of activities or, more concretely, the trends of demand-supply relations of certain products/services in long-term and short-term markets. Many elements are required for the leading bodies to have the strategic visions, namely: (1) Having the personal qualities for strategic aspects; (2) Having practical knowledge of the scope of activities; (3) Managing well the forecasting methods for assessment of trends, demand-supply changes and impacting actors; (4) Understanding clearly requirements for strategic visions; and (5) Identifying clearly the roles and senses of strategic visions.

John Adair provided the evidences to show that Warren Bennis and John Maxwell [21] have almost the same point of view. These two leading scholars in their study of leadership problems had described the strategic visions as a beautiful panoramic picture where the leading bodies are exactly the first to capture its traits. More concretely, according to Jim Collins, the visions include all the philosophical concepts, points of view, plans and objectives which cause impacts or indicate long-term orientations. It is necessary to gather important elements to achieve the objectives, namely core values (to give answers to questions: What the belief is for? What is the most important and precious? What helps the ever-lasting?), spirits, invariability and stability. All of these serve as backgrounds for visions.

According to John Adair, the visions with the period of ten years, twenty years, fifty years or even hundred years would be the guides for all activities and the motivating factors to drive the development and to create the unifying, concentrating and linking actors. In order to achieve the objectives, the components and individuals need to look each for other, to be side-by-side, to unite and to have strong resources (internal ones), high concentration and visions to maintain the development and the ever-lasting.

The core values can be seen as a set of a kind of genes transferred from individuals of the organization which helps maintain the transfer of specific features of the organization from generation to generation in a stable manner. John Adair noted clearly that a right vision would have high educational values, and its main indications oriented to noble objectives would direct activities of all members and make them realize their ideas.

- *Requirements to strategic visions*: Actually, many scholars conduct studies of models of visions. Among them there are some models which attract the most attention, namely the BHAG model by Jim Collins and the SMART model.

BHAG Model

B	Big - Defined objectives must be highly valued.
H	Hairty - All objectives have risks in implementations, the bigger the risk are, the higher the results and effectiveness are.
A	Achievable - Defined objectives have to be feasible

Source: Collins J., Porras J. (1994) Built to Last: Successful Habits of Visionary Companies

SMART Model

S	Specific
M	Measurable
A	Achievable
R	Realistic
T	Time-bound

Source: Collins J., Porras J. (1994) Built to Last: Successful Habits of Visionary Companies

- *Background of strategic visions*: In his work "Build to be ever-lasting", Jim Collins, on basis of studies of 18 world leading companies of the average age of 100 years (since 1926), made conclusions that the causes of success of the great and ever-lasting companies is their magic combination of maintained core values and encouraged application of innovations in activities. Many comments indicated that the core values are themselves the background for sustainable development of the companies, their culture and the nation as whole.

In order to have core values, it is necessary to carry out studies and tough selections of values which are not copied versions or borrowed principles. The core values need to be built and forged in long periods, then transferred and propagated from generation to generation. The ever-lasting nature of core values of the organization is the main factor which permits it to stay firm even in disadvantageous circumstances. Therefore, according to Jim Adair, in order to have core values, it is necessary to make efforts to create, to maintain, to consolidate and to develop them. This big volume of works

is the highest duties of the leading bodies and the whole organization. In addition to core values, the leaders need to pay attention to external environment factors and to foresee future trends before setting up the visions.

- *Building and selection of strategic visions*: According to many experts, it is necessary to have methodologies to build up the visions. Actually, there exist many methods which can be used such as forecasting, regression, interpolation, extrapolation, expertise, learning, visiting, consultant leasing, inquiry for opinions. After using these methods to collect opinions the leaders need to synthesis them and then conclude the most core values.

- *Transfer of visions:* After having completed the selection of values and the set-up of strategic visions, the next step - transfer of visions - is quite necessary in order to share information and awareness as well as to get the acceptance from everyone in the organization. The transfer of vision must be made very clear, easily understood and repeated to make them come deeply in mind of every staff. Staff need to absorb the defined values, philosophical concepts, principles of actions and efforts of sharing. The transfer must also selective in terms of methodologies and manners. Actually, the direct observation is the most popularly used method for this purpose.

1.2. Decision making capacities

In order to have decision making capacities, the leaders have to enrich permanently their knowledge and skill in the scope of their decision making powers. It is the basic condition to make right decisions. According to John Adair, the decision making capacities are seen through the answers and solutions for a series of questions: What to do? Why do that? What is the scope of impacts? In which ways to do that? In addition, addition to these questions, more concretely, the leaders need to provide answers to the following questions: Who does it? When do it? Where do it? What is the conditions for doing it? When finish it? What are the minimal outcomes? How to organize the check and to make final reports? Obviously, the flexible application of the decision-making procedure in actual contexts is the one of criteria to evaluate the decision making capacities of leaders. John Adair proposed the decision making model of Prentice Hall 1980 for purpose of more clear illustration as follows.

DECIDE decision-making model

Step		Contents of work
1	**D**	**D**efine problems
2	**E**	**E**numerate possible causes
3	**C**	**C**ollect information

4	**D&I**	**D**evelop measures and **I**mplement the chosen measure
5	**E**	**E**valuate the implementation

Source: Huber, Steps in Decision Making, Prentice Hall 1980

According to point of view of many experts and researchers, the quality of making decisions depends on the objectivity of used information and the logic procedure of decision making process (DECIDE model). The exact definition of problems to be solved is very important and the leaders need to keep firmly the nature of the problem to get their right definition. The solution of problems has a dual nature: positive and negative. The positive side is the distance from the objectives to achieve to the real capacities for successful achievement (factors of success). The negative side is the gap between the level the objective are really achieved and the one the objective should be achieved (in order to identify the rooted causes and then to propose the solutions to settle them radically).

Actually, there exist many methods for decision-making such as consulting, law of majority, law of consensus, brain storming, logic drafting and etc. Which of them to be used is subject to circumstances and conditions the leaders may face. They need to have a suitable model combined well with a proper method to make a good decision. Two methods of brain-storming and logic drafting are found effective to make solutions to settle problems in combination with the GREAT model. Together, they give an optimal choice with 5 criteria: (1) **G**ains which means the benefits collected from the chosen solutions; (2) **R**isks which means eventual risks for the chosen solutions; (3) **E**xpenses which means the total mobilized investment to implement the chosen solutions; (4) **A**chievability which mean the feasibility of the chosen solutions; and (5) **T**ime-bound which means the suitable time frame for implementation of the chosen solutions [29].

1.3. Influencing capacities and image building capacities

John Adair considers that the influencing capacities and image building capacities are close to mobilizing and encouraging capacities but remain broader and cover larger areas. Influencing capacities are processes to be apply, in integrated manner, all the measures to impose impression to other people, to turn attentions to non-traditional elements, to be independent from rules, regulations and policies of the organization but produce sense rich results. These capacities depend on the power the leaders have (position, prestige, image, professional capacities and etc.). It is possible to note that the influencing capacities and image building capacities are close to the so-called *soft powers* of leaders. Soft powers are the way to gain the things they want through causing impacts to activities or to achieve the

objectives they want through influencing the thinking way of others, and by this way make others desire the things they want. All of these is *the soft powers applied through attracting and convincing powers.* In a national level, the soft powers are established on basis of three elements: national culture, national values and national policies [10].

In order to cause impacts, it is necessary to keep firmly the methods and procedures to do which may include mechanical compliance, inspiration and idol images with numerous ways of implementation such as persuading, calling, swapping, consulting and cooperating in order to convince the crowd and lower-ranked staffs.

1.4. Self-understanding capacities and other people understanding capacities

According to many psychologists, the skills to self-understand and to understand other peoples are high positioned advantages. For S&T policy makers, the capacities to understand the objects under impacts of S&T policies play important roles which may lead to success or failure. Up to now, there exist many methods "to understand others" which may be gathered in two main ways:

- Using evaluation sheets: It is necessary to design evaluation sheets and then to send them to people which are under impacts of S&T policies to collect their opinions and then to analyze them;
- Using the so called 360^0 method which is to make evaluation on basis of consideration of evaluations collected from all the surrounding people, namely: (i) Evaluations by higher-ranked leaders; (ii) Evaluations by lower-ranked staffs; (iii) Evaluations by colleagues; (iv) Evaluations by clients; and (v) Evaluations by related peoples.

In the new context, in order to define priorities and to orient S&T development the S&T, policy makers need to understand clearly the qualification, capacities and capabilities of the objects which are under impacts of S&T policies and requirements of socio-economic development.

1.5. Mobilizing and encouraging capacities

In his study, Kathryn Bartol [20] considered that the new leaders, by mobilizing and encouraging, can promote in maximum the resources of their systems, organizations and the society, in a broader sense. The mobilizing and encouraging capacities can be seen through the capabilities: (i) To make lower-ranked staffs involved voluntarily; (ii) To transfer the inspiration and eagerness to lower-ranked staffs; (iii) To find out the way to fit actual situations; and (iv) To find out the effective way to solve problems.

For any policies, only the high-ranked bodies have powers to issue them, and the levels which do not issue them are usually executing bodies. The policies are found difficult to enter the life if the policy-making bodies do not make contacts with executing bodies, and similarly, the contacts turn to be effective only in presence of mobilizing and encouraging capacities.

According to Campbell and Pritchard [12], the potentials of human resources would remain a "zero" if there is no mobilizing and encouraging actions. In this case, the organization would never achieve the objectives. The model by Campbell and Pritchard shows well the relation between results of activities and the combination of mobilizing and encouraging capacities and working conditions. Therefore, the leaders need to capture needs of people to mobilize and encourage them.

Many researchers, in their research of needs, consider that, from theoretical point of view, the needs are extremely multi-form and they change subject to contexts. Therefore, the leaders need to capture the change of needs and, on basis of that, regulate and meet the needs accordingly. As Maslov [8] said, the spiritual needs get increasing. For every actual object, the leaders need to apply suitable ways to mobilize and to encourage. Many methods can be used such as higher wages, bonus, special favors, recognition or appointment to higher positions. Researchers of behavior consider that the transfer of inspiration can overpass the level of scientific assessment to come to the level of arts. Here we deal with not only arithmetic calculations but come to the level of harmony and resonance.

Impacts from mobilizing and encouraging actions are very large. They are not only keys to develop those people which are talent and have organizing capabilities but also to maintain their motivation and eagerness for better contributions to successes of the organization. According to Maslov, leaders always should keep in mind the question "How to make lower-ranked staffs work in the most active and effective way to achieve the highest results and productivity in implementation of tasks assigned by the organization".

2. Enhancement of capacities for macro level objects

Up to now, many macro level objects are found to need to enhance their capacities for implementation of macro level policies and for policy making of micro level organizations. Subject to their nature of activities such as enterprises or S&T organizations, they would have to require different capacities. Nevertheless, *the common capacities, such as the ones to build and to issue policies of their organization, are basically of the same nature and have to be enhanced. These capacities are similar to the ones for micro level organizations, namely the capacities to build the visions and to make*

decisions. Here we will talk about the concrete capacities required for enterprises and S&T organizations to carry out macro level policies.

2.1. Capacities and criteria of enhancement of the capacities for enterprises

The scope of capacities necessary for enterprises is very large. There exist, however, three important capacities to be enhanced to play the role of background for capacities of policy making, namely:

Technological capacities: They are capacities to gather methods, procedures, skills, know-hows, tools and means to turn resources to products. Technological capacities of enterprises require the availability of labor forces of certain qualification level and good labor means. "Technological capacities" of a company are partially found in its labor forces. Qualified staff are important assets for implementation of innovation. Without having highly qualified staffs, a company cannot master technologies and, in a higher level, have no ways to carry out innovations. In addition to researchers, the company needs to have engineers who can carry out and control producing operations, to have sellers who understand the technologies they sell, and the managers who can have the full awareness of technological topics" [26]. Therefore, in order to have technological capacities, enterprises need to have qualified human resources which are one of the most important input factors to decide technological capacities of the enterprises. "An enterprise or an organization would have endogenous technological capacities when they have capabilities to carry out activities of investment preparation, selection and negotiation for technologies, and purchase, installation, maintenance, improvement and, even, propagation of technologies they have. In order to do these works, the persons in charge of enterprises need to have knowledge at certain level through education, training and learned experiences" [9].

Knowledge transferring capacities: For any organization, first of all, it concerns the internal transfer of knowledge. It is a necessary step before starting activities of innovation of products and technological procedures. Basic knowledge should be transferred largely inside the enterprise and these activities create the interaction between divisions and units inside the enterprise. Knowledge transfer should be conducted in natural and regular ways.

Note that the transfer of know-hows is a matter which is quite different from the knowledge transfer. The transfer of know-how related new knowledge which plays the key roles for competition cannot be conducted for all the divisions and units of the enterprise. This transfer is particular and requires specifically qualified staffs which can be taken as "guardians" of specific technologies. The team of these staff need to update regularly

their knowledge and to be trained well to do the best ways to absorb and then transfer the gained knowledge. Robert Boyer and Michel Didier [3] had demonstrated that majority of outstanding achievements have their sources from research works conducted by the enterprise itself, i.e. from inside efforts of the enterprise.

External relations, from another side, are also found necessary to carry out successfully the innovations. It, in fact, relates to establishment and maintenance of relations between suppliers and users after conclusion of contracts for transfer or purchase of technologies and R&D results (discoveries, inventions, utility solutions), contracts for industrial machine and equipment purchase, contracts for industrial designs and production take-offs, contracts for new products and technological improvement. The growth which derives from external factors is made in mutual interactions between processes of improvement and innovation which target a more effective production.

Here, *the culture-social factors,* in addition to human factors, play very important roles which impact the learning capacities of enterprises. Many researchers consider that the culture-social factors are backgrounds for effective innovations of the enterprise. Easy communication, effective information channels, on-work skill training and knowledge accumulation which are conducted between units of an organizations or between organizations are very important. Here, a good management and a proper strategic vision are found to be key factors [26].

Innovation capacities: They are to include a set of factors the company may have or not have, and the way to combine effectively these factors [26]. In order to carry out the innovation, enterprises have to conduct many steps in fields of science, technologies, organization structure, finance and trade, R&D activities, application of R&D activities, marketing, innovation strategies and investment potentials for innovation by enterprises. In addition to the above noted capacities, the other aspects to reflect the capacities of enterprises are seen through the results of successfully ended activities, ongoing activities or pending activities. Successful enterprises are those which could identify, evaluate and gain the momentum to create and to launch new products or services [18]. They should not stop here in the full process also. Innovation capacities of enterprises are also seen through the position and competition advantages in markets which may come from the exclusive rights of innovative products or patents. The later give them chances to make high value products and to gain high benefits.

2.2. Capacities and criteria for enhancement of capacities of science and technology organizations

According to definition by OECD (2011), public research institutions (PRI) keep a very important position in innovation of their roles in creation and propagation of knowledge. Nevertheless, the expenditure for PRIs remains limited. Many countries are found almost absolute in their efforts to increase investments for R&D sector. In reality, the expenditure for PRIs is a small part in the total expenditure for R&D in OECD countries. This did not make high effectiveness. Therefore, investment objectives were adjusted during recent years in OECD countries which are focused more on PRIs. New challenges to policies and, in a broader aspect, to economic and political development had promoted the shift in orientation and definition of S&T tasks. International cooperation activities become more regular and extensive. By this way, PRIs have more diversified income sources and the financial supports get more competitive. Sponsoring organizations need to balance short term and long term objectives to maintain the quality of researches and to ensure the sustainability of activities of PRIs, and then to enhance capacities of S&T organizations.

Capacities of S&T organizations, in fact, are the capacities to innovate the creation and the propagation of knowledge mainly on basis of R&D activities since the later is a kind of creative activities conducted in a systematic way to enrich knowledge on the human, culture, society and nature, and then to use this knowledge capitals in efforts to find out new applications. R&D activities, as rules, are conducted mainly in S&T organizations, universities and service sectors.

Criteria for enhancement of capacities for science and technology organizations

- *Development of S&T organizations:* Many S&T organizations give recommendations that the key point of enhancement of research capacities is to consolidate S&T organizations and to create a broader research environment [6]. This, according to many researchers, would create sustainable research capacities because solid research organizations can basically sustain uncomfortable conditions such as limited State financial supports for R&D activities. At the same time, they provide an environment necessary for multi-sector approaches which remain the main approaches for study of policies. WHO gave a recommendation that the nations which have a low-income level and a big gap in research capacities should set up strategic objectives. Here, their efforts are focused not only on creating new research organizations but also on evaluating activities of established research organizations. The evaluation should clarify if the later can meet requirements of a broader research system.

- *Insurance of sources to supply researchers:* S&T organizations, in order

to have high quality researchers, need to develop links with education and training organizations, i.e. universities in particular, to recruit and to keep high quality scientists on basis of principles: respecting scientists, developing young researchers, building research norms and developing core forces of S&T policy researchers.

- *Insurance of financial sustainability:* The diversification of supporting sources and the enhancement of financial management quality play important roles for S&T organizations to ensure the financial sustainability

- *Financial autonomy and self-management:* It is the important criteria to mobilize and to use resources, to recruit and to keep qualified experts and to implement strictly research strategies without being impacted from short term pressures or other external pressures. This criteria for enhancement of capacities shows that Resolution No. 115/2005/ND-CP dated 5th September 2005 by the Government governing the self-control and self-liability of public S&T organizations and Decision No. 1926/QD-TTG dated 20th November 2009 governing the provision of regular operation costs of the year 2010 for S&T organizations to implement the above noted Resolution No. 115 are the important criteria to enhance capacities of S&T organizations.

- *Balanced and harmonica relations:* It is extremely necessary to develop and to balance the integrated links with macro level S&T policy making institutions and supporting organizations. Therefore, the process of development of new S&T organizations and operating S&T organizations need to focus attentions to the extent they can develop these links. Actually, the "neutral" extent is believed to give the most effective results.

- *Investment for leading and managing positions:* The investment for leading and managing positions is required not only for macro level S&T policy making institutions but also highly necessary for advising and consulting bodies. International organizations including OECD, WHO, UNESCO, UNIDO and many other S&T organizations in the world acknowledge the necessity of investments for leading and managing positions. WHO, in 2009, called that "the investment for leading and managing positions need to be considered as important strategy for development of research organizations. The establishment of a network of works and exchanges between leaders is also an effective strategy for development of research capacities. In addition to development of leading capacities, research organizations need to develop an efficient management system, particularly in fields of finance, personnel management and planning activities".

- *Development of S&T organization culture:* The culture of an organization is the set of values, rules and typical norms for activities of social relations which are set up and practiced in the organization. Kathryn A Baker emphasized, in addition, that the organization culture is clearly seen as: (i) Necessary factor for successful change of the organization and the growth of the human values; (ii) Management of culture has become a key management capacity; and (iii) The adaptation of culture may be a necessary condition for success of the organization.

As summary, the enhancement of capacities for S&T policy making is the necessary and important work in both macro and micro levels in order to bring effectively S&T policies into life. It is also measures to confirm the position and roles of S&T as driving forces for development. The most popularly applied ways now are short term training courses and regular practice through implementation and test of policies in small scaled scope of activities (similarly to pilot projects). Then, experiences and lessons of implementation steps would be taken and the process is conducted in the above noted cycle of 5 steps. After the completion of the tests, checks and conclusion of lessons as regulated, the issue of a new S&T policy would start.

REFERENCES

In Vietnamese:

1. *Documents of the XI-th Party Congress*. Hanoi: National Politic Publishing House, 2011.
2. Claude Fabrizio. (1997) *Glorifying the diversity*. UNESCO Magazine, September 1997, pp.10-11.
3. Robert Boyer, Michel Didier. (2000) *Innovation and Growth. Vietnam - France Economic-Financial Forum*. Hanoi: National Politic Publishing House.
4. Nguyen Danh Son. (2003) *Measures to enhance S&T endogenous capacities for sustainable development in Vietnam*. MOST level research project, 2003, p.15.
5. Dang Duy Thinh. (2004) *Reforms of Research-Development policies in context of shift to market economy in Vietnam*. Hanoi: Agriculture Publishing House.
6. WHO. (2009) *Reasonable choices - Enhancement of capacities for evidence-based health care policy-making process.* Hanoi: Medicine Publishing House.
7. Dang Ngoc Dinh. (2012) *Evidence-based studies and recommendations for policies - Some thoughts*.

In English:

8. A.H. Maslov. (1943) *A theory of human motivation*. Psychological Review:370-96

9. Martin Fransman, Kenneth King. (1984) *Technological capability in the third world*. Macmillan, London, pp. x + 404. UK pound.
10. Joseph S. Nye. (1990) *Bound to Lead: The changing nature of american*. New York 1990, ISBN 0-465-00743-0.
11. Bengt-Ake Lundvall. (1992) *National systems of innovation towards a theory of innovation and interactive learning*. London and New York.
12. Peter Campbell. (1992) *Making socialists: Bill Pritchard, the Socialist Party of Canada, and the Third International*. Labour/Le Travail, vol. 30 (Fall 1992), pp. 45-63. In JSTOR.
13. Collins J., Porras J. *(1994) Built to last: successful habits of visionary companies.*
14. J.Coolahan. (1996) *Key competencies a developing concept in general compulsory education.* European Commission (Directorate-General for Education and Culture).
15. Charles Edquist. (1997) *Systems of Innovation Research Program (SIRP).* Institutions and Organizations in Systems of Innovation: The state of the Art, June 4th, 1997.
16. David C.Mowery. (1998) *The roles and contributions of R&D collaboration*. Matching Policy Goals and Design: March 11, 1998, p.6.
17. Fischer, Frank. (1998) *Beyond empiricism: Policy inquiry in post positivist perspective*. Policy Studies Journal 26 (1), p.129-146.
18. Scott Shane, S. Venkataraman. (2000) *The promise of entrepreneurship as a field of research*. The Academy of Management Review. Vol. 25, No. 1 (Jan., 2000), pp. 217-226
19. F.E.Weinert. (2001) *Having analysed many definitions of the notion of competence*. OECD, 2001b, p. 45.
20. Bartol, Kathryn M., Durham, Cathy C., and Poon, June M. L. (2001) *Influences of performance evaluation rating segmentation on motivation and fairness perceptions*. Journal of Applied Psychology, 86, 1106-1119
21. Eurydice. (2002) *Key Competencies A developing concept in general compulsory education*. Text completed in October.
22. Warren Bennis, John Maxwell. (2002) *Running with the Giants*
23. Current Science. (2003) *Innovation chain and CSIR*. Vol.85, No.5, 10 September.
24. Bengt-Åke Lundvall. (2003) *Innovation Policy in the globalising learning economy-summary*. By Aalborg University and Susana Borras, Roskilde University
25. Erik Baark. (2004) *Making of S&T policy in China*.
26. OSLO. (2004) *The measurement of S&T activities proposed guidelines for collecting and interpreting technological innovation data*.
27. OECD. (2005) *Definition and Selection of Competencies* (DeSeCo Project)
28. Alexis A.Halley. (2005) *Applications of boundary theory to organizational and inter-organizational culture*.
29. OECD/DAC. (2006) *The Challenge of Capacity Development: Working Towards Good Practice*. Document Library.

30. *Great Britain*. (2007) McGraw Hill Company.

31. Melbourne. (2008) *Declaration on educational goals for young Australians*. December, 2008.

32. John Adair. (2010) *Effective strategic leadership: The complete guide to strategic management.*