SOME GENERAL ISSUES ON KNOWLEDGE TRANSFER FROM UNIVERSITY TO PRACTICE

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Abstract:

The transfer of knowledge from universities to production and business activities is a key factor in promoting the knowledge economy. In the context of digital transformation and the intensification of global connectivity, this process is becoming more accessible and effective. This article analyzes the factors affecting knowledge transfer between universities and enterprises, including the academic environment, business strategy, and government support policies. In particular, the article emphasizes the role of digital technology, public-private partnership models, and innovation strategies in promoting this transformation process. The study also highlights the current situation, along with the opportunities and challenges that stakeholders face in the process of applying academic knowledge to practice. Based on this, it proposes solutions to enhance knowledge transfer activities. The article also provides practical lessons from both an international and Vietnamese perspective to guide future strategies.

Keywords: *Knowledge; Knowledge transfer; Technology; Digital technology; University-Enterprise Cooperation; Innovation; Entrepreneurship.*

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1. Introduction

In an era where knowledge is considered the most valuable asset, the transfer of knowledge from the academic environment to production and business practices has become an priority issue. The successful application of scientific research in daily life not only contributes to economic growth and enhances national competitiveness but also helps address social challenges such as climate change, healthcare, and sustainable development.

However, the process of knowledge transfer still faces many obstacles. The differences in language, culture, and objectives between researchers and businesses often lead to difficulties in understanding and evaluating the value of research. Issues related to information security and intellectual property rights are also major barriers, making researchers hesitant to share their findings. A lack of financial resources, infrastructure, and supportive policies further limits progress. Facing these challenges, this study aims to achieve the following objectives:

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First, the article will analyze the concept and role of knowledge transfer at universities in the development of a knowledge economy; at the same time, it will analyze in depth the common forms of knowledge transfer today, such as research cooperation, technology transfer, startups, and training.

Second, it will assess the current status of knowledge transfer activities at universities in Vietnam and explore the challenges that this process is facing.

Third, the article will present emerging trends and opportunities in knowledge transfer, especially in the context of the Fourth Industrial Revolution and the rapid development of digital technologies.

Finally, based on the current situation, opportunities, challenges, and prevailing trends in university-based knowledge transfer, the article will propose feasible solutions to promote this activity.

2. Knowledge transfer in the current context

2.1. Concept and role of knowledge transfer

Knowledge is a collection of information, experience, skills, and understanding that humans accumulate through learning, experience, and interaction with their surrounding environment. According to Nonaka & Takeuchi (1995), knowledge can be classified into two main types: explicit knowledge and tacit knowledge. Explicit knowledge can be recorded, stored, and communicated easily, such as in books, research reports, and technical documents. Meanwhile, tacit knowledge is a type of knowledge that is difficult to convey in writing and is highly personal, often including skills, experience, and instincts. Knowledge can also be structured into a system to help organize information and support the development of practical applications. In knowledge transfer, the identification and effective exploitation of both explicit and tacit knowledge play an important role in the process of technology application and innovation in enterprises. From the research perspectives of scholars across different fields of study, knowledge transfer is viewed and valued differently, with varying roles and interpretations.

From the perspective of academic institutions, knowledge transfer is understood as the process through which universities and research institutes share their research findings, expertise, and specialized knowledge with businesses and the wider community. According to Perkmann et al. (2013), this activity includes not only joint research projects but also expert consulting, technology transfer, and other collaborative initiatives. Universities often utilize technology transfer offices to manage and promote this process effectively.

From the perspective of strategy and business, knowledge transfer is considered a key factor in developing sustainable competitiveness for businesses. Chen & Huang (2009) emphasize that knowledge transfer is not only about information sharing but also a strategic process that enables organizations to integrate new knowledge into their operations to improve their ability to innovate and respond flexibly to market changes. This type of knowledge transfer often requires businesses to have strong knowledge management capabilities and effective processes to exploit external knowledge.

From a practical perspective of cooperation, according to D'Este & Patel (2007), knowledge transfer from universities to businesses is a complex process that includes not only the transfer of mature technologies but also the sharing of tacit knowledge, which is difficult to codify or transmit through written documents. D'Este and Patel argue that the effectiveness of knowledge transfer often depends on the level of practical cooperation and the development of long-term relationships between researchers and business partners.

From the perspective of organizational knowledge management, Easterby-Smith & Lyles (2011) argue that knowledge transfer is a process involving the identification, codification, storage, and transfer of knowledge from one organization or individual to another, with the aim of enhancing organizational capability. This process requires coordination across multiple departments to create a favourable ecosystem for knowledge to flow, circulate, and be applied in practice.

From the perspective of innovation and economic development, Pereira & Mellahi (2021) affirm that knowledge transfer is a key innovation driver in high-tech industries and emerging economies. According to the authors, policies and regulations can play a decisive role in building the infrastructure and the collaborative models that are necessary to promote this process. Successful examples show that economies with mechanisms that encourage university–industry linkages tend to grow faster due to their ability to apply knowledge in practice.

From an international perspective and knowledge globalization, the World Bank (2020) points out that in the context of globalization, knowledge transfer occurs not only at the national level but also across borders, with cooperation between organizations in many different countries. This allows businesses and organizations to learn from international practices, thereby enhancing global competitiveness. Knowledge transfer from an international perspective requires an ecosystem that includes supportive policies, cultural adaptability, and international networking skills.

In summary, knowledge transfer is a process of communicating, sharing, and applying knowledge from academic institutions such as universities to businesses. Davenport & Prusak (1998) emphasize that knowledge transfer is not only about providing information but also includes the process of applying knowledge into practice to create new value. Knowledge transfer in the modern context often aims to help optimize production processes, improve products, and enhance business efficiency.

The role of knowledge transfer in the economy is becoming increasingly important, especially in the context of globalization and the Fourth Industrial Revolution . Research by Bozeman (2000) shows that enterprises that actively participate in the process of transferring knowledge from universities have higher innovation capacity than those that do not participate. Knowledge transfer not only helps enterprises increase their competitiveness but also promotes innovation, thereby bringing added value to society.

2.2. Current context

In the context of globalization and the Fourth Industrial Revolution, knowledge transfer from universities to the manufacturing and business sectors is increasingly

becoming an essential factor to promote innovation and sustainable growth. Specifically, important factors in the current context include:

The development of digital technology and the Fourth Industrial Revolution

Digital technology is making a big step forward in knowledge transfer, especially in areas such as artificial intelligence (AI), the Internet of Things (IoT), and Big Data. According to OECD (2019), these technologies not only expand the scale and speed of knowledge transfer but also change the way knowledge is created, shared, and applied in practice. Universities and businesses are increasingly using digital platforms to connect, exchange, and collaborate on research projects. This helps to bridge the gap between theory and application, facilitating the introduction of new inventions into the production process.

Globalization and international competition

Globalization has created strong pressure for businesses and national economies to improve their innovation capacity and apply international knowledge to development. According to the World Bank (2020), countries can enhance their competitive advantage by promoting knowledge transfer from leading research institutes and universities. Globalization also opens up opportunities for universities to cooperate with multinational enterprises and access international markets, thereby increasing the influence of academic knowledge in global production sectors.

The rise of public-private partnerships

Public-private partnerships (PPPs) are becoming a prominent trend to promote knowledge transfer from universities to businesses. Perkmann et al. (2013) point out that university-industry collaboration projects are often more effective when the state is involved through financial support programs, tax incentives, and intellectual property protection regulations. The state plays an important role in creating a favourable environment for knowledge transfer, helping collaborative projects develop and bring about practical benefits.

Changes in policies to support innovation and sustainable development

Many countries are introducing policies to prioritize and support innovation and knowledge transfer from universities. These policies include research funding, incentives for collaborative projects with businesses, as well as start-up programs. Pereira & Mellahi (2021) suggest that, with government support, universities can enhance knowledge transfer through mechanisms such as spin-off companies and business incubators, which help generate new products and technologies that contribute to sustainable development.

The need to improve competitiveness in the context of economic crisis and fluctuations

In the context of economic volatility and the challenges posed by the pandemic in many countries, knowledge transfer has emerged as a solution for businesses to maintain competitiveness and explore new development opportunities. Chen & Huang (2009) emphasize that applying knowledge from universities enables firms to enhance efficiency, improve production processes, and develop new products, thereby responding to market demands more flexibly and sustainably.

The above factors have changed the way and requirements for knowledge transfer in today's era. It is this new context that has made cooperation between universities and businesses more essential than ever, presenting both unique opportunities and challenges. This places demands on all parties involved, not only in terms of cooperation capacity but also in terms of adaptability and continuous innovation throughout the knowledge transfer process.

3. Forms of knowledge transfer

In today's academic and industrial environments, knowledge transfer takes on diverse forms, ranging from traditional methods to deep collaborative approaches, including: networking and partnership building, co-organizing conferences and seminars, teaching, co-authoring and publishing research, secondment of researchers/research teams, sharing facilities, providing scientific and technological services, and commercializing inventions and technologies, establishing and incubating S&T spin-offs under universities... These forms not only support innovation in production but also help businesses promptly grasp new technology and knowledge trends from universities. Below are some common forms of knowledge transfer:

3.1. Research and Development (R&D) Collaboration

R&D collaboration is one of the most important forms of knowledge transfer from universities to businesses, allowing both parties to jointly conduct research projects or develop new products and processes. According to Siegel et al. (2003), R&D collaboration promotes the transition from basic research to practical applications through the sharing of resources, information, and benefits. A typical example is the development of renewable energy technology in Europe, where collaborative projects between universities and businesses have helped improve the efficiency and competitiveness of this technology (*Cunningham & O'Reilly, 2018*). These collaborations contribute not only to economic growth but also help businesses meet the demands of innovation and sustainable development.

This process requires close coordination between parties to achieve efficiency, from determining research objectives, allocating resources, to managing progress and evaluating results. D'Este & Patel (2007) also emphasize that the participation of enterprises in R&D projects helps universities orient their research activities in a more practical way, promptly responding to the technological innovation needs of enterprises.

3.2. Technology transfer

Technology transfer is a key form of knowledge transfer, helping to convert university inventions and innovations into products or processes that have practical applications in enterprises. This process may include licensing the use of technology or selling intellectual property rights to enterprises. Bercovitz & Feldman (2006) point out that technology transfer offices at universities play a key role in facilitating this process by providing legal, financial, and intellectual property management support.

According to OECD (2019), technology transfer involves experts from both sides, including sharing technical documents, training, and support for the implementation of new technologies. To ensure success, universities often provide training and technical support to help businesses have enough knowledge and skills to apply technology to the production process.

A typical example is that universities in the United States and Europe have established support centers and technology transfer offices to promote the application of scientific research to production practices. In Vietnam, many universities have also established technology transfer offices and technology centers to support the knowledge and technology transfer from universities to external businesses.

3.3 Startups and spin-off companies from universities

Spin-off companies from universities are a emerging form of knowledge transfer, and are encouraged to commercialize valuable research results. According to Shane (2004), spin-off companies often take advantage of the knowledge, financial support, and research environment from universities to develop new products. In addition, Mathisen & Rasmussen (2019) also argued that spin-offs promote innovation and create new competition in the market, thanks to the ability to adapt and develop from scientific research. Spin-offs not only help enhance knowledge transfer but also contribute to the creation of high-quality jobs and improve national competitiveness. University spin-off companies have experienced significant growth, bridging the gap between research and application.

Examples of this model are companies such as Google and Genentech, both of which originated from university research and have grown into world-leading corporations. According to Clarysse et al. (2008), spin-off companies play an important role in promoting innovation and economic growth, especially in developed countries. In Vietnam, startups and spin-off companies from universities have been growing strongly, especially in fields such as information technology and life sciences. For example, the Center for Technology Business Incubation of Ho Chi Minh City University of Technology (HCMUT-TBI) has supported the development of a series of high-tech startups, and BK Holdings of Hanoi University of Technology specializes in artificial intelligence and software products.

3.4. Training and consulting

Training and consulting are forms of knowledge transfer that support businesses, especially when businesses need to improve their technical capacity or access new knowledge in their specialized fields. This form helps businesses improve their capacity. According to Bozeman & Boardman (2014), training programs from universities, including short courses, seminars, and consulting services, not only transfer knowledge but also foster strong, long-term cooperative relationships with businesses.

Universities and businesses can sign consulting contracts to solve specific technical or process problems in production. Santoro & Bierly (2006) argue that training and consulting programs not only improve production efficiency but also build a sustainable knowledge transfer ecosystem between universities and businesses.

In Vietnam, many universities have implemented training and consulting programs tailored to the needs of businesses, aiming to transfer knowledge directly. FPT University is a typical example when it cooperates with businesses in the information technology sector to provide training programs on programming and Big Data management for FPT Corporation's employees. This helps to enhance the skills and capabilities of the corporation's workforce, while also updating advanced technologies that students and employees can immediately apply to their work.

4. Status and challenges of knowledge transfer

4.1. Status of knowledge transfer in Vietnam

University-enterprise cooperation: Progress but still limited

In recent years, Vietnam has made certain progress in university-enterprise cooperation through joint research programs and cooperative projects sponsored by the Ministry of Science and Technology. However, the number of universities engaging in cooperation remains low, especially in high-tech industries. According to data from the Ministry of Science and Technology (2023), only about 20% of universities have research cooperation activities with enterprises, mostly concentrated in areas such as information technology and biomedicine. However, most of the cooperative projects are only at the pilot-experimental level, not reaching the commercialization stage (*Hoang Giang, 2024*). Some notable collaboration models, such as the Technology Business Incubation Center of Ho Chi Minh City University of Technology or partnership programs at Hoa Lac High-Tech Park, have been implemented, but their scale remains limited.

The reason lies in the lack of consensus on objectives between universities and enterprises, which often results in projects failing to meet both parties' expectations. Companies remain hesitant to engage in collaboration due to concerns over intellectual property rights, high costs, and lengthy project timelines.

Limited financial resources and professional human resources

Vietnam's current R&D spending ratio is only about 0.42% of GDP, significantly lower than other countries in the region, such as Thailand (1.3%), Singapore (2.2%) (*OECD, 2022; World Economic Forum, 2020*). This has led to a lack of funding for many universities and research institutes to implement knowledge transfer projects. Staff at university technology transfer offices often lack practical experience, resulting in limited effectiveness in connecting with businesses. As a result, many research projects with application potential are not developed into commercial products due to a lack of capital. The workforce also lacks essential skills in knowledge management and negotiating collaborations with businesses.

Incomplete legal framework

According to Perkmann et al. (2013), in developed countries, clear legal frameworks regarding intellectual property and benefit-sharing have helped promote more effective university-enterprise cooperation. In contrast, in Vietnam, the lack of transparent regulations has slowed down the progress of many cooperation projects

(*World Bank, 2020*). Currently, regulations related to intellectual property protection in research cooperation are unclear, leading to many disputes and reducing trust between parties. Tax and fee incentives for enterprises engaging in collaborative research have not been widely implemented, reducing the private sector's motivation for participation.

As a result, the approval and implementation process for research projects in Vietnam is often prolonged, leading to a waste of time and resources . There is also a lack of strong incentive mechanisms for universities to commercialize research outcomes.

Digital transformation has not kept pace with global trends.

A report by the World Economic Forum (2022) shows that only about 30% of small and medium-sized enterprises (SMEs) in Vietnam integrate digital technology into their production and business activities, which hinders the reception and application of research results from universities. Digital platforms supporting connections between universities and businesses are lacking, leading to limited information sharing and research coordination. Consequently, SMEs lack both the capability and financial resources to invest in digital technology and modern R&D solutions. There are no specialized digital ecosystems for knowledge transfer.

4.2. Challenges in knowledge transfer

Transferring knowledge from universities to production and business is a complex process and faces many obstacles. These barriers not only stem from differences in goals and approaches between the two sides but also from institutional, management, and resource limitations. Below are some of the main barriers.

Cultural differences between academic and business environments

Cultural differences are one of the main barriers that make cooperation between universities and businesses difficult. While universities prioritize long-term goals such as publishing research results, businesses focus on short-term solutions that bring immediate financial benefits. These differences make it difficult to shape common goals and cooperation mechanisms.

For example, research by Ankrah & AL-Tabbaa (2015) shows that university researchers often have difficulty aligning their research with market needs, leading to an imbalance in goals between the two. To address this problem, some countries have established intermediary units, such as innovation centers, to bridge the gap in culture and goals between universities and businesses.

In Vietnam, many universities have established knowledge transfer centers, such as Hanoi National University, which has launched the Knowledge Transfer and Entrepreneurship Supporting Center (VNU-CIC), which acts as a bridge to promote cooperation between researchers and businesses. This center not only organizes seminars to enhance mutual understanding but also supports both sides in adjusting cooperation goals to meet practical needs.

Confidentiality and intellectual property rights

Confidentiality and intellectual property rights are always sensitive issues in the process of knowledge transfer. Businesses are often concerned about the risk of information leakage when cooperating with universities, especially in highly competitive industries.

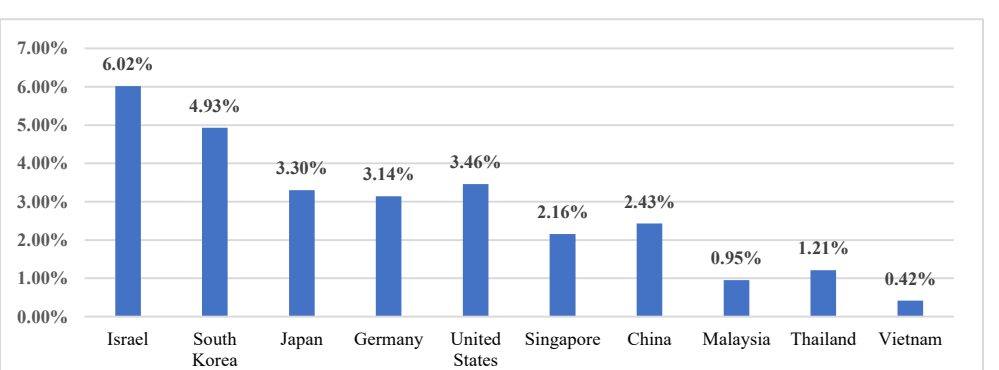
Research by Perkmann et al. (2013) shows that disputes related to intellectual property rights not only slow down the progress of transfer projects but can also lead to the cancellation of cooperation. A common solution is to establish clear contracts on intellectual property rights from the beginning, which clearly define the rights of the parties and measures to handle disputes.

In Vietnam, some large universities such as Hanoi University of Science and Technology and Hanoi Law University have also developed internal regulations on intellectual property management to ensure the rights of both researchers and businesses. However, smaller universities still face difficulties in implementing these regulations due to a lack of resources and expertise.

Resources and Finance

Limited resources, both financial and human, are among the biggest barriers to knowledge transfer projects. In Vietnam, the budget for research and development (R&D) remains low relative to to other countries in the region. According to the report of the Ministry of Science and Technology in 2023, investment in R&D in Vietnam is 0.4%, lower than the average level of Southeast Asia, ranked 66th globally, a drop of 7 positions compared to the previous year. Meanwhile, countries in the same region have increased investment capital in this activity, made notable progress in the 2023 rankings, and quickly climbed up in the rankings table, such as Thailand 1.3% (up 4 positions), Singapore 2.2% (up 3 positions), and Malaysia 1% (*Hoang Giang, 2024*).

Investment in R&D is an important indicator reflecting the priority level of each country for innovation. According to updated data up to 2022, the R&D spending ratio of some countries is as follows:



Comparing Vietnam's R&D investment level with some countries in the world (The data is compiled from sources such as Statista and Trading Economics, with data updated to 2022)

Vietnam currently has a significantly lower R&D spending ratio than other countries in Southeast Asia and the world. This shows the need to increase investment in R&D to enhance competitiveness and catch up with global innovation trends.

For example, Israel - the country with the highest R&D spending ratio in the world (6.02%) has built a strong startup ecosystem, becoming the "Startup Nation". Similarly, South Korea, with a ratio of 4.93%, has achieved remarkable achievements in high-tech industries such as electronics and automobiles.

This has led to a situation where many universities do not have enough resources to implement applied research projects. Some projects have to stop due to a lack of funding, while businesses are reluctant to invest in high-risk research.

One solution applied in many countries, including Vietnam, is to establish public-private funding to provide financial support for knowledge transfer projects. For example, the National Technology Innovation Fund (NATIF) has funded hundreds of R&D collaborative projects between universities and businesses.

5. Trends and opportunities in the current context

5.1. Knowledge transfer in the digital age

Knowledge transfer in the digital age is an irreversible trend, driven by advances in information and communication technology. The digital age has changed the way knowledge is created, shared, and applied through digital tools and platforms, thereby bringing outstanding efficiency to both universities and businesses.

Tools such as artificial intelligence (AI), big data, and cloud platforms have created a favourable environment for real-time knowledge sharing. Innovation ecosystems such as the Vietnam National Innovation Center (NIC) in Vietnam have used online tools to connect universities and businesses, facilitating R&D collaboration regardless of geographical distance.

Online learning platforms and research portals such as ResearchGate, Google Scholar, or even ERP systems are used by businesses and universities to synchronize research data and manage collaborative projects. According to Whelan et al. (2013), digital platforms help create more effective collaboration spaces by reducing information barriers and accelerating the collaborative decision-making process.

Currently, many universities and enterprises in Vietnam participate in international cooperation programs such as Erasmus+ and Horizon Europe to enhance their knowledge-sharing ability. For example, Hanoi National University has cooperated with international partners to develop AI projects, taking advantage of resources and knowledge from developed countries.

Although digital technology brings many opportunities, small and medium-sized enterprises in Vietnam still face barriers in accessing digital solutions due to financial and technological capacity limitations. According to the World Economic Forum report (2020), only about 30% of enterprises in Southeast Asia, including Vietnam, integrate digital technology into R&D activities, showing a large gap that needs to be filled through support policies.

5.2. Some new cooperation models

Developing the public-private partnership (PPP) model

The PPP model is a prominent trend in knowledge transfer, connecting public and private resources to solve practical problems. This is not only a way for businesses to access new knowledge but also a way that helps universities apply research into practice. The Collaborative Industry Projects (CIP) program in Singapore has made universities strategic partners of businesses in more than 300 projects since 2010 (*Tan et al., 2021*). In Vietnam, business incubation centers such as Saigon Innovation Hub have also been successful in connecting research projects from universities with startups.

Connecting networks between universities and businesses

In Europe, the Erasmus+ Knowledge Alliances program not only provides finance but also creates a platform for students, lecturers, and businesses to collectively solve practical challenges. According to the European Commission (2018) report, the programme has created more than 10,000 internship opportunities and joint research projects with a success rate of up to 85% in product commercialization.

Research and Incubation Collaboration

One of the prominent trends in knowledge transfer is the model of cooperation between universities and enterprises through incubation centers. These centers not only help transfer basic research into practice but also support startups to develop products and technologies from scientific research.

Open Innovation Model

The open innovation model allows universities and enterprises to share resources and knowledge, not limited within the organization, but expanding beyond the traditional boundaries of that organization. This is a way for universities to cooperate with many different enterprises, thereby creating more innovations and promoting knowledge transfer.

Global Knowledge Transfer Model

This model focuses on building international collaborative networks where universities and businesses from many countries can share knowledge and research. These networks regularly organize seminars, forums, and academic exchanges to facilitate more effective knowledge transfer.

The Global Innovation Index (GII) is a good example of how countries and businesses in developed and developing economies are connecting to promote global knowledge transfer. Universities in the GII network often collaborate with global technology companies to develop innovative initiatives.

5.3. Innovation in Macro policies

The role of government in facilitating knowledge transfer

Governments play an important role in investing in research and development, building a legal environment, and supporting innovation initiatives. These policies create strong incentives to promote technology transfer from universities to businesses. A study by the OECD (2015) shows that government support for research and development activities in universities and businesses is a decisive factor in creating innovative technologies and promoting economic development.

According to Forbes (2020), the innovation environment needs to have a combination of factors such as finance, infrastructure, and the legal environment. The government needs to develop supportive policies to create favourable conditions for knowledge transfer and promote innovation initiatives.

Policies to encourage university-industry collaboration

Policies that promote collaboration between universities and businesses can bridge the gap between academic research and industrial production, while also driving innovation. A study by the European Commission (2019) shows that public-private partnership is an important tool to enhance collaboration between universities and businesses and promote the development of the knowledge economy.

Governments can encourage businesses to invest in R&D through preferential tax policies. Deloitte (2021) shows that countries such as the UK, the US, and Canada have been successful in promoting R&D investments through tax incentives for businesses.

Macro policies facilitate technology transfer from universities to production realities.

Policies that support intellectual property protection, promote research-based startups, and provide financial support for startups play an important role in creating a mechanism for technology transfer from universities to production. According to the World Intellectual Property Organization (WIPO), intellectual property protection policies are very important in ensuring the technology and knowledge transfer from universities to production realities. This protection helps researchers and startups feel more secure in product development and commercialization *(WIPO, 2020).*

A study by Harvard Business Review shows that policies that encourage research-based startups in universities help increase the technology commercialization ability and promote innovation *(Harvard Business Review, 2018).*

6. Solutions to promote knowledge transfer from universities in Vietnam

From the current situation, challenges, and trends in knowledge transfer from universities, the authors propose a number of solutions for knowledge transfer in the current context.

6.1. Strengthening cooperation between universities and enterprises: Shaping strategic linkages

Specialized connection model. Establish university knowledge and technology transfer centers at each university to operate as "one-stop" offices to support researchers and enterprises in finding suitable partners. These centers will have the following tasks: Supporting the commercialization of research results; Organizing seminars and exhibitions to promote technology; Acting as an intermediary to help resolve conflicts over intellectual property rights.

Promote public-private partnership (PPP) projects. Encourage the participation of both the public and private sectors in research projects. Governments should support through grants or tax incentives. For example, Singapore has implemented the Collaborative Industry Projects (CIP) program, which provides financial support for projects between universities and businesses, resulting in more than 300 successful projects in the fields of artificial intelligence and biotechnology (*Tan et al., 2021*).

Strengthen engagement through education and practical training. Integrate long-term internship programs for students at businesses to connect research to production practice. For example, Hanoi National University cooperates with FPT to organize programming and big data management training courses, which help students access modern technology and businesses find suitable human resources.

6.2. Financial investment and resource development

Establish a National Public-Private Research Fund. This fund will finance applied research projects with commercialization potential. Operational mechanism:

- For the state: Contribute initial capital and maintain long-term support;

- For enterprises: Participate in capital investment at a certain rate, and enjoy tax incentives when the project is successful.

For example, Israel, with an R&D investment fund accounting for 6.02% of GDP, has built a strong startup ecosystem, becoming a "Startup Nation" (*Statista, 2022*).

Increase the R&D budget to 1% of GDP within 5 years. The government needs to commit to increasing spending on science and technology research, at least reaching the average level of the Southeast Asian region. This will not only help improve domestic capacity but also create motivation to attract foreign investment.

Developing specialized human resources. Organize specialized training programs for staff at knowledge transfer offices. Training content should include: Project management skills, Cooperation and negotiating skills with businesses, and Intellectual property management.

6.3. Perfecting support mechanisms and policies

Legal framework on intellectual property. Issue clear regulations on intellectual property rights in collaborative projects, ensuring the interests of both researchers and businesses. This helps minimize conflicts and increase trust in collaboration.

For example, Korea applies a “profit-sharing” policy, in which businesses receive the right to use patents, and universities receive a portion of the revenue from the products.

Financial incentives and tax policies. Provide preferential tax policies for businesses investing in university research projects. Some incentives include: 30% reduction in corporate income tax on R&D expenditures; Exemption from import tax on technological equipment used in collaborative projects.

Speed up the project approval process. Simplify the registration and implementation procedures for research projects, minimizing the time from submitting a research proposal to project approval for implementation.

6.4. Promote digital transformation in knowledge transfer

Build digital connection platforms. Develop online portals to support: research data sharing between universities and businesses; information posting on cooperation needs and new research projects. For example, ResearchGate or Google Scholar can be used as models to build similar platforms in Vietnam.

Apply modern technologies. Increase the use of artificial intelligence (AI) and big data in analyzing market demand and the potential of research results for applications.

Enhance the digital transformation capacity of small and medium-sized enterprises. Coordinate with universities to train and advise small and medium-sized enterprises, helping them access and apply digital technology in their production and business.

6.5. Raising awareness and skills of stakeholders

Raise awareness of the value of knowledge transfer. Launch national communication campaigns to raise awareness among businesses and the community about the socio-economic benefits of knowledge transfer.

Support research-based startups. Create dedicated startup programs for students and lecturers, with support of innovation grants and seed capital from funding funds and professional mentorship. For example, the Technology Business Incubation Center has supported a series of startups in the high-tech sector, such as BK Holdings, specializing in artificial intelligence.

7. Conclusion

Knowledge transfer from universities to production and business is a key factor in promoting innovation and sustainable economic growth. In the context of globalization and the Fourth Industrial Revolution, leveraging digital technologies and new cooperation models has opened up many opportunities to shorten the gap between theory and practice. However, Vietnam still faces many challenges, including cultural differences between parties, intellectual property issues, and limited financial resources. To overcome these problems, universities and businesses need to cooperate more closely with government agencies in the following areas: building clear mechanisms and policies to protect intellectual property rights; increasing investment in research and development; and promoting

forms of public-private partnership, especially incubators and innovation support funds.

These efforts not only contribute to enhancing national competitiveness but also lay the foundation for a sustainable knowledge-based economy. In the future, knowledge transfer needs to focus more on strategic areas such as green technology, artificial intelligence, and big data, while expanding international cooperation to make the most of global knowledge. With the aim of analyzing the current situation and proposing solutions to promote knowledge transfer in Vietnam, the article has provided a solid theoretical basis, a detailed analysis of barriers, and proposed strategic directions for the future./.

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