



Open innovation promoting with co-ownership of patent

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Abstract

Open innovation is required for the development of commercially beneficial innovations, and patent co-ownership is a legal tool that can facilitate open innovation. The purpose of this study is to examine the limitations of patent law in the adoption of open innovation and the use of patent co-ownership agreements to address those limitations. Additionally, the study focuses on the development of the characteristics and missions of relevant organizations with patents and open innovations in Thailand, with the goal of promoting open innovations that are based on more concrete intellectual property rights. According to the study, patent law is not intended to facilitate the flow of knowledge, information, or innovation and hence is incompatible with the nature of open innovation between parties. Additionally, in order to improve the environment, Thailand should establish a patent and open innovation organization in the form of funds, specialized agencies, state-owned enterprises, or public-private partnerships to encourage researchers and entrepreneurs to collaborate more efficiently on open innovation.

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Introduction

Entrepreneurs and researchers in the modern world cannot innovate as efficiently and rapidly as they can through collaboration or exchange of innovations with other companies or external organizations. As a result of this collaboration, open innovation flows have emerged as a critical tool for commercial innovation development. When it comes to promoting open innovation through the law, co-owned patent provision is a critical tool (Kazuyuki, 2016, p. 16). However, Thailand faces the following constraints in promoting open innovation through patent co-ownership:

To begin, patent law is not intended to facilitate the exchange of information, knowledge, or innovation, and thus is limited to promoting open innovation. When the Patent Act B.E. 2522 was examined, it was discovered that co-owned patents were not specified in detail. However, amendments to the Patent Act B.E. 2522 require time and may not satisfy the intent of collaboration in innovation that results in a co-owned patent for an individual researcher or entrepreneur (Smits, 2014, p. 53).

Secondly, there is no standardized approach to patent co-ownership agreements that can be used in practice. The World Intellectual Property Organization (WIPO) and the Organization for Economic Cooperation and

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Development [OECD] have recommended a patent co-ownership agreement in order to address the issue of patent law in the world. Thus, when it comes to open innovation collaboration, researchers and entrepreneurs can benefit from a standardized approach to patent co-ownership agreements (Lee et al., 2010). However, Thailand does not yet have a standardized approach to patent co-ownership agreements that benefits researchers and entrepreneurs, particularly small and medium-sized enterprises that lack dedicated legal counsel. Contracts for interest allocation of patent co-ownership, contracts for joint research, and confidentiality agreements are among the guidelines for patent co-ownership agreements found in the study that can be used as standards or recommendations for open innovation collaborations.

Thirdly, there is a dearth of open, integrated, and comprehensive patent and innovation-related enterprises. According to data derived from documents and samples, it is critical for organizations involved in open patent and innovation to be able to promote open innovation within the context of intellectual property rights by providing assistance in areas such as research funding, consulting, patent right management, integrated intellectual property platform operations, and so on. As a result, the state should place a premium on the organization's nature and mission in relation to open patents and innovations. Without a doubt, Thailand has a plethora of open patent and innovation organizations, but they are not fully managed in the best interests of researchers and entrepreneurs. Results of the study revealed the nature and mission guidelines for establishing an organization that supports open innovation in context and intellectual property in Thailand. Such an organization could be established in the form of funds, specialized agencies, state enterprises, or a joint venture between the public and private sectors, among other options. In order to promote, support, and build on research or innovation for commercial, academic, and policy applications, the aforementioned establishment must have a comprehensive management strategy in order to be successful. The findings of this study may suggest a subsequent study on patent law that is more aligned with the open innovation context in order to benefit future exchanges of information, knowledge, or innovation.

Literature Review

Open innovation entails entrepreneurs bringing knowledge or innovative ideas from both inside and outside the organization to integrate them into the development of products, processes, and marketing

strategies that leverage technological advancements, as well as establishing a system of collaboration based on the patterns of individual entrepreneurs in various industries (Aujirapongpan et al., 2018, p. 147). It is critical to have a culture of open innovation in today's economy because of the complexity and rapidity with which technology is advancing and changing, both of which are driving forces behind the dramatic rise in economic interactions.

Knowledge base results in today's innovation not only from the efforts of a single entrepreneur, but rather from the synergies between a number of different parties involved in that innovation. To accomplish such collaboration, of course, requires cognitive capabilities that enable it to spread further and ultimately result in productivity (Sledzik, 2021), such as the Covid AstraZeneca vaccine, a COVID vaccine developed by Oxford University (OXFORD UNIVERSITY) in collaboration with AstraZeneca (ASTRAZENECA), which is a significant example of open innovation in the context of COVID-19 (Astrazeneca and Oxford's Bumpy Partnership Hang over Covid Vaccine's Future, 2021).

Thailand and Open Innovation in the Context of Patent Co-Ownership

Thailand's government policies have incentivized the private sector to develop innovations based on open innovation and to collaborate on intellectual property rights development. Therefore, open innovation-based patent collaboration is an intellectual property tool that can broaden entrepreneurs' options and facilitate them to further increase their economic value (Open innovation, a shortcut to Thailand 4.0, 2021).

In spite of these shortcomings, a study found that the Patent Law Act B.E. 2522 has the potential to promote open innovation. However, there are several limitations to this goal, including: (1) the lack of criteria for participation in the invention process in co-ownership; (2) the lack of right management criteria; (3) the lack of utilization of co-ownership in patents which means to include sharing of benefits from the utilization of co-owned patents, co-owned patent litigation, and sharing of litigation damages; and (4) the lack of criteria governing the co-owned use of patents by patent holders and third parties, such as licensing agreements, the right to transfer inheritance, the use of co-owned patents as business collateral, and manufacture license agreement, etc. As a result, the Patent Act B.E. 2522 remains incapable of facilitating patent co-ownership in support of open innovation. There are several significant organizations involved in the promotion of open patents and innovations in Thailand, including the following:

1. The National Innovation Agency's primary missions include fostering the development of a national innovation system, facilitating access to and utilization of innovation infrastructure, and enhancing the target audience's innovation skills and abilities (National Innovation Agency (Public Organization), 2021).

2. The Department of Intellectual Property is charged with the responsibility of safeguarding intellectual property rights. (Strategic Plan of the Department of Intellectual Property)

3. The Office of the National Higher Education, Science, Research, and Innovation Policy Council's mission is to establish a system for allocating and managing innovations for the purpose of achieving tangible results. The Office has established an integrated budget with the goal of achieving block grants in accordance with the research system and national innovation and strategy, research and innovation in each field, as well as the establishment of a system for continuous monitoring and evaluation (National Science Technology and Innovation Policy Office, 2017, pp. 38–39).

However, it is necessary to understand that each organization's mission, with its specific scope and responsibilities, cannot be managed in a comprehensive manner for the benefit of researchers and entrepreneurs.

Reviewing Patent in Open Innovation Scheme and Amendments to the Law's Limitations via Parties' Agreements

There is a case to be made that international patent law is incompatible with the promotion of open innovation because, despite the fact that the WIPO and other countries reached an agreement on intellectual property rights, there is currently no globally compatible patent law, and the patent law principle has remained unchanged from its origins, which emphasized concealment and the grant of exclusive rights to patent holders (The Parliamentary history of England from the earliest period to the year 1803 vol. XII London, 2020).

Following a discussion of this issue using data from the sample group, it was determined that the intellectual property agreement provides strong protection for all technologies under the same standard, despite the fact that each business or industry may require a unique type of patent protection. Given the constraints imposed by effective co-owned patent management, one factor to consider when promoting the success of open innovation is how to align unauthorized exploitation by competitors with the open innovation model in order to allow competitors access to these intellectual assets for the

purpose of promoting technology advancement. A patent co-ownership agreement between the parties is an effective tool for managing patent co-ownership, and it is a guideline recommended by the WIPO and the OECD to promote open innovation. Model Agreements (Intellectual Property Agreement Guide [IPAG], 2021) have been developed by the WIPO. The OECD has published a research document on the issue of patent co-ownership promotion, under the title, "Co-ownership of Intellectual Property: Exploring the value creation and appropriation. implications of Co-Patenting" (Belderbos et al., 2014).

In practice, entrepreneurs and researchers will enter into a patent co-ownership agreement to bridge the gap in legal interpretation, create a space for free-of-contract bargaining, and build trust between the parties (Fosfurina et al., 2012), and companies may enter into contracts to avoid the application of laws governing the right to exploitation (Gorbatyuk, 2016). As a result, it is critical to foster open innovation and the development of an innovation ecosystem.

Case Study of Japan as Thailand's Industrial Foundation: Open Innovation and Patent Co-ownership in Japan

The Japanese government is attempting to foster an environment conducive to open innovation (Swedish Agency for Growth Policy Analysis, 2021). To foster innovation and intellectual property, the Japan Science and Technology Agency was established. The agency provides a comprehensive range of intellectual property support and services, including consultation on intellectual property management, patent transfers, intellectual property protection assistance, and fundraising for companies seeking investment in intellectual property research and development (Japan Science and Technology Agency, 2021).

Additionally, the Innovation Network Corporation of Japan, or INCJ, was established as a public-private investment fund through a joint venture between the Ministry of Economy, Trade, and Industry (METI) and the Japan Investment Corporation, or JIC (Japan Investment Corporation [JIC], 2021). The Life-Science Intellectual Property Platform Fund was created as a result of this joint venture. Its mission is to solve problems of university patent holding that do not meet market demand, to solve inertial patent solutions, to solve economic stimulus problems, and to develop new life science innovations.

According to the following table, a comparison of the laws governing the protection and promotion of patent co-ownership in Japanese patents reveals that the former has more provisions outlining this issue than Thai patent legislation.

Table 1 Japan's laws governing patent co-ownership

Provisions Relating to Patent	Sole Action	Co - Action
1. Criteria for co-ownership involvement in the invention process	-	Co-owned patent applications were filed by other joint inventors.
2. Rights management criteria, patent co-owners' conflicts of interest, and patent benefit sharing	-	If the co-owned patent holders do not reach an agreement to the contrary, each co-owned patent holder may use the invention covered by the patent without the consent of the other co-owned patent holder.
3. Requirements for co-owned patent use by patent holders and third parties	-	Without the consent of other co-owned patent holders, each co-owned patent holder is prohibited from entering into an exclusive licensing or a non-exclusive licensing agreement with a third party.
1) Licensing Agreement		Without the consent of all other patent owners, each patent owner cannot assign a part of their rights to another person.
2) Patent Assignment		The consent of other co-owned patent holders is not required for the transfer of co-owned patent rights by inheritance.
3) Inheriting of Patent right		Without the consent of other co-patent owners, a co-owned patent holder cannot make use of a patent as a business collateral.
4) Utilization of Co-owned Patents as a form of Business Collateral		

A Study of Large-Capitalists in the United States in the Context of Micro-Entrepreneurs: Open Innovation with Patent Co-ownership in the United States. In the early twentieth century, companies created, developed, and commercialized their ideas according to the closed innovation paradigm (Chesbrough, 2003, pp. 35–41). Small and medium-sized businesses are encouraged through open innovation by an organization called the US Small Business Administration Office [SBA] in the United States, which provides innovative research programs for small and medium-sized businesses in the

development of early-stage and high-risk technologies with an assessment and evaluation process (The SBIR AND STTR Programs, 2021).

In regard to a review of the United States law protecting and promoting patent registrations, it was discovered that there are more detailed co-owned patent laws, such as those depicted in the Japanese law presented in the table above, implying that Thai patent law contains fewer co-owned patent provisions. The table below summarizes the laws governing US patents that were studied.

Table 2 United States Patent Legislation Relating to Patent Co-ownership

Provisions Relating to Patent	Sole Action	Co - Action
1. Criteria for co-ownership involvement in the invention process		If an invention contains a joint invention and there is no agreement to the contrary, each inventor is presumed to be a co-owned patent holder.
2. Rights management criteria, patent co-owners' conflicts of interest, and patent benefit sharing	Unless otherwise agreed, each co-owned patent holder may manufacture, use, offer for sale, sell, or import a patented invention in the United States without the consent of the other co-owned patent holder, with no accountability to other co-owned patent holders, including no obligation to account profit to other co-owned patent holders.	
3. Requirements for co-owned patent use by patent holders and third parties	Without the consent of the other co-owned patent holder, each co-owned patent holder may enter into a licensing agreement in his or her own right with another person.	
1.) Licensing Agreement	Assignment of rights is a form of exploitation of a patent that can be exercised by the patent co-ownership holder. Patent assignment, on the other hand, requires the consent of other co-owned patent holders.	
2.) Patent Assignment	In case the co-owned patent holder dies without leaving a will, the court in the state where the co-owned patent holder resides has the authority to determine how property must be divided legally.	
3.) Inheriting of Patent right	Granting a manufacture license agreement is equivalent to granting permission for third parties to use the rights; co-owned patent holders may do so in accordance with their respective rights.	
4.) Manufacture License Agreement	Patents issued in the United States may be used as business collateral. Without the consent of other co-owned patent holder, any co-owned patent holder may use his or her interest in the patent as business collateral.	
5.) Utilization of Co-owned Patents as a form of Business Collateral		

Methodology

This research was a qualitative investigation into documentary concepts and theories related to patent co-ownership provisions and agreement. The patent legislation of the selected countries, which included Japan and the United States, and the limitations of joint patent development in Thailand, were examined, as were the patent laws of the selected countries that were related to patent co-ownership protection and promotion. Additionally, the study conducted in-depth interviews with key informants who were experts in this field, dividing them into three groups totaling 15 people based on purposive sampling criteria. These groups included representatives from the public sector, entrepreneurs, and academics. Additionally, a focus group was conducted. The participants were divided into three groups of twenty individuals each, and each group organized a focus group discussion using criteria for selecting a purposive sampling of government representatives, entrepreneurs, and academics.

Results

The research findings include the following: the amendment of the Patent Act B.E. 2522; and the investigation of characteristics and missions of organizations involved in patent and open innovation in Thailand.

Amending the Patent Act B.E. 2522 to encourage Open Innovation through the Use of a Patent Co-ownership Agreement

Entrepreneurs and researchers must collaborate to reach a compromise due to legal constraints. A patent co-ownership agreement should be executed between entrepreneurs and researchers to discuss the possibility of amending the patent law to allow them to enforce their rights against one another (Fosfurua et al., 2012). Additionally, the patent co-ownership approach addresses the issue of intellectual property right restriction by avoiding the use of laws governing co-owners' exploitation rights and the establishment of restrictions on the freedom companies' binding contract clauses (Belderbos et al., 2014; Gorbatyuk, 2016).

According to the research findings, the following guidelines apply to the fundamental requirements of an interest allocation agreement and the application of patent co-ownership agreement:

First, the use of agreement forms consistent with contract law and practice, including place of agreement, date of agreement, name of the parties, address and

details of the parties, contracting authority, certification of agreement, and witnesses (if any), among others. There should, however, be a definition of the agreement's form and content. This point is based on an examination of the documentation, as well as on interviews and discussions with a sample of contract drafting experts.

Second, the Patent Act B.E. 2522 was amended to fill in gaps on interpretable issues, such as involvement in the invention process through patent co-ownership, right management, co-ownership of patent utilization, and benefit sharing in patent applications. Analysis of documentation, interviews, and discussions among legal scholars and practitioners involved in contracts and intellectual property, including entrepreneurs and researchers, resulted in the formulation of agreement terms discussed in this section.

Third, in practice, contractual provisions are applied on the basis of their utility in the event of a dispute. A comparative document of agreement sourced from foreign and domestic searched data, as well as interviews and discussions with a sample of legal scholars and practitioners working in the field of contracts and intellectual property, including entrepreneurs or researchers, were used to develop the agreement formulations discussed in this section. Additional agreements, in addition to patent co-ownership agreements, may be required in the course of collaborative innovation and research to advance open innovation, such as co-owned patent research contracts, non-disclosure agreements, and so forth.

Investigating Characteristics and Mission of the Organization related to Open Patents and Innovations for Thailand

According to the documentation and data from the in-depth interview sample group and focus group discussion, it appeared to be necessary to establish a support system in the form of funds, specific agencies, state enterprises, or public-private partnerships to assist the innovation ecosystem with the following missions:

A first step in this process is to promote, support and enhance research or innovation in any form (including knowledge, processes or guidelines) for application in commercial, academic, or policy settings.

For the second goal, it is important to encourage and support collaboration for research development or joint innovation between individuals, organizations, businesses, or members of the public, both in the short and long term.

In the third place, to assist and provide financial advice to individuals, organizations, businesses, and the general public in joint research development or innovation for efficient, thorough, and sustainable development of the country.

Providing consultancy services in the field of business, resolving issues where the university's patent portfolio does not meet market demand, resolving patent package issues, coordinating the patent generation and acquisition process, negotiating licensing agreements, and transferring rights, providing financial services to entrepreneurs, and researching and developing valuable or in-demand innovations are examples of how the establishment of the particular organization mentioned above can be put into action.

Discussion

Patent co-ownership agreement is advantageous as a tool for promoting open innovation. However, Thailand's Patent Act B.E. 2522 is silent on patent co-ownership applications. For example, participation in the invention process in co-ownership (eg. article 15), the administration, utilization of the co-ownership patent, and sharing of patent benefits (e.g. articles 40, 77), utilization of co-ownership patent between patent holders and third parties (e.g. articles 10, 40). And, at the moment, the law's amendments require time. Therefore, in order to foster innovation collaboration, the parties should establish an interest allocation agreement and implement patent co-ownership agreement. It is primarily concerned with the proper application of the agreement form in accordance with applicable contract law and practice. Besides this, gaps in the Patent Act B.E. 2522 should be filled and it should be stipulated that agreement terms should be applied pragmatically in the event of a dispute, as well as to facilitate the innovation ecosystem. Furthermore, organizational tools such as the establishment of a fund, a specialized agency, a state-owned enterprise, or a public-private partnership to support innovation and the utilization of intellectual property rights should be considered. The organization's nature and mission are contingent upon its suitability for the Thai context, which should be thoroughly examined in the future.

Conflict of Interest

The authors declare that there is no conflict of interest.

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