

Research Article

DEVELOPMENT POLICY ON THE INTERMEDIARY ORGANIZATION OF THE SCIENCE AND TECHNOLOGY MARKET IN SOME COUNTRIES AROUND THE WORLD - LESSONS FOR VIETNAM

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ABSTRACT

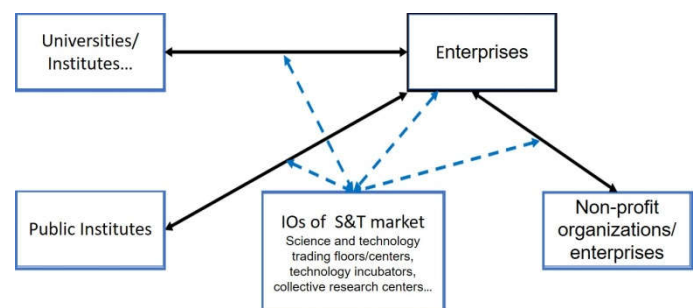
For Vietnam, science and technology (S&T) is the leading national policy, the foundation and driving force of industrialization and modernization, affirmed and thoroughly understood in many documents of the Party during the renovation period. For S&T to perform well in its leading role and driving force for socio-economic development, countries around the world, including Vietnam, often focus on developing the S&T market. The S&T market can be understood as a place where buying, selling, exchanging, and transferring ownership of technological goods occur; It also includes mechanisms and policies to allocate resources to ensure the smooth and successful transaction and transfer of technology goods. Aim to develop the S&T market, it is necessary to have technological goods, technology suppliers, technology demanders, technology intermediary institutions/organizations, and institutions to ensure the maintenance and development of the market. Experiences of countries around the world show that the formation/development of the S&T market intermediary organizations plays an essential role in developing the S&T market. However, the formation and development of the S&T market intermediaries depend on many factors. Therefore, for Vietnam to develop the S&T market intermediaries, it is necessary to summarize the experiences of other countries in order to draw lessons and develop the direction of intermediaries following Vietnam's conditions. For that purpose, the paper will aim to clarify the concept of the S&T market intermediaries, experience the formation and development of intermediaries in the S&T market in some countries around the world, and then give the lessons on the development S&T market intermediaries in Vietnam.

Keywords: Experience, science and technology market, science and technology intermediaries.

THE INTERMEDIARY ORGANIZATIONS' CONCEPT AND ROLE IN THE SCIENCE AND TECHNOLOGY MARKET

Intense international competition, high R&D costs, and increasingly complex goods and services have increased the uncertainty associated with an investment in innovation. These factors have contributed to the perception of more open innovation models (Chesbrough, 2003) and have also brought about dramatic changes in the role of higher education institutions (Etzkowitz, 2002; Audretsch và Phillips, 2007; Antonelli, 2008). These changes are accompanied by the simultaneous development of new ways of organizing funding (representing the growth of the knowledge sector), the emergence of advanced intermediate markets for knowledge (patents and licenses), and has created substantial institutional/institutional channels for the transfer of technological knowledge. S&T markets "are transactions for the use, diffusion and creation of S&T knowledge" (Arora, 2001). An S&T market is also where technology sellers (suppliers) meet technology buyers (demanders). The S&T market can be described as (i) Possible purposes for the transfer of existing technologies (e.g., IP market) or production/co-production of new technologies (e.g., based on bilateral contracts). (ii) Type of technology transaction. Technology transactions can take various forms, from pure licensing or the sale of well-defined intellectual property to complex partnership agreements involving technology development or performance technology "from scratch."(iii) The actors involved can be enterprises, individuals, universities, government agencies, and intermediary organizations of the S&T market.

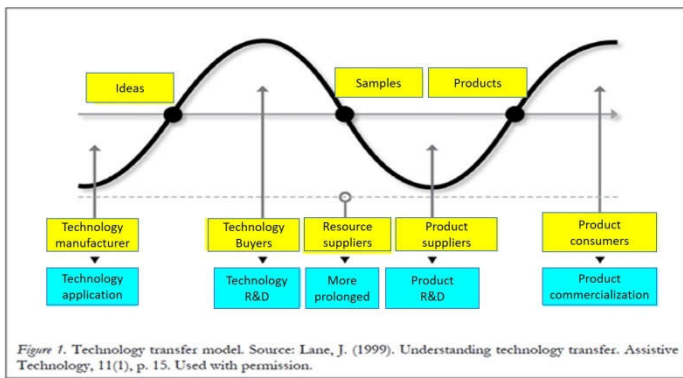
According to Howells (2006) view of the intermediary organization, the intermediary organization of the S&T market is an organization/agency/enterprise that acts as a broker/agent to promote/support the connection between R&D's technology and service providers and the Party wishing to use the R&D's technology and services. Meanwhile, in the opinion of André Spit oven and Mirjam Knockaert (2012), intermediary organizations can be organizations (Science and technology trading floors/centers, technology incubators, collective research centers, industry associations), enterprises that perform the function of connecting the suppliers of technology (Universities, research institutes; Public research organizations; Non-profit organizations/enterprises) and the demanders of technology (enterprises).



Source: André Spithoven & Mirjam Knockaert (2012)

Besides, the technology transfer model of Lean (1999) shows that intermediaries can appear in the entire process of technology transfer from the ideation stage to the product development stage and bring the product to market. At that time, intermediary organizations play the role of connecting parties in the technology transfer process. According to Lean (1999) point of view, the stakeholders in the S&T market include:

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Technology manufacturers: provider:	Universities, research institutes, and laboratories (public sector)
Technology Buyers:	Manufacturing enterprises; Government agencies (public sector)
Resource/resourcesuppliers:	Government agencies (funds, contracts, public insurance), private insurance companies (returns), market intermediaries (brokers), venture and angel capitalists (private investments)
Product suppliers:	Manufacturing enterprises
Product consumers:	Primary consumer (end-user) Secondary consumers (purchase and referral individuals or service providers)

Figure 1: Private sector labs - companies and independent inventors

The OECD (2005) points out that the intermediaries of the S&T market have become more numerous and diversified as the need for technology transfer and patent pricing has increased. In other words, intermediaries play an essential role in the innovation and development of the S&T market (see Figure 2).

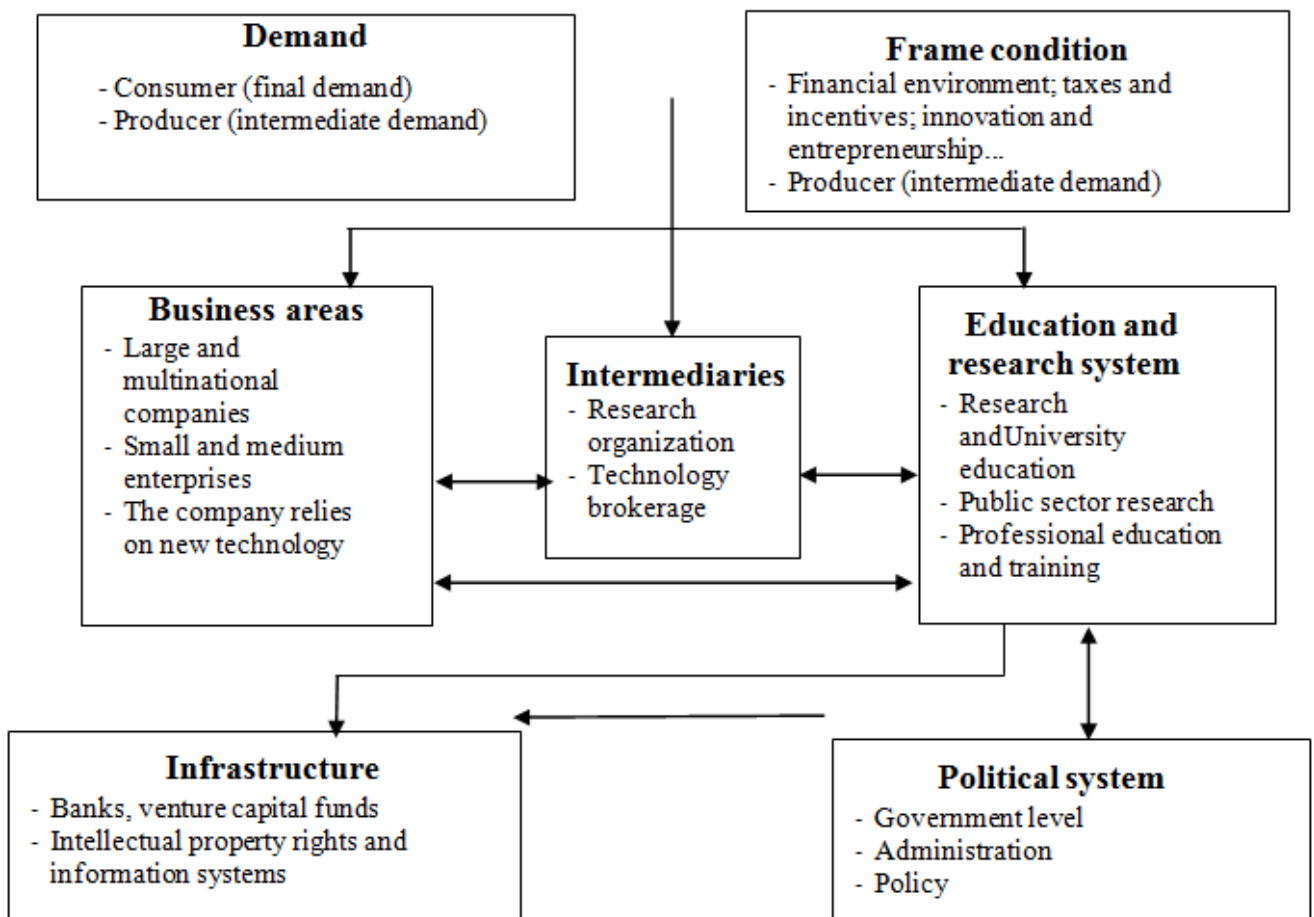


Figure 2: Technological intermediaries in innovation systems

Source: OECD (2005)

Besides, according to Intarakumnerd and Chaoroenporn (2013), the S&T market's Intermediaries could be:

- Technology research organization;
- Industry and Trade Association;
- Professional associations;
- Private establishments;
- Enterprises.

Furthermore, according to the approach between technology transfer and innovation, Frank Tietze and Cornelius Herstatt (2010) approach to the direction of science, technology, and innovation market, argues that the Technological Market Intermediaries (TMI) are organizations/agencies/enterprises acting as brokers/agents to promote/supporting the connection between technology providers, R&D service providers and the Party wishing to use technology and R&D services. Intermediary organizations participate in product research and development to supply/sell products to the market and innovate/improve the next generation of products.

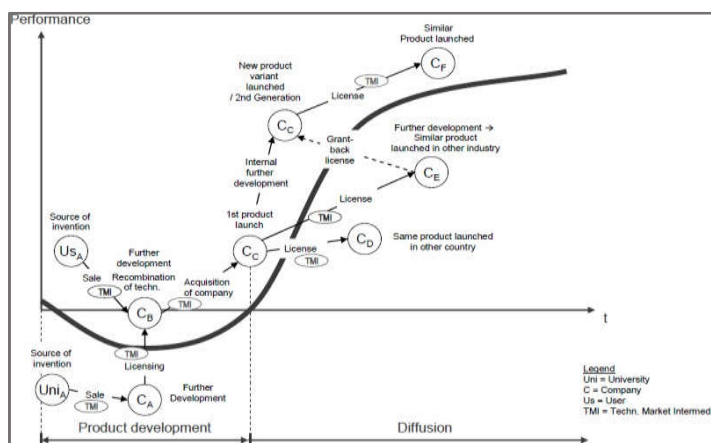


Figure 3: Participation of intermediary organizations

Source: Frank Tietze và Cornelius Herstatt (2010)

Thus, the intermediary organizations of the S&T market are seen as the 'most important bridge' to the national and regional innovation systems. An intermediary in the S&T market is defined as "an organization or entity that acts as a mediator in any aspect of technological innovation between two or more stakeholders, such 'broker' activities include: (i) helping to provide information about collaborators, (ii) brokering transactions between related parties, (iii) act as an intermediary to connect units and organizations that are willing to cooperate, (iv) advise, support and sponsor innovative technology products of cooperation between the parties" (Howells, 2006). Therefore, these intermediaries are the central policy for creating and maintaining thriving innovation ecosystems (Siv *et al.*, 2010). On the technical front, Intermediaries in the S&T market can work with inventors, manufacturers, and users, acting as a bridge between the parties and enabling joint activities to take place smoothly within a 'global innovation community' (Kivimaa 2014; Wang *et al.*, 2012). S&T market intermediaries in developing countries play an increasingly important role in connecting and adding value in bringing stakeholders together to create innovation (Watkins *et al.*, 2005). Accordingly, intermediaries in the S&T market are an essential tool in national innovation policies (Winch and Courtney, 2007).

Therefore, the S&T market intermediate is an organization/agency/enterprise that acts as a broker/agent to promote/support the connection between technology suppliers, R&D service providers, and parties wishing to use technology and R&D services.

SOME ISSUES IN THE DEVELOPMENT OF INTERMEDIARY ORGANIZATIONS IN THE SCIENCE AND TECHNOLOGY MARKET IN VIETNAM

In Vietnam, the intermediary organization of the science and technology market (starting now referred to as the intermediaries) is specified in Decree 76/2018/ND-CP and Circular 16/2014/TT/BKH & CN as follows: Article 30 of Decree 76/2018/ND-CP (effective from July 1, 2018) guiding the Law on Technology Transfer, has stated the concept of an intermediary organization as (i) an organization providing services of brokerage, consulting, promoting technology transfer, assessment, price appraisal, and technology assessment; (ii) organization providing connection services to support other parties in technology-related transactions, including services of research and development support, technology commercialization; intellectual property, standards, measurement, quality services; investment consulting, trade promotion, startup support, technology incubation, business incubation; organizations to support small and medium enterprises; cooperative alliances; Association of Occupation.

Circular 16/2014/TT/BKH&CN defines an "Intermediary organization as an organization providing services to connect and support suppliers, demanders and other parties in transactions related to technology, intellectual property according to the provisions of civil, commercial, investment, enterprise, science, and technology. This Circular also identifies six types of intermediary organizations in the Vietnamese technology market, including:

- Technology trading Exchange;
- Technology transaction center;
- Center for promotion and support of technology transfer activities;
- Center for intellectual property valuation;
- Center for Innovation support;
- Technology, science, and technology enterprises Incubators

Through events such as Technology supply and demand demonstration (Techdemo), Technology and equipment market (Techmart) and Technology trading Exchange, and Center for application and transfer of science and technology advances in the period 2015 - 2018, there were more than 1,200 contracts and minutes signed with a value of nearly 1,000 billion VND.¹ In the 2016 - 2018 period, nearly 1,000 supply-demand connection and investment connection sessions were organized for more than 5,000 organizations and enterprises² on new technologies according to the needs of enterprises and localities. Selected and introduced more than 1,500 processes, technologies, equipment, products, and research results of nearly 1,000 domestic and international enterprises, S&T organizations, Departments of Science and Technology of provinces, cities, and enterprises of 63 provinces and cities; has built a dataset of over 3,500 management scientists with 480 topics.³ Major events held on a national, regional, and international scale, including the technology and equipment market (Techmart), technology supply and demand demonstration (Techdemo) annually, and technology start-up festival (Techfest), have promoted technology and equipment trading activities, created the positive effect on the S&T market. The transfer of scientific research and technological development results between institutes, universities, and enterprises has made positive changes. Some results have also been formed from scientific tasks assigned by the State to host organizations or enterprises in need, typically the Vietnam Academy of Science and Technology, Hue University, Institute of Biotechnology. For intellectual property (excluding copyrights, related rights, and plant varieties), in the period 2015 - 2018, there were 2,267 transfer contracts between Vietnamese businesses and individuals and 206 contracts between Vietnamese enterprises and individuals from foreign countries, respectively, with 4,026 and 792 industrial property objects to be transferred.⁴ For the technology commercialization project group, in the period 2015 - 2019, the program focused on supporting the fields of agriculture, food technology, fisheries, mechanical engineering, electronics, nano, medicine, and pharmaceuticals for institutions, universities, and businesses. This is one of the project groups that have received a high response from participating organizations because currently, the

¹Synthesized from the Department of Technology Application and Development, the National Science and Technology Information Administration, the Market Development Department and S&T enterprises.

²Synthesized from the Department of Technology Application and Development, the National Administration of Science and Technology Information, the Department of Market Development and Science and Technology Enterprises.

³Statistics are from the tasks of promoting the development of the S&T market by 03 units of the Market Development Department and S&T enterprises; National Science and Technology Information Department; Department of Technology Application and Development.

⁴Synthesized from the National Office of Intellectual Property and the Department of Market Development and S&T Enterprises.

research results are only limited to the laboratory scale and require a step to support the transition to the market trial production phase and production on an industrial scale, conforming to standards for commercialization. The scientific and technological products supporting this group are almost 100% registered with intellectual property rights and fully calibrated technology to ensure eligibility to enter the commercial channel in the market. They were creating more goods for industrial production, creating products with many new technical characteristics, contributing to Vietnam's S&T market development. In addition, most of the projects are implemented in all localities across the country, especially in localities where there are local transfer centers, which have contributed to the formation and development of a network of the S&T market's intermediaries. Currently, there are more than 2,321 S&T cooperation and support organizations in Vietnam. Of which there are more than 60 application centers located in different provinces, there is a center for applying for S&T advances under the provinces' Departments of Science and Technology. The role of these Science and Technology Application Centers is to be the core organization, the key and vital force directly serving the state management of science and technology in the locality; The focal point to promote the transfer and application of advanced technology, develop S&T service activities, meet the requirements of production, business and state management of application and transfer of technology to create a driving force for local economic development. In this type of organization, the number of Research Institutes and Universities is vast, accounting for more than 1,621 units, but in fact, the contribution to the development of science and technology of this type of organization has not been studied intensely. In addition, more than 400 S&T enterprises are operating under the Law on Science and Technology across the country after ten years of the Government's decree on this type of enterprise being issued; compared with the expectation, the number of 400 S&T enterprises is not really as expected. In general, the S&T market in Vietnam and the intermediary organizations of the S&T market, in particular, have made positive developments in recent years due to taking advantage of the opportunities of the international economic integration process. This is explicitly shown in recent years in the scale and growth rate of the S&T market and S&T intermediaries in Vietnam. However, the policy of developing S&T intermediaries in Vietnam still has specific weaknesses that need to be overcome to improve the operational efficiency of S&T intermediaries, contributing to promoting the development of the S&T market in Vietnam. Some specific limitations are as follows:

Firstly, the definition of the intermediary organization of the S&T market is not clear.

Although Decree No. 08/2014/ND-CP and Circular No. 16/2014/TT-BKHCHN, Article 43 of the Law on Technology Transfer have defined S&T intermediaries, these definitions are not consistent and may lead to problems arising in practice. For example, Article 9 - Form and classification of science and technology organizations (Law on Science and Technology, 2013) does not have any regulations on S&T intermediaries. In addition, Circular 16/2014/TT-BKHCHN also stipulates that the naming of intermediary organizations shall comply with the provisions of Circular No. 03/2014/TT-BKHCHN dated March 31, 2014, on guiding conditions for the establishment and operation registration of S&T organizations, representative offices, and branches of S&T organizations. The question is whether the intermediary organizations of the S&T market are S&T organizations? This makes it challenging to prioritize and support the activities of these organizations. In addition, these definitions are inconsistent with the classification of the economic sector system in the national statistical system (Decision No. 27/2018/QĐ-TTg on the Vietnamese economic system), which makes it challenging to collect data to track

the effects of support policies and priorities. These shortcomings need to be corrected to suit the actual situation to improve the effectiveness of implementing policies on S&T market development.

Second, there is a lack of institutions and policies to develop intermediaries of the effective S&T market.

Although suggestions and guidelines on promoting the development of intermediary organizations of the S&T market have been mentioned in legal documents such as Law on Technology Transfer, Decree 08/2014/ND-CP, Decree No. 76/2018/ND-CP, translating them into concrete actions requires a transparent, clear, and easily enforceable institutional framework. Therefore, the Ministry of Science and Technology needs to have specific and detailed guiding documents to be able to quickly and conveniently form and develop intermediary organizations of the S&T market, and this leads to Next, it is necessary to supplement and complete Circular No. 16/2014/TT-BKHCHN dated June 13, 2014, of the Minister of Science and Technology stipulating the conditions for establishment and operation of intermediary organizations of science and technology market; review the naming of the intermediary organization following the provisions of Circular No. 03/2014/TT-BKHCHN dated March 31, 2014, of the Minister of Science and Technology guiding the conditions for establishment and activities licenses of S&T organizations, representative offices, and branches of S&T organizations.

POLICIES TO DEVELOP THE INTERMEDIARY ORGANIZATION OF THE S&T MARKET HAVE NOT CREATED A DRIVING FORCE FOR STAKEHOLDERS TO PARTICIPATE IN THE DEVELOPMENT OF THE S&T MARKET.

Although the Government has issued several mechanisms and policies to promote the development of the S&T market in general and S&T intermediaries in particular, these policies are either still new, so they have not had a clear impact, or are not attractive to enterprises, organizations and S&T to participate. Currently, incentives are regulated in many different legal documents. This makes it difficult for housing management agencies to implement the policy and, at the same time, makes it difficult for businesses to access and use the policy. The ambiguity and uniformity in policies also hinder and make it difficult for investors in science and technology. Therefore, organizations with the current S&T intermediary function either only operate in moderation or operate with many other functions. In particular, exchanges operate inefficiently due to a lack of resources, infrastructure, technology data, and human resources. Organizations with sufficient capacity to provide technology assessment, valuation, and assessment services are still limited, and technology transfer brokerage organizations in universities have not yet performed the role of intermediary in connecting technology suppliers from universities and institutes to the technology needs of enterprises; the number of qualified intermediaries providing decryption, support, mastering advice, technology commercialization services has not been much; there are few established innovation centers in universities, so it is difficult to form a network of these centers to promote technology-based start-ups. Therefore, it is necessary to effectively implement, amend, supplement and complete policies to promote the development of intermediary organizations, forming a network of capable organizations connecting entities on the S&T market. At the same time, it is necessary to have mechanisms and policies to support from the state budget to build technology infrastructure, to support the operation of intermediary organizations, the main pillars are national technology exchanges, centers supporting national start-ups, organizing training to improve the quality of human resources for

intermediaries, supporting material and technical foundations, databases, improving the capacity to exploit information and technology, intellectual property, results of scientific research and technological development in and outside country, promoting the performance of consulting services, brokerage, technology transfer promotion, assessment, valuation, and technology determination.

EXPERIENCE IN DEVELOPING INTERMEDIARY ORGANIZATIONS OF SCIENCE AND TECHNOLOGY MARKETS IN SOME COUNTRIES AROUND THE WORLD

The Belgian experience

In Belgium, collective research centers, which act as technology intermediaries, are funded by government and private sector support. Collective research centers were initially created to encourage S&T research in low-tech fields to improve productivity, quality, and production capacity. The main activities of these centers include (i) testing, analysis, and investigation; (ii) consulting and technology transfer; (iii) technical information system; (iv) standardization and certification; (v) technology tracking; and (vi) education and training following the Frascati Manual(OECD). Spit oven and Knockaert (2012) find that collective research centers are the only actors in the innovation system engaged in R&D and technology transfer; activities depend on the size, R&D budget, and the number of members to strengthen the ability to absorb technology for members. These centers are involved in R&D in cooperation with their member companies, providing member companies with a wide range of technology transfer services. Also, according to the statistics of Spithoven and Knockaert (2012), a total of 12 collective research centers in Belgium have performed the role of technology intermediaries in various industrial fields such as wood, ceramics, machinery, roads, construction, cement, textiles, diamonds, painting and painting, metallurgy, welding, and packaging. These are traditionally areas with low involvement in R&D. All companies in the above sectors are required members of the centers. Companies belonging to other industries are not required to become members of the Center. Although the centers are created at the industry initiative, they can still call for funding for specific activities, so there is a public-private partnership in maintaining and developing the centers. With a long history of development, collective research centers in Belgium have proven their ability to adapt to changing technology and business models. Thus, the experience of Belgium shows that, for the intermediary to develop, countries, including Vietnam, need to establish collective research centers by professions, especially those with many small and medium enterprises, to focus resources to promote scientific and technological research as well as promote transactions and transfer of science and technology to help enterprises improve productivity, quality, and competitive advantage.

The China experience

In China, S&T development has become one of the essential components of the national development strategy and many other programs. The transfer of S&T achievements is essential; however, it has been a weak point in China's national innovation system for a long time. China needs to accelerate the flow of knowledge and technology transfer, which requires commitment from the Government, universities, research institutions, and intermediaries (Miesing and Tang, 2018). The development of intermediary services in science and technology for the development of agriculture and industry and the development of the knowledge base has contributed to promoting the modernization process, improving the national strength and the general quality of the industries in China (Liu, 2017). According to Miesing and Tang (2018), the operating model of

technology transfer organizations in China mostly has an Administration department, a Consulting department, an Information department, a Marketing department, a Human Resources department, and other departments. Technology transfer organizations can be regional or sector-specific. China is very interested in developing intermediary organizations and broker systems to create relationships and connect suppliers and demanders. This system of intermediaries includes non-business units of the State, units of professional organizations, associations, and private organizations. The State facilitates private organizations or affiliated with professional organizations and associations operating by the self-accounting method and has tax incentives. State-owned non-business units in technology transfer intermediaries and brokers include centers of information, consulting, training, technology transfer brokers, technology trading exchanges, and production capacity development centers. These agencies have organizational models with different levels of market penetration, operate in a non-profit, part-accounting manner, and are funded by the State for regular operations and State activities requested or ordered according to the approved annual plan or order according to the approved annual plan. Revenues from services are spent on development investment and staff salaries. These units are heavily invested in infrastructure by the State. Currently, China has about 60,000 centers for information, consulting, and technology transfer brokers with over 1.2 million employees, performing the task of linking science and technology organizations with businesses. The Chinese State train officials were working as intermediaries and brokers. Thus, in order to promote the S&T market in general and develop S&T intermediaries in particular, Vietnam needs to continue to invest in infrastructure and provide funding in the form of orders for non-business units; at the same time, it is necessary to strengthen the training of human resources to perform intermediary activities between S&T organizations and enterprises.

The United States experience

Since the beginning, technology intermediaries formed in the context that the United States technology market was still very fragmented. The development of intermediaries in the United States S&T market is seen through:

Models of technology trade fairs in the United States

In the United States, the technology trade shows (TTS) model has had a recurring tradition and is held widely in the states. In particular, Consumer Electronics Show (CES) is considered by many experts to be the most significant technology fair not only in the United States but also open to the world technology community to participate widely. Organized in 1967 by the U.S. Consumer Technology Association (CTA), CES brings together demonstrations and introductions of technology related to consumer electronic products. Held annually for more than 60 years, CES has created a great attraction for itself, bringing together important names in the technology field to showcase updated achievements in the modern technology market. In addition, many other technology fairs in the United States focus on specific industries, such as HIMSS, which focuses on IT applied to healthcare, or OTC fairs, including seminars and Exhibits for the oil and gas industry. Many other small and medium technology events are also widely held across the United States. This is the fundamental premise for technology transactions to occur and helps determine the value of transactions.

Method of determining the value of technology transactions in the United States

Regarding the definition of 'transaction value,' Shailesh P. Sheth (2013) argues that transaction value includes any amount that the buyer is responsible for paying when purchasing goods. Therefore, determining the value of a technology transaction is very much dependent on having and establishing a vibrant technology market. Market factors play a considerable role here. Currently, most new research focuses on valuing technology based on cost-based, market-based, and cash-flow-based methods. Many researchers believe that transaction valuation is the next step after estimating the value of the technology. In the United States, the long-standing and robust development of technology intermediaries such as patent lawyers or patent agents helps technology products be quickly registered and into technology transactions. The value of the transaction now depends on the extent to which the seller and broker promote and introduce the technology, as well as the ability of the buyer to exploit the chosen technology. Hidden, off-the-shelf technologies are thoroughly valued at the transaction, often in secrecy between the parties before being finalized and made available to the public. Because of that nature, technology transactions take place over a relatively long time, carefully bound by specific terms between the parties involved. Today, a new trend in the technology market is that the value of some technology transactions can be determined through public patent auctions. In the United States, although it was first held publicly in 2006 in San Francisco, technology auctions have quickly been maintained and expanded, not only within the U.S. but also spreading to other areas such as Europe and Asia. The products participating in the auction are mostly technologies that come with the device. Although the first auction did not attract as much capital as expected, it still attracted the participation of big names such as GE, Microsoft, and AT&T. The modest success of this new form is to be expected when information about technology and registration fee to attend the auction is considered high. However, this is still a very new idea, hoping to make technology transactions happen faster, promoting the market to become more exciting. In addition, in some developing countries, including Vietnam, the determination of the value of technology transactions through customs through the import of technology from abroad is a standard method applied. Its advantage is simple and easy to define. However, the determination of transaction value through customs is superficial, asymmetric information when only the seller can most accurately grasp the actual value of the technology is? Some countries' customs rules can result in distorted import values that do not closely reflect the value of technology.

The Korean experience

In the context of the increasing desire of SMEs for technological innovation, the Korean Government established the Korea Technology Finance Corporation (KOTEC) in 1989. KOTEC operates as a non-profit credit guarantee organization subject to a particular ordinance, the "Ordinance on Financial Assistance for New Technology enterprises." "KOTEC is now a Korean professional organization that supports SMEs and joint ventures with new competitive technology at every stage of development. KOTEC's mission is to "Take the lead in transforming the Korean economy into creativity and innovation." The fund is usually aimed at SMEs with high technology content and high-risk level. KOTEC funds are provided mainly by the Government and financial institutions. As of 2015, KOTEC has accumulated capital of KRW 280 trillion, securing a comprehensive financial source for 70,000 enterprises. KOTEC is very active in creating a new growth engine for the Korean economy by improving the methods of financing technological innovation. KOTEC's primary services include (1) Technology guarantee; (2) Appraisal of technology; (3) Investment related to guarantee; (4) Compensation management. In addition, KOTEC also provides

several additional services such as technology and management consulting, and information technology innovation support in providing certifications in Venture and Inno-Biz, Green Technology, and Green Enterprise. SMEs are often assessed as high risk and vulnerable, so it is not easy to access funding sources. Understanding the difficulty of SMEs, KOTEC's Technology Guarantee service helps SMEs overcome difficulties in finding loans from financial institutions. KOTEC establishes technology guarantee programs and encourages financial institutions to lend loans to SMEs, even in cases where these businesses are unable to provide sufficient information on collateral or do not have appropriate financial records. KOTEC has launched an Electronic Information System and developed a self-analysis service to be fairer and more transparent. Customers enter their data into a credit rating simulation model to assess and diagnose their credit status. The results are fully publicized via the Internet. KOTEC has developed an intermediary service to enhance technology trading to find the most suitable technology for the requesting parties. This essential online service is called Kibo Technology Matching System (KTMS). This process is developed according to: *Firstly*, the technology appraisal center (TAC) branches of KOTEC will have a survey and consultation with the requester to determine the technology demand. Technology Assessment Centers (TACs) were established in 1997 as a specialized technology assessment organization to provide reliable technology assessments. TAC comprises 162 Ph.D. professionals, 593 technology appraisers, and 10 Certified Public Accountants (CPAs). The Center is available nationwide in 54 different locations. TACs help increase enterprises' access to KOTEC's financial support by assessing business and technology prospects and doing research to commercialize potential ideas and promote the entrepreneurship and development of SMEs. Enterprises can apply for technology appraisal in three categories: technology valuation, technology project commercial feasibility, and comprehensive technology appraisal. KOTEC has established the "Technology Assessment Certification System" to provide technology assessments for financial institutions, helping financial institutions to have a more comprehensive view of the technology potential and capabilities of enterprises, not just financial situation. In addition, KOTEC also provides Technology Rating Systems (TRGs) for technology assessment and risk measurement, business prospect assessment, and technology feasibility risks. To help SMEs in their respective growth stages, KOTEC also provides services such as consulting and support programs, start-up conferences, strategy development, M&A, technology transfer, and management consulting to connect entrepreneurs and professionals, using its customer database as a bridge to funding sources that guarantee credit for potential technologies. *Second*, the Technology Convergence Center (TCC) specializes in intermediary services that will communicate with the requesting Party both online and offline. The Center will use the KTMS online platform to search for the required technologies. *Third*, using KTMS, the technology convergence center will find the most suitable technologies for the requesting Party. Research institutes or SMEs develop most of the technology offered. The Center will assist with research, negotiation, and contract work if technology is appropriate. Finally, KOTEC will financially support the requester with loan guarantees for licensing, development, and production. As of 2016, there were 239,057 proposals and 999 requests for records requested at the KTMS website. In 2014, KOTEC achieved the most significant achievement since it first entered the technology transfer business in 2001, with 166 technology transfers for 254 successful technologies. The number of technology transfer contracts in 2015 increased by 57.8% compared to 2014. In 2014 and 2015, under the development of KTMS, 710 technologies were transferred and licensed to Korean small and medium enterprises. KTMS is also a great tool for foreign organizations or companies looking for cutting-edge Korean technology. This system allows the requesting Party to

find the most appropriate technologies. In addition, KOTEC will ensure technology and financial support for Korean companies to cooperate with foreign organizations and companies. Thus, to promote the S&T market in general and form intermediary organizations for the S&T market in particular, the Korean Government has formed KOTEC. KOTEC's mission is to "Take the lead in transforming the Korean economy into creativity and innovation." KOTEC funds are provided mainly by the Government and financial institutions. Funds are often aimed at SMEs with high technology content and a high level of risk. KOTEC has developed an intermediary service to enhance technology trading to find the most suitable technology for the requesting parties called KTMS (Kibo Technology Matching System). This is also a lesson learned for Vietnam to develop the S&T market; it is necessary to promote technology-based e-commerce platforms. It is necessary to continue to build/complete a technology data system for the suppliers, and the demanders readily participate/connect on S&T.

LESSONS LEARNED FOR VIETNAM ON THE DEVELOPMENT OF INTERMEDIARY ORGANIZATIONS IN THE SCIENCE AND TECHNOLOGY MARKET

Firstly, in order to develop the science and technology market in general and to form/develop the intermediaries of the S&T market in particular, Vietnam needs to concretize activities related to the S&T strategy, in which special attention is paid to clarifying the national technology development roadmap and the national action plan on S&T including market development plans and development of intermediaries; *Second*, following the Belgian experience, out of a total of 12 collective research centers in Belgium, which have performed the role of technology intermediaries in various industrial sectors such as wood, ceramics, machinery, roads, construction, cement, textiles, diamond, painting, metallurgy, welding and packaging. These are traditional areas with low involvement in R&D. All companies belonging to the above sectors are mandatory center members. Thus, for Vietnam to form and develop intermediaries of the S&T market, the Government should prioritize/focus resources on establishing centers/GSOs by industry/field that Vietnam has strengths and opportunities to develop the technology. Besides, based on Korea's experience, these intermediaries have a team of leading experts, whose resources are concentrated by the State to carry out technology search, technology, verification development, technology assessment, and intellectual property certification. *Third*, the Government should consider intermediaries of science and technology to be specific organizations with their policies and mechanisms. According to the Chinese model, that is seen as delegating tasks, not financing, for organizations to operate and compete fairly, thereby promoting the development of the technology trading market. Funds/budgets are needed to assign tasks to S&T intermediaries through the number of technologies researched and applied to the production practices of enterprises. *Fourth*, in the same way that China's intermediaries do, Vietnamese intermediaries should be financially self-sufficient in promoting the development of the technology trading market, such as: connecting supply and demand, looking for partners who have needs in buying and selling technology, implementing a regime of transparency and disclosure of technical information for the convenience of parties in need. *Fifth*, based on the experience of the United States, it is necessary to focus on organizing national technology trade fairs on the national scale or in the North, Central and South not only on the domestic scale but also to attract the participation of the world technology community. In particular, it is necessary to attract essential enterprises in the technology field to introduce updated achievements in the modern technology market. In addition, many other technology fairs that should focus on specific industries include industry-specific seminars and exhibitions. Many

other small and medium technology events should also be widely held across the country. This is the fundamental premise for technology transactions to occur and thereby form/develop intermediary organizations of the S&T market. *Sixth*, it is necessary to continuously train a team of highly qualified and skilled human resources and send them to learn and experience in countries that have succeeded in developing intermediate organizations of S&T centers. There is a worthy remuneration regime for individuals and collectives to maintain the sustainable development of the intermediary organization of the S&T market.

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