Transforming Academic Libraries Into Hubs of Innovation and Entrepreneurship: A Case Study of a New Library Model

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Abstract: In a data-driven era, academic libraries must evolve beyond traditional roles as spaces for reading and storing information resources to become platforms promoting learning, research, innovation, future skills, and entrepreneurship. Based on the triple helix model of innovation, this paper highlights the new library model in a case study aimed at transforming traditional academic library services into enterprising, innovation-driven activities. For over ninety years, Thammasat University Library has been located on Rattanakosin Island, an historical area of Thailand. More recently, the library business model has evolved to meet modern needs. This qualitative research uses a case study to explore library strategies to create space meeting requirements of diverse user groups: students, faculty, staff, alumni, businesspeople and the community, including older residents. Service innovations responding to user demands are prioritized by drawing on the expertise of librarians. These changes generate new revenue for the library and enhance the space design and use through the Life Space concept. Co-working spaces, learning areas, inspirational corners, and performance venues make the library a platform for inspiring creativity, learning, life enhancement, and business ventures. The Thammasat University Library has also become an innovative bridge linking university research with small and medium-sized enterprises (SMEs), facilitating knowledge transfer and research commercialization. These findings may serve as guidelines for academic libraries seeking to adapt the Library of Life approach to be centres catering to readers of all generations and stations in life.

Keywords: Library space design, Service innovation, Cluster theory, Triple helix model, SMEs

1. Introduction

Competing in the innovation economy instrumentalizes collaboration between universities and the private sector to hasten innovation development in developed and developing nations (Secundo et al., 2016). Universities help shorten delays in marketing entrepreneurial innovations, with technology transfer offices used as mechanisms for commercializing university research (Chais et al., 2018). Universities participate in transforming scientific and technological knowledge through industrial innovation (Ismail et al., 2018). However, the success rate of technology transfer remains low, including in the United States (Oliveira and Teixeira, 2010). Small- and medium-sized enterprises (SMEs) fail to transfer technology from universities due to different factors: investment limitations, extant SME production processes (Khongmalai & Distanont, 2022), and entrepreneurial intent to adopt technology transfer (Distanont, Khongmalai, & Kritpipat, 2018).

Recently, research has sought solutions for how universities and SMEs may collaborate to enhance innovation and business capabilities. In Europe, governments have continuously promoted SME-university collaborations, with SMEs participating in short-term strategies to join government projects annually. Others find benefits in long-term strategies of research funding at universities, resulting in diverse research and development (R&D) outcomes for each country (Bjerregaard, 2009). In some nations, universities lacking expertise in commercialization focus on transferring knowledge about innovation processes to empower SMEs by application through organizational innovation (Lundberg & Öberg, 2021). In Australia, micro, small, and medium-sized enterprises (MSMEs) often rely on generic university-industry knowledge through conventional channels such as short-term training and academic publications from libraries, which is adapted for business purposes, rather than engaging in university research collaboration. In addition, MSMEs emphasize the importance of knowledge transfer in the business ecosystem from national and international customers and suppliers (Zubielqui et al., 2015).

University libraries serve as other mechanisms for institutions of higher learning to drive innovation and entrepreneurship. Space is a valuable library asset as a study, research, and usage hub for intellectual properties. With the advance of digital virtual technology, the traditional model of providing book reading space has become partly outdated. Service models have transformed into anywhere, anytime libraries for users from all groups in addition to students (Chan & Spodick, 2014). University libraries have transitioned into flexible spaces where users hone skills according to their needs. These may include spaces for learning, research, social interactions, innovation, and innovative incubation (Li, 2006; Chan & Spodick, 2014; González-Solar and Fernández-Marcial, 2019).

However, university libraries are challenged by burgeoning subscription costs, necessitating cancellation of subscriptions with important publishers (Piwowar et al., 2018). Simultaneously, a demand for scientific papers is growing among students, researchers, and entrepreneurs. Therefore, a new Open Access trend in accessing scientific publications has emerged on platforms such as Sci-Hub, providing cost-free access to scientific publications (González-Solar and Fernández-Marcial, 2019). The increasing popularity of Sci-Hub emphasizes the need to access scientific publications for advancing R&D. From another perspective, a unique, specialized free access hub for scientific publications is a model that encourages increased readership (Ajani, et al., 2023).

In Thailand, the Office of SMEs Promotion (OSMEP), a government agency responsible for setting policies to promote MSME competitiveness, centrally links the public and private sectors. The OSMEP Annual Report 2021 indicates that Thailand's gross domestic product (GDP) grew by 1.5%, with SMEs contributing 5.60 trillion baht or 34.60% (OSMEP, 2021). This highlights the key role of SMEs in driving Thailand's economic expansion. OSMEP provides annual financial support to universities to develop SME business capabilities. However, SMEs still face challenges in accessing knowledge and research to continuously innovate business processes. One reason for this difficulty is the fragmented nature of research in Thailand, often distributed across faculties and research institutes in universities, transmitted by academic papers which are not easily translated into commercial applications. Therefore, OSMEP has collaborated with Thammasat University, a leading university in Thailand, to transform academic libraries into innovation and entrepreneurship hubs.

This paper investigates an effective model for transforming academic libraries into hubs of innovation and entrepreneurship, to become continuous collaborative spaces for researchers, business consultants, and SMEs. The main research targets comprise: 1) the ideal format for transforming academic libraries into hubs of innovation and entrepreneurship; and 2) factors adding to the success of building academic libraries into hubs of innovation and entrepreneurship.

2. Literature Review

2.1 Cluster Theory and SME Development

Porter (1998) proposes that a nation's ability to compete must start with companies as the smallest unit of the economic system. By increasing productivity, especially labor productivity, rather than just reducing costs, companies may achieve a competitive advantage. If several companies in an industry increase productivity, overall industrywide competitiveness is attained. When many industries increase productivity, national competitiveness is boosted. Porter (1998) defines clusters as a group of related companies and institutions in close proximity within the same field, linked by commonalities and complementarities. The geographical scope of clusters may range from regional to state or neighboring cities and countries. Thus, clusters cover different interconnected industries and other organizations required for competition, such as providers of specialized components, machinery, and services, including specific infrastructure. Many clusters also include government agencies, universities, research institutions, vocational training providers, standard-setting bodies, and trade associations which facilitate specialized training, education, data, research, and diverse forms of technical support.

Michael Porter's cluster theory provides a framework for understanding the concept of geographical clusters, which are concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a specific location (Porter, 1990). According to Porter, these clusters promote increased efficiency, productivity, and innovation through several key mechanisms. First, proximity reduces the cost of transactions and information, allowing for better coordination and trust among businesses. Second, clusters stimulate competition and cooperation, which drives firms to enhance their own capabilities and innovate faster. This environment of enhanced competition and collaboration results in a more dynamic business atmosphere that is conducive to productivity improvements and innovation. Clusters also help companies to access specialized input, skilled labor, and complementary products, which are facilitated by the cluster's developed infrastructure and the regional focused educational and training institutions. In addition, being part of a cluster allows companies to directly access the latest information on technology and market trends, which can significantly enhance competitive advantage (Porter, 1990).

Abundant research examines cluster development as a strategy for building competitiveness in different contexts and dimensions (BCI Global, 2022; Abdin & Rahman, 2015; UNIDO, 2006; Porter & Bond, 2004; Doeringer & David, 1995). Porter (1998) argues that clusters influence competition in three key areas: 1) increased productivity of local firms located in the area; 2) driving the direction and acceleration of innovation; and 3) stimulating new business creation to expand and strengthen the cluster. Clusters enable members to gain mutual benefits and strengthen business operations. Developing clusters helps SMEs to leverage cooperation to strengthen competitiveness in their respective sectors. By coordinating activities in their sectors, SMEs may

achieve economies of scale surpassing the potential of standalone companies. Examples include bulk purchase of raw materials, shared use of machinery, and combined production capacity to fill large orders. These collaborative efforts translate into a competitive advantage for businesses in the cluster. This competitive edge stems from two main sources: 1) expanding business knowledge to cover areas such as design, quality control, and market-related data; and 2) building networks linking to a diverse range of technologies and other resources. Cooperation among SMEs enables entrepreneurs to focus on core businesses, resulting in overall improved production efficiency. BCI Global (2022) identifies nine key factors for developing successfully sustainable business cluster management as shown in table 1.

Table 1: Nine key factors for developing successfully sustainable business cluster management (BCI Global, 2022)

Key factors	Definition
Cluster formation	Creating robust entrepreneur communities is principally about shared space to promote collaborative work and knowledge sharing by facilitating collaboration through access to vital resources. In this context, shared space refers to physical spaces that encourage interactions and encounters among businesses.
Supportive authorities	Policymakers, governmental agencies, and local institutions are essential for building resilient entrepreneur communities.
Talent pool	Diversely talented stakeholders are key components for community building. Successful entrepreneurs, along with skilled personnel with expertise, experience, and diverse perspectives, enhance innovation, collaboration, and overall business ecosystem growth.
Education	Providing knowledge, skills, and resources to interlace businesses, teaching vitally promotes entrepreneurs and community building.
Advanced technology	Revolutionizing how entrepreneurs start, operate, and expand businesses.
Understanding market	Seeing how changes and opportunities occur, as well as responding to customer demands, are essential for entrepreneurial success.
Business networks	Creating entrepreneurial communities fosters cooperation, shares knowledge, and exchanges resources.
Capital	Access to funding sources enables entrepreneurs to invest in business infrastructure, hire skilled personnel, and seek growth opportunities.
connectivity	Building relationships and connecting entrepreneurs transforms entrepreneurial communities into potential clusters. In an increasingly interconnected world, entrepreneurs mutually rely on one another to access information, collaborate, and leverage diverse resources.

2.2 Triple Helix

The triple helix model of Etzkowitz and Leydesdorff (1995) emphasizes the interplay between three key sectors: universities, industry, and government. Collaboration among these entities can drive innovation through diverse channels, including joint university-industry research, policy and business collaboration networks, and establishing innovative experimentation spaces. These collaborative efforts facilitate accelerated market introduction of innovations, continuous improvement, and adaptation to evolving market and societal demands. The roles of the three sectors are interconnected and complementary: 1) universities help create and spread knowledge by academic R&D, generating new technology and innovation with industrial applications while contributing to workforce development by training graduates with required labor market skills; 2) industry uses current knowledge and innovations to develop new products and services, growing businesses and creating economic value to generate jobs and implement innovation; 3) government formulates policies supporting innovation and SME development by providing financial support, tax incentives, and measures to reduce barriers to business initiation and operations while encouraging investment and balanced competition.

Several research studies have applied the triple helix model of innovation as a framework for analyzing business competitiveness, innovation, and sustainability. Khouroh, et.al., (2019) and Dudin et al. (2015) found that cooperation promotes innovation, leading to competitive advantages and improved business efficiency. Etzkowitz and Ranga (2011) applied the triple helix model to analyze the emergence of innovation and business development. Ranga and Etzkowitz (2013) found that innovation stems from the three-partner relationship as well as the business-government relationship, as seen in industrial societies. Luengo-Valderrey, et al. (2020) and Lahi and Dervishi (2019) underlined that triple helix cooperation has positive economic, social, and environmental impacts. In addition, Sato and Okamoto (2019) emphasized the role of a conducive working environment in promoting sustainable innovation. Papagiannidis, Li, Etzkowitz, and Clouser (2009) found that the triple helix model is used to analyze business and cluster integration, while universities are increasingly involved in entrepreneurial activities, beyond their traditional roles as research and teaching institutions.

Universities have become resource providers for businesses, and the role of government has also changed. Apart from regulatory operations, governments now promote innovation and flexibility within legal frameworks through tax incentives, loans, and grants. Lahi (2019) found that universities significantly drive sustainability through triple helix cooperation. In sum, the triple helix model is essential for businesses to foster operational innovation, competitiveness, and sustainability.

2.3 The Evolving Role of Academic Libraries in Innovation

Recent scholarly discussions have increasingly recognized the transformative role of academic libraries in supporting innovation and entrepreneurship. Academic libraries are no longer seen merely as book and journal repositories, but as active partners in the innovation ecosystem. Institutions such as the Thammasat University Library are now engaging directly with SMEs to facilitate technology transfer and commercialization of research, embodying a new paradigm where libraries act as connectors between academia and industry (Li, 2006; Chan & Spodick, 2014). The academic literature suggests that modern academic libraries can play a pivotal role in fostering innovation by providing resources and spaces that encourage creativity, collaboration, and entrepreneurship (González-Solar and Fernández-Marcial, 2019). For instance, the modern university library model proposes an adaptive approach where libraries serve varied community needs, from digital learning hubs to innovation incubators (Li, 2006). This evolving role is supported by the triple helix model of innovation, which emphasizes the library's potential to act as a mediator and facilitator among the academic, business, and governmental sectors (Etzkowitz & Leydesdorff, 1995). By integrating these roles, academic libraries can significantly contribute to regional and national innovation systems.

3. Research Design

Qualitative single case study research was done. Yin (2018) and Creswell & Poth (2018) state that a case study is useful for answering the how and why questions about a social problem. The research process consisted of five stages as shown in Figure 1.

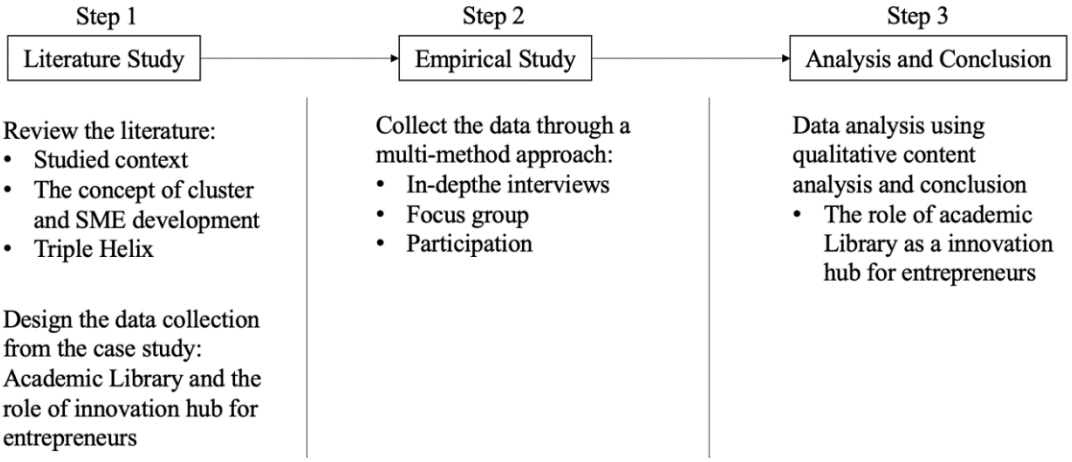

Figure 1: Research Process

The first step was developing a theoretical framework based on a literature assessment of the concepts of cluster and SME development and triple helix. The goal was to understand the overall subject and its context and design data collection from the case study, including question and structural design. This literature review defined the empirical study structure. The second step was an empirical study. Multi-method data collection included in-depth interviews, focus groups, and participation. Samples were stakeholders chosen for their expertise and participation in academic library and business development in Thailand. They were receptive and eager to cooperate with the study, which ensured rich empirical data for analysis. The third and final step was data analysis, using qualitative content analysis to interpret and draw conclusions from the collected data.

4. Results

4.1 Model Development

In Thailand, SMEs drive the economy, representing over 35% of the national GDP in 2022. They also serve as a significant employment source, accounting for 71% of total employment (OSMEP, 2022). However, the rapid pace of global development is profoundly impacting SMEs. To navigate this dynamic landscape and thrive in the face of change, all stakeholders, including SME promotion agencies, government entities, and SMEs themselves must proactively prepare and adapt. By embracing transformations, all parties may benefit from a changing

world. Thailand's strategy for sustainable economic prosperity develops the national industrial economy through business clusters to enhance economic competitiveness in manufacturing, trade, and services. From 2017 to 2022, The Thirteenth National Economic and Social Development Plan (2023- 2027) and the Fifth SME Promotion Plan (2023-2027) continuously implemented support and development for clusters to assist specific entrepreneurial groups with different needs. Distinct promotion and development guidelines are required for each SME group to create strong and sustainable clusters. Study results and data on cluster promotion guidelines in different industries (OSMEP & Thammasat University, 2023) indicated that from 2017 to 2022, OSMEP has promoted and raised the profile of prototype clusters. Over forty clusters promoted by the government pertain to the coconut and herbal industries, agricultural technology, durian, food processing, wellness tourism, future food, and e-sports & digital economy.

The concept of transforming academic libraries into hubs of innovation and entrepreneurship is based on the framework of the triple helix theory through tripartite collaboration between government, university, and SMEs. OSMEP acts as the government, SMEs represent the business sector, and the Thammasat University Library represents the university. In-depth interviews were done with nine participants, including three OSMEP administrators, three Thai Chamber of Commerce entrepreneurs, and three Thammasat University academic staff. Results revealed a conceptual model for transforming academic libraries into innovative entrepreneurship hubs based on the triple helix model (Figure 2) while indicating challenges and expectations of each party: 1) OSMEP aimed to create strategic business network connections. After completion of annual formal support programs, established business networks continued to foster connections and provide mutual support among participating businesses; 2) SMEs expected financial support for development from the government and knowledge and technology from universities for businesses, including product, marketing, and process innovation. Significantly, SMEs require suitable knowledge and technological operation backing through easily accessible channels; 3) Thammasat University Library strives to transform organizationally to link between faculties and the technology transfer office as well as to support innovation and entrepreneurship in physical and online spaces.

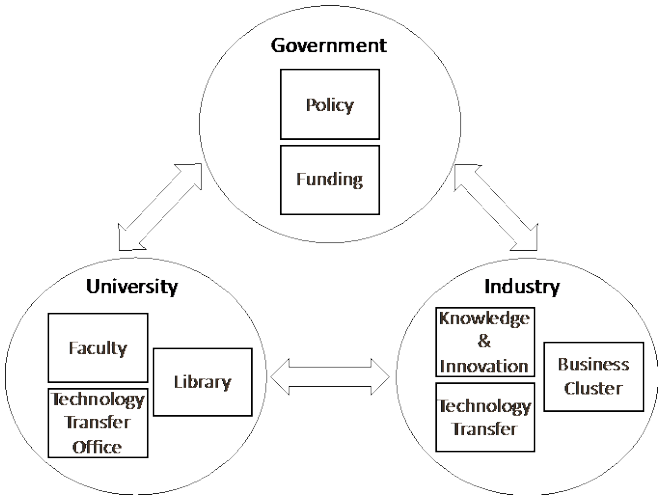

Figure 2: Conceptual model: innovation and entrepreneurship hubs based on the triple helix model

4.2 Model Testing

From October 2022 to September 2023, Thammasat University Library and OSMEP collaborated to develop business clusters by promoting MSME participation in the project to receive benefits for business development. Membership in the Thailand Business Cluster Platform included financial support for business development from OSMEP and access to diverse Thammasat University Library knowledge sources. Networking activities with other entrepreneurs in the same value chain were also offered. 162 MSMEs were chosen to participate in the project, including clusters of 55 in future food, 54 in wellness tourism, and 53 in e-sports and digital economy. Each business cluster participant received appropriate technology transfer upstream and downstream. For example, future food upstream businesses received technology transfer for vegetables, fruit, animals, and environmentally friendly chemical extractions. In addition, downstream businesses received technology for shelf-life extension, freeze-drying, spray-drying, ozone-drying, and encapsulation technology.

After closing this development project, focus groups were conducted with 23 stakeholders, including five administrators from government agency, nine university academic staff (three lecturers, three researchers, and three librarians) and nine from entrepreneurial clusters (three from future food, three from wellness tourism,

and three from e-sports and digital economy). Focus group investigated the format of transforming academic libraries into innovative entrepreneurship hubs through tripartite collaboration among the government, universities, and SMEs. Results indicated a new library model as innovative entrepreneurship hubs through three main service delivery mechanisms: 1) life space; 2) service innovation; and 3) Thailand business cluster platform (TBCP). The conceptual model for transforming academic libraries into innovation and entrepreneurship hubs is illustrated in Figure 3.

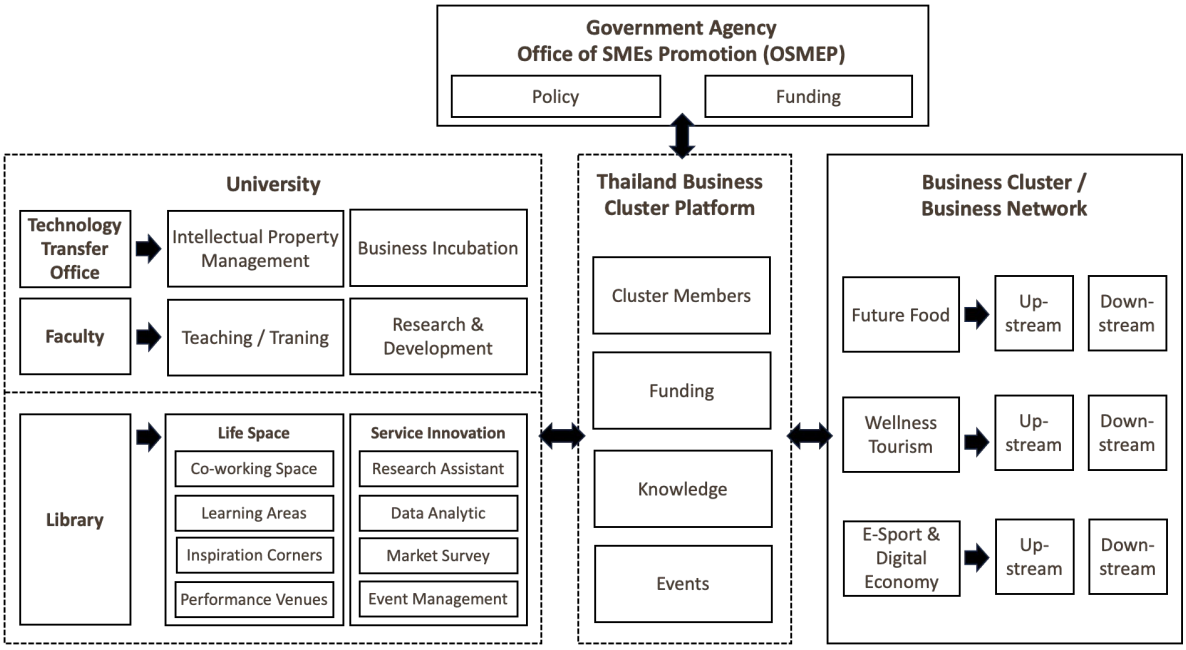

Figure 3: Model for transforming academic libraries into innovation and entrepreneurship hubs

A primary finding was the application of the Life Space Concept, which divided the library space into four distinct areas to meet different needs: co-working spaces, learning areas, inspirational corners, and performance venues (Table 2). These spaces were developed based on user feedback and needs assessments conducted through focus groups. A participant from the focus group remarked: "The inspirational corners have significantly enhanced our creative thinking process, making the library not just a place for reading, but for creating."

Secondly, Thammasat University Library introduced four service innovations to entrepreneurs, including research assistance, business data analytics, market survey, and event management (Table 3). The third mechanism was the Thailand Business Cluster Platform, providing an online connection between the business network and four key features: business; capital sources and state benefits; knowledge access; and event information (Table 4).

Table 2: Life Space Concept: zoning and definition

Life Space	Description
1. Co-working spaces	Designed to foster collaboration among students, faculty, and entrepreneurs.
2. Learning areas	Equipped with advanced technology to support learning and research activities.
3. Inspirational corners	Created to inspire creativity and innovation among users.
4. Performance venues	For events, presentations, and performances to engage the community.

Table 3: Service innovation: service type and definition

Service innovation	Description
1. Research assistance	Provides expert help for conducting and managing research projects.
2. Business data analytics	Offers data analysis services for market trends and making informed decisions.
3. Market survey	Conducts surveys to gather market insights for entrepreneurs.
4. Event management	Assists in organizing events promoting innovative entrepreneurship.

Table 4: TBCP: features and definition

Cluster platform	Description
1. Business clusters	Links entrepreneurs in the same value chain from upstream to downstream
2. Capital sources	Provides information on funding opportunities and governmental support.
3. Knowledge access	Links entrepreneurs to Thammasat University research, technology, and innovation.
4. Event information	Provides details about events fostering business collaboration and networking.

The TBCP presents multidimensional member data, including cluster, geographical area, and expertise. This enables interested businesses to easily find suitable partners. Thammasat University Library also works as a facilitator, organizing a business clinic day program to offer consultations, connecting SMEs with areas for improvement to leading companies and university experts. Experiments have shown that it facilitates business connections in the same business cluster. For example, in wellness tourism, a doctor who owns a rehabilitation center classified as a small-sized enterprise specializes in treatment and services, but faces challenges in scaling up the business. After joining a project between Thammasat University Library and OSMEP, the firm underwent quality screening and standards and were provided with business networking opportunities. They had an opportunity to discuss business with Sindhorn Kempinski, a world-class luxury hotel, and a business deal ensued. Sindhorn Kempinski created service innovations to offer inhouse rehabilitation services in their chain, with the rehabilitation center as service provider.

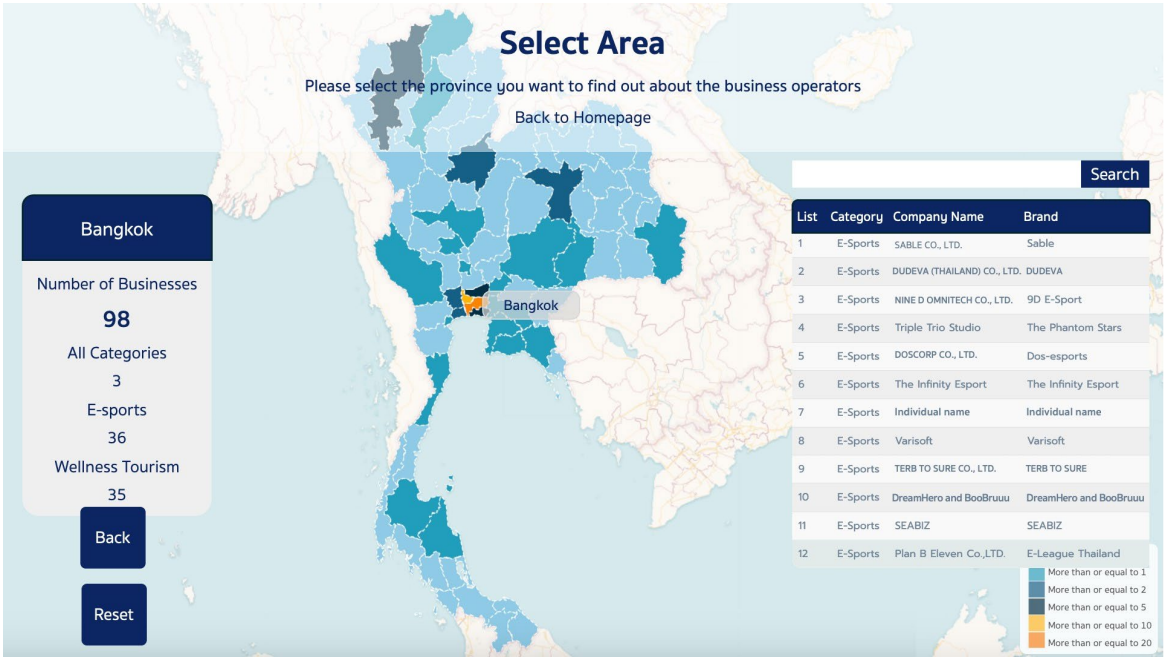

Figure 3: Thailand Business Cluster Platform (TBCP)

In sum, the Thammasat University Library has successfully transformed into hubs of innovation and entrepreneurship. The new model supports technology transfer, innovation creation, and entrepreneurship through collaborative efforts, innovative space design, and service enhancements. This approach aligns with global trends and provides a sustainable model for other academic libraries seeking to drive regional economic development and foster a culture of innovation.

5. Discussion and Implications

As a successful model, Thammasat University Library has transitioned from mainly providing book reading spaces to supporting technology transfer, innovation creation, and entrepreneurship. Several factors contribute to the success of this operation, based on the triple helix model and related components: 1) supportive authority from OSMEP participating in policy support and budget allocation; 2) education and technology provided by Thammasat University Library acting as a hub for gathering knowledge and technology to transfer to SMEs; 3) business networking, curated through initial project screening to produce a network of capable and trustworthy entrepreneurs; 4) connectivity through the TBCP facilitates searching for expert entrepreneurs in diverse fields

for collaborations; 5) shared facilities, as in the collaboration between a world-class hotel chain and small-sized rehabilitation center, allow resource-sharing such as hotel service areas and medical personnel. This enables service innovation for both parties without significant additional investment, increasing business opportunities for both parties.

This research aligns with Asian nations such as Korea, where research indicates that a main problem for SMEs is lack of technology and resources, including business networks. Universities solely serving as technology providers are inadequate. They must become network promoters in university-industry collaboration, strengthening regional business clusters to enhance SME competitiveness. Subsequently, different network formations occur among the regional business cluster members (Kim, 2018). SMEs can now receive more technology transfers for market innovation as they receive support and business engagement from cluster members. This study introduces a new approach to building a business ecosystem, departing from the traditional practice of creating collaborations among SMEs in the business ecosystem according to multi-level geographical advantage such as sharing the same state or nation (Zubielqui et., al. 2015). Instead, opportunities are proposed for creating business ecosystems based on business type, using the TBCP to transcend geographical limitations.

Linking the triple helix model and academic libraries integratively, comprising interactions between universities, industry, and government, helps transform academic libraries into hubs of innovation and entrepreneurship. In this framework, academic institutions such as the Thammasat University Library serve as nodes facilitating knowledge transfer and innovation. The library role extends beyond traditional services to support technology transfer, foster innovation, and encourage entrepreneurial activity. In this model, universities (represented by the Thammasat University Library) act as knowledge creators and transmitters, providing research, development, and educational support. Industry (represented by SMEs) uses this knowledge to develop new products and services, driving economic growth and job creation. Government (represented by OSMEP) formulates supportive policies, providing financial incentives and fostering a conducive environment for innovation and SME growth. This tripartite collaboration ensures that academic libraries become dynamic spaces that support continuous learning, innovation, and business development. By transforming into innovation hubs, libraries facilitate the interaction between researchers, entrepreneurs, and policymakers, driving regional economic development and promoting a culture of innovation.

These findings are in line with concepts discussed in the literature review, particularly the theories related to cluster development and the triple helix model. The role of Thammasat University Library as an innovation hub aligns with Porter's cluster theory, which emphasizes the benefits of geographically concentrated enterprises and institutions that collaborate to boost competitiveness and innovation (Porter, 1998). The library's engagement with SMEs and government bodies likewise reflects the triple helix model's call for university-industry-government collaboration as a framework for innovation (Etzkowitz & Leydesdorff, 1995). This study demonstrates how academic libraries can extend their traditional roles to become active participants in this model, contributing to the knowledge economy by facilitating knowledge transfer and innovation diffusion.

This paper revealed three important policies: 1) policy support: governments should consider policies that recognize and support the innovative roles of academic libraries in the national innovation system; 2) innovation funding: increased funding should be directed towards libraries to help them build the necessary infrastructure and services that support innovation and entrepreneurship; 3) partnership development: libraries should continue to foster partnerships with industry and government bodies to facilitate the effective transfer of knowledge and technology. Adopting these recommendations could significantly impact national innovation policies. Libraries could be acknowledged as central actors in the innovation ecosystem, essential for driving sustainable economic growth.

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