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Barriers from the Organizational Model to Innovation in Science and Technology Information Activities in Vietnam: Approach from a Policy Perspective

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Abstract

Science and technology information activities play an important role in transforming scientific and technological information resources into values for the socio-economic development of each country. Through the analysis of current documents on institutionalizing science and technology information policy, along with secondary quantitative data, the research has identified and clarified the factors affecting innovation in science and technology information activities, analyzed and clarified barriers from policies related to organizational models to innovation in science and technology information activities. The article points out that, in Vietnam, there are many different models of science and technology information organization, these are the factors that affect the process of standardizing the operating model and the way of providing science and technology information products. This is considered as a barrier from organizational factors to innovation in science and technology information activities. From this identification, the study proposes solution with policy implication to overcome these barriers.

Keywords

Innovation, Science and Technology Information Activities, Science and Technology Information Organization, Information Policy

1. Introduction

Humanity is living in the information age, along with the development of science and technology, especially the achievements of the Fourth Industrial Revolution, has created an important driving force for economic-society of each country. In this context, the potential of science and technology information becomes one of the extremely important resources for the development and promotion of innovation. In the Strategy for Science and Technology Development and Innovation to 2030[1], the Government of Vietnam has identified key tasks in developing and effectively exploiting science, technology and innovation infrastructure, focusing on "*continuing to invest in improving the capacity of the national science, technology and innovation information system, perfecting the national database system on science, technology and innovate on the basis of building and operating digital platforms to connect, strengthen effective links between science and technology information centers of ministries, branches, localities, research institutes* …", from these important orientations, there is an urgent requirement for the renewal of scientific and technological information activities on the basis of applying the achievements of the fourth industrial revolution and the trend of digital transformation in order to improve the quality of science and technology information management, scientific research results in order to promote the value of scientific knowledge, as well as apply technological achievements to serve production and business.

Approaching from a policy perspective, science and technology information activities are governed by many different documents, including measures to regulate organizational models, which affect to innovation in scientific and technological information activities. In the context of the continuous development of science and technology, the trend of digital transformation and changes in the needs of users for information, it is necessary to analyze and review the contents and regulations to identify barriers, thereby proposing solutions to overcome barriers from the policy perspective in promoting innovation in current scientific and technological information activities. This study answers the question: *From a policy perspective, what are the barriers from the organizational model to innovation in science and technology information activities in Vietnam?*

2. An Overview of Innovation in Scientific and Technological Information Activities

2.1. Concepts: Science and Technology Information and Science and Technology Information Sources

When classifying information, considering the needs of users, it can be divided into two types: mass information and scientific and technological information. Unlike mass information, which is the usual information of the nature of updating news formed in people's daily lives, scientific and technological information is the result of scientific research activities, which carries a high content of

[1]Decision No. 569/QD-TTg dated May 11, 2022 of the Viet Nam Prime Minister.

knowledge and is the driving force of each country's development.

According to the Government's Decree 11/2014/ND-CP on Science and Technology Information Activities (hereinafter referred to as Decree 11), scientific and technological information is data, facts, figures created in science, technology and innovation activities. In which, science and technology activities are defined to include: research and development (R & D) activities and technology development activities including: technology expansion, technology upgrading and technological innovation and science and technology service activities.

From this definition, it can be identified that scientific and technological information is the output product of scientific, technological and innovation activities and is an important scientific and technological potential that needs to be managed contribute to improving the national innovation capacity.

Related to the concept of "scientific and technological information", there is also the concept of "Science and Technology Sources" which is defined as a carrier of scientific and technological information *that is collected and organized into a collection or a database on one or more topics*, *processed and organized according to international or national standards to preserve and serve the information needs of users*. Types of scientific and technological information sources identified include: books, newspapers, scientific journals; Proceedings of scientific conferences and seminars; explain tasks, report on results of implementation, application of results of scientific and technological tasks; intellectual property documents, standards and technical regulations; industrial catalogs; scientific thesis; design and technical documents; database; electronic information; scientific and technological statistical documents; multimedia documents and documents on other media[2].

2.2. The Concept of Science and Technology Information Activities

Scientific and technological information activities are considered activities that turn the potential of scientific and technological information into value so that people can access and use them according to different needs, serving scientific research, production and business, socio-economic development.

It can be defined: *scientific and technological information activities are scientific and technological service activities*, *including activities*: *development of scientific and technological information*, *information processing*, *storage and preservation of information*. *information*, *searching and disseminating information*, *consulting activities*, *knowledge transfer*, *technology transfer and supporting activities to turn scientific and technological information into resources*, *products and services*. *Serving the needs of organizations and individuals*.

From this definition can be identified:

- The position of science and technology information activities is a form of

[2]According to Clause 2, Article 3 of Decree No. 11/2014/ND-CP dated February 18, 2014 of the Government on science and technology information activities.

science and technology services;

- The content of science and technology information activities is a combination of two groups of activities: 1) professional activities including (development of scientific and technological information, analysis of, information processing, information storage and preservation, information search and dissemination) and 2) activities related to consulting, supporting knowledge transfer, technology transfer.
- Both of these groups of activities aim to turn scientific and technological information into a resource, providing scientific and technological information products to meet the organization's information use needs, individual.

2.3. The Concept of Innovation in Science and Technology Information Activities

The concept of innovation "Innovation" needs to be distinguished from the phrase "Renovation" which is often associated with the reform, renewal and development of the country. The concept of innovation was first mentioned in the studies of Joseph Schumpeter (1934) with the basic view that economic development is considered as a process of qualitative change brought about by innovation that is the combination of combination of available resources on the technology platform. By 1973 in the book Innovation and Organizations, Zaltman, Duncan, and Holbeck (1973) mentioned creativity in terms of the association in a certain method to create a model that was previously unknown to others. participation. Peter Drunker (1985) in Innovation and Entrepreneurship argues that innovation is the specific tool of entrepreneurs, the means by which they use to exploit change as an opportunity to create business or service. other service. Whereas the study of E. M. Roger (2003) argues that innovation is the implementation of an object that is considered new and is performed by an individual or a unit using it, John R. Bessant and Joe Tidd (2007) states that innovation is the process of converting ideas into useful products, processes and services.

According to the Law on Science and Technology 2013, innovation is the creation and application of management achievements and solutions to improve the efficiency of socio-economic development, productivity, quality and value. increase of products and goods[3].

According to the Organization for Economic Co-operation and Development (OECD), innovation is the implementation of a new or significantly improved product (goods/service) or process, a new marketing method or a new measure. practical organization activities in the work organization or in external relations. According to OECD (2005), innovation is divided into four categories: Product Innovation, Process Innovation, Marketing Innovation and Organisational Innovation.

In this study, the author approaches the concept of "innovation" from the

[3]Clause 16, Article 3 of the Law on Science and Technology.

OECD's point of view, thereby identifying the element of organizational model has an impact on innovation in science and technology information activities.

3. An Overview of Science and Technology Information Policies to Promote Innovation in Science and Technology Information Activities

The concept of "information policy" was first appeared in the study of Marc Uri Porat (1977), in this study, he showed that the foundation of the information economy is computers with processing capabilities. sensitive information compared to human capacity to process information, while emphasizing that the future of information policy is a combination of computers and telecommunications. Thinking about a national information policy is also mentioned in the work of Charles Oppenheim et al. (2002), in which the research group emphasizes that information policy is not only governed by technology, but more importantly, equality, creating opportunities for citizens of each country to access knowledge, information and serve the community, from which problems form e-Government, self due to information, data security, global access… are mentioned in order to reduce the technical gap, e-commerce problems and especially copyright issues in the digital environment. Studies led by UNESCO from 1988 to 2009 partly outline a model in national information policy with five basic pillars: 1) Information for development; 2) Information Literacy; 3) Information preservation; 4) Information ethics; 5) Information Accessibillity (Rozengardt, Davidzuk, & Finquelievich, 2009).

In Vietnam, the research of author Nguyen Huu Hung (1999) has made arguments on national policy on scientific and technological information with the aim of minimizing possible losses. in research, production and socio-economic activities due to lack of information or not using information. Research indicates that the pillars of a national information policy include: 1) information needs; 2) information infrastructure; 3) awareness of the whole society; 4) value-added information quality; 5) facilities and information infrastructure; 6) international cooperation; 7) information and computerization equipment and 8) specific policies on science and technology information resources, information distribution and use agencies, human resource development, scientific application and technology. Later studies on science and technology information policy have pointed out the basic foundations of science and technology information policy in Vietnam with issues of network establishment and organizational systemization. scientific and technological information organization from central to local levels, the issue of scientific and technological information activities by proposing important legal frameworks in the development of scientific and technological information products, performance evaluation standard system.

According to Le Tung Son (2021), science and technology information policy *is a set of institutionalized measures, promulgated by the authority or state*

management entity, affecting the process of forming supply network, ensuring resources for activities of creating, storing, preserving, providing information, and disseminating scientific and technological knowledge towards the targets of ensuring scientific and technological information for development of each country.

The relationship between policy and innovation in science and technology information activities is identified in Figure 1.

Through Figure 1, it is possible to identify the relationship between science and technology information policy and the innovation of science and technology information activities from the following aspects:

- Science and technology information policy: as a control center, through a system of impact measures to promote innovation. Impact measures include: operating mechanism, resources, technology for innovation. Measures in science and technology information policy aim at:

1) Standardization of organizational structure associated with organizational innovation;

2) Standardization of science and technology information products and processes associated with product and process innovation;

3) Standardization of communication activities associated with innovation in Marketing.

- Innovation in science and technology information activities is approached in the following aspects: Product Innovation, Process Innovation, Marketing Innovation and Organizational Innovation, these factors are influenced by science and technology information policy through measures affecting inputs for innovation activities.
- Environment: these are external factors affecting policy making and the process of innovation in science and technology information activities, in which key factors such as:

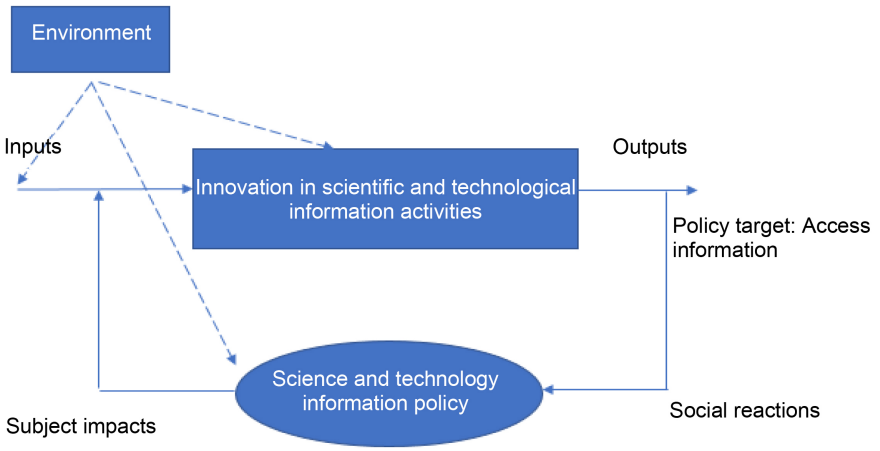

Figure 1. The relationship between science and technology information policy for innovation in science and technology information activities from a systems theory approach (controlled systems).

1) The socio-economic development is associated with changes in the needs of organizations and individuals to use scientific and technological information;

2) The advancement of science and technology, especially the trend of digital transformation.

4. Overview of the Document that Institutionalizes Contents in Innovation of Scientific and Technological Information Activities

Science and technology information policy is institutionalized in many types of State documents with different legal effects, within the scope of the study, the authors focus on researching documents that have an directly related to the innovation of science and technology information activities in Vietnam, which can be mentioned as:

- General documents on scientific and technological information activities: Decree 11, Law on Libraries 2019, Law on Intellectual Property[4].
- Other specific regulations on factors affecting innovation in scientific and technological information activities include:

+ Organizational factors: Decision 1785/QD-BKHCN dated June 26, 2018 of the Minister of Science and Technology on promulgating the Charter on organization and operation of the National Agency for Science and Technology Information (hereinafter referred to as Decision 1785); Circular 01/2021/TT-BKHCN dated March 1, 2021 of the Minister of Science and Technology guiding the functions, tasks and powers of specialized agencies in science and technology under the People's Committee provincial and district levels (hereinafter referred to as Circular 01);
+ Resource factors: Decree 95/2014/ND-CP stipulating investment and financial mechanism for science and technology activities (hereinafter referred to as Decree 95), Circular 10/2017/TT-BKHCN dated June 28, 2017 of the Minister of Science and Technology providing for the construction, management, exploitation, use, maintenance and development of the national database on science and technology (hereinafter referred to as Circular 10).
+ Operational factors: Decision 1285/QD-TTg dated October 1, 2018 of the Prime Minister approving the project "Development of scientific and technological information sources for scientific research and technological development until 2025, orientation to 2030" (hereinafter referred to as Decision 1285); Decision No. 206/QD-TTg dated February 11, 2021 of the Prime Minister approving the "Program on digital transformation of the library sector up to 2025, with orientation to 2030" (hereinafter referred to as Decision 206); Circular 06/2022/TT-BKHCN of the Minister of Science and Technology promulgating economic-technical norms of public non-business services funded by the state budget in the fields of information, statistics and libraries science and technology (hereinafter referred to as Circular 06).

[4]Law on Intellectual Property 2005, revised in 2009, 2019 and 2022.

In addition, the Fourth Industrial Revolution and the trend of digital transformation have created challenges in renewing scientific and technological information activities, especially in renovating professional and professional operation methods, services, as well as creating new values for access to scientific and technological information for the community. Approaching from the policy factor, the Project "developing a digital Vietnamese knowledge system" has identified the project's goals as: building a digital Vietnamese knowledge system through synthesis, systematization, and Vietnamese. digitizing, digitizing, storing and disseminating knowledge in all fields, first of all, supporting education, training, innovation and fields directly related to people's lives such as law, medical, production engineering…; create a favorable environment to attract people and businesses to participate in the role of both exploiting and contributing to enriching Vietnam's digital knowledge resources, thereby gradually contributing to the development of domestic industry. Vietnam's digital content, orienting users' knowledge use in the network environment.

Thus, the above documents have concretized various aspects and are an important factor determining the ability to innovate scientific and technological information activities.

5. Identifying Barriers in Innovation of Scientific and Technological Information Activities from Organizational Model Factors

Measures on building the organizational structure of science and technology information organizations is one of the contents that create the foundation in the implementation of innovation in science and technology information activities.

Article 22 of Decree 11 stipulates the organization of performing the scientific and technological information function with 05 basic types: 1) the organization performing the function of the national focal point for scientific and technological information; 2) organize the function of the focal point for scientific and technological information at ministerial level; 3) organize the function of focal point for scientific and technological information at provincial level; 4) Other public scientific and technological information organizations; and organizations performing the science and technology information function established by non-state organizations, enterprises and other organizations.

On the basis of this regulation, the Minister of Science and Technology and other relevant management entities have developed a system of documents to define the functions, tasks and organizational models of implementing organizations, perform the function of scientific and technological information, which must include:

- Decision 1785 stipulating the functions, tasks and organizational structure of the Science and Technology Information Department as an organization performing the function of the national scientific and technological information focal point.

- Circular 01 stipulates the functions, tasks and powers of specialized agencies on science and technology under the People's Committees of provinces and districts, in which:

+ For the provincial level: Organize the processing, analysis, synthesis and provision of scientific and technological information; guiding the implementation of the collection; building and developing science and technology information infrastructure; the focal point to connect and implement projects of the digital Vietnamese Knowledge System in the locality; directing the implementation of the scientific and technological statistical reporting regime; organizing service activities in the fields of information, libraries, statistics, databases on science and technology…
+ For the district level: Organize the implementation of legal documents and plans on science, technology and innovation after promulgation and approval: information, statistics, propaganda, instructions for dissemination, education, monitoring of law enforcement in the fields of science, technology and innovation.

Also in the provisions of Circular 01, the model of public non-business unit performs the function of information and statistics on science, technology and innovation with the position under the Department of Science and Technology. with an organizational model including: Leaders of the center, offices and specialized departments to carry out the work of organizing and performing processing, analysis, synthesis and provision of scientific and technological information for service, leadership, management, and social and economic development services in the locality.

- In addition, for organizations performing the function of scientific and technological information focal points of ministries and branches, they are specified in the functions and tasks of Departments and Departments under the Ministry (most of them are performed at Departments of Science, Technology and Environment) or research institutes.

In addition, the Library Law 2019 also addresses the issue of the library network, in which, regulations on the functions and tasks of specialized library groups and libraries in educational institutions are subject to the control of public libraries, amendment of Decree 11.

Basically, the regulations on network organization and operation model of scientific and technological information focal organizations are relatively complete and create impacts on the process of network formation. science and technology information organization, as of January 2022, the network of science and technology information organizations includes: 01 organization performing the function of national scientific and technological information focal point (Science and Technology Information Department); 32 scientific and technological information focal organizations of ministries and branches, 63 scientific and technological information focal organizations at provincial level, in addition to scientific and technological information organizations of universities, colleges,

research institutes and other institutions. Through these measures, the scientific and technological information organization model is also identified, including:

1) Model of department and department under the Ministry: this is the model in the state management advisory agency under the Ministry, the most typical for this model is the National Science and Technology Information Department, in addition This model exists in a number of ministries and branches such as the Ministry of Public Security (Department of Science, Strategy and History of the Public Security), the Ministry of Industry and Trade (the Department of Science and Technology), the Ministry of Transport (the Department of Science and Technology). Committee for Ethnic Minority Affairs (General Department)…;

2) The model of a science and technology advisory body under the Provincial People's Committee (Department of Science and Technology) (so far there are about 17 provinces/cities) following this model, such as: Tuyen Quang, Tien Giang, Tay Ninh, Thanh Hoa, Thai Binh, Soc Trang…;

3) Research institute model: this is a model linking science and technology information activities with scientific research activities at ministries and branches, typical for this model can be mentioned: Institute of Information social sciences (Academy of Social Sciences), Institute of State Organizational Sciences (Ministry of Home Affairs), Institute of Labor and Social Sciences (Ministry of Labour, Invalids and Social Affairs);

4) Model of information center/information and statistics center Science and technology/informatics application center Science and technology, information center - science and technology application, center information and application of scientific and technological advances… These are models of public non-business units under the specialized agencies on science and technology under the provincial People's Committees. So far, 46 provinces/cities have organized this model.

5) The model of a library, library information center, information-document center, departments, information-document departments: this is an organizational model with a number of scientific information organizations and technology is mainly concentrated in universities, research institutes, state agencies and enterprises… the activities of these organizations mainly serve the learning, research and production needs of the institutions.

In essence, science and technology information activities are non-business activities, with the role of providing science and technology services. Therefore, the model of public non-business unit is considered as the ideal model to carry out this activity. However, measures on organizational model have impacted and created different models: including those of state management advisory agencies (at Department, Department, Department level), this leads to the situation The state of non-discrimination between state management responsibilities and operational responsibilities of non-business units, affecting the innovation process of scientific and technological information activities.

Access from the scientific and technological information operation process, with a series of processes from collecting, processing, analyzing, storing, preserving, searching and disseminating information; However, with the operating model of a department, a department or a department, the arrangement of resources for scientific and technological information activities is different from that of public non-business units.

For bureaus, departments or departments, the human resources working in these agencies are civil servants, who are entitled to the remuneration regimes for civil servants; the financial mechanism for investment in science and technology information activities has different characteristics; especially these models are influenced by the government's policy of downsizing the payroll and administrative reform, so it is difficult to secure resources, especially human resources (with the requirement of downsizing the payroll). Thus, with this model, it will be difficult to standardize operational processes of scientific and technological information organizations. From the difficulty in standardizing activities, it will lead to the difficulty in standardizing the quality of scientific and technological information products. This is a factor promoting innovation in scientific and technological information activities because state management of functions are different from the service provision function of Public non-business unit.

Science and technology information policy with regulations on identifiable scientific and technological information organization model, there is no consensus in the organizational model in the entire science and technology information network. national technology. This does not create foundations for innovation in scientific and technological information activities from an organizational perspective (due to inconsistency in models); operational process innovation (because each organization has a different operating method); product innovation (because the level of product supply at each organization is different because the resources invested in scientific and technological information activities have certain characteristics). These issues pose a need to refine science and technology information policy from an organizational perspective.

6. Conclusion and Recommendations

Science and technology information policy includes many different measures of the management subject and all aims and ensuring scientific and technological information for each person's access to information. Among these measures, innovation in science and technology information activities is considered a key factor contributing to creating resilience for the entire system of science and technology information organizations in Vietnam. However, the issue of innovation in scientific and technological information activities is also affected by certain measures related to the organizational model of scientific and technological information activities. Research shows that there are up to 05 different models of science and technology information organization currently existing in the science and technology information network in Vietnam, which affects the

process of standardization in terms of science and technology. Organization, operating model, and innovation in organization, process, product and marketing are considered barriers in the process of innovation in science and technology information activities in Vietnam.

From here, the problem of perfecting science and technology information policy is raised in order to overcome barriers in the innovation of scientific and technological information activities from the perspective of organizational model at the following points: Science and technology information organizations need to be consistent with the model of public non-business units with full operational processes according to the information and documentation chain, thereby creating a foundation for standardizing the organizational model. Stemming from this requirement, the study proposes the development of a Project on Science and Technology Information Law with provisions on consolidating and strengthening the network of scientific and technological information organizations in general and for with the scientific and technological information organization model in particular.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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