

Knowledge Acquisition toward Startups' Perspectives: Empirical Cross-Case Study of Leading Technology Business Incubators in Thailand

Kittichai Rajchamaha^{1*}, Mongkolchai Wiriyapinit², Voraphan Raungpaka³ and Akkharawit Kanjana-Opas⁴

¹*Technopreneurship and Innovation Management Program, Graduate School, Chulalongkorn University, Bangkok 10330, Thailand*

²*Department of Commerce, Faculty of Commerce and Accountancy, Chulalongkorn University, Bangkok 10330, Thailand*

³*College of Management, Mahidol University, Bangkok 10400, Thailand*

⁴*National Science Technology and Innovation Policy Office (STI), Bangkok 10330, Thailand*

ABSTRACT

Startup progress is recognized as a vital driver to sustain economies. A technology business incubator (TBI) is one of the devices to serve it. Recent studies have found that one of the TBI's key success factors in assisting startups' survival is knowledge management (KM), particularly knowledge acquisition (KA). This study aims to examine startups' behaviors toward their KA that occurred between before and after accessing early-stage incubation (ESI) of TBIs. The study used a qualitative case survey research (Yin, 2013) for five selected cases of leading TBIs in Thailand, namely PSU, KKU, SUT, NSTDA, and STEP. Purposive sampling was used with data gathered from a total of 114 startups who were incubated from 2014 to 2016. Data were collected using primary data through a survey method with semi-structured questionnaires. A summative content analysis, validity, and reliability were used and tested. A conceptual model was created from reviewing recent

studies and theories, including resource-based view, knowledge-based view, and KA theories to explore purposes. Findings show that startups' behaviors toward KA before accessing ESI need to acquire technical knowledge through online channels using "search engines" and "target websites" with more frequencies of KA. Startups' demand toward KA after accessing ESI is

ARTICLE INFO

Article history:

Received: 17 July 2017

Accepted: 26 February 2018

Published: 24 December 2018

E-mail addresses:

Kittichai.R@student.chula.ac.th / cmkittichai@gmail.com

(Kittichai Rajchamaha)

mongkolchai@cbs.chula.ac.th (Mongkolchai Wiriyapinit)

voraphan.rau@mahidol.ac.th (Voraphan Raungpaka)

akkharawit@sti.or.th / akkharawit.k@psu.ac.th

(Akkharawit Kanjana-Opas)

* Corresponding author

the need to acquire business rather than technical knowledge through both offline and online channels regarding methods related to different knowledge sources with more frequency. This shows both academic and practical contributions conducted at leading TBIs.

Keywords: Early-stage incubation, knowledge acquisition, startup, technology business incubator

INTRODUCTION

Startups are vital drivers for both economic and social development in developing countries. Unfortunately, startups tend to fail in higher proportions than mature businesses. However, business incubation is one of the various mechanisms that have been developed to enhance survival rates and performance of startups (Benjamins, 2009). Business incubators (BIs) provide new firms with physical facilities and a variety of business services to help them increase their chances of surviving in the early stages of development (Organisation for Economic Co-Operation and Development, 1997). Other than BIs, in general, the technology business incubator (TBI) is one of the types of BIs that focus on promoting technology startups. The TBI supports businesses wanting to sell their technology-based products or services to the marketplace, not the development of technologies as such (Dietrich, Harley, & Langbein, 2010). In addition, TBIs are more vital than BIs because new technology startups are suggested to exhibit a “multiplier” effect

in terms of job creation. Considering the process model of TBIs, the author has referred to the Carter and Jones-Evans process model (Hannon, 2003), which presents steps in the incubation process. Moreover, one of the most important steps in Carter and Jones-Evans’ process is firm formation and development or early-stage incubation (ESI) because it is the stage for which early-stage entrepreneurs frequently seek resources (Thorpe, Holt, Macpherson, & Pittaway, 2005). Knowledge resources are important resources for the firm during ESI of the business (Macpherson & Holt, 2007; Studdard & Munchus, 2009; Thorpe et al., 2005), therefore, the study has referred to the theory of knowledge-based view (KBV), which is a part of the resource-based view (RBV). It could be used to explain the incubation process as the accumulation and application of new venture development know-how to the mentoring of the incubatees (Nonaka, 1994). Consequently, these lead to research interest and scope of the study focused on knowledge acquisition (KA). In addition, there exists no current focus involving startups’ KA comparing before and after startups’ access to ESI as empirical cases studied within leading TBIs in Thailand.

The study aims to focus on examining startups’ behaviors toward their KA comparing before and after accessing ESI of TBIs through five cross-case analyses. By the context of the aims and recent studies referred to in Section 2.3, we consider the main issues to cover the research questions involved in startups’ behaviors toward KA.

The remainder of this paper is organized as follows: Section 2 analyzes literature reviews and recent studies on the business incubation process and relevant theories based on systematic approaches, Section 3 presents materials and methods, Section 4 exhibits results and discussion, Section 5 presents conclusions, Section 6 shows implications for theory and practice, and Section 7 exhibits limitations and further research directions.

RELEVANT THEORIES AND RECENT STUDIES

Carter and Jones-Evans' Business Incubation Process Model (2000)

Regarding TBIs' process models as explained in Section 1, this research conducted a review of relevant TBI process models and has finally referred to the Carter and Jones-Evans process model (Hannon, 2003) as the benchmark, which clearly presents each business incubation process conforming to TBIs. Besides, the Carter and Jones-Evans process model (Hannon, 2003) has also been recognized as the outstanding TBI process model that clearly sets six important stages, namely, idea formulation, opportunity recognition, pre-start planning and preparation, entry and launch, and post-entry development. However, this study mainly focuses on the pre-start planning and preparation stages, which show important activities in ESI. Finally, the authors introduce the incubation process model that has been used to organize the conceptual framework that the Carter and Jones-Evans process model (Hannon, 2003)

proposed as the key steps in the incubation process (Hannon, 2003) to construct the conceptual framework as shown in Figure 1 and to develop the KA models derived from lessons learned from leading TBIs in Thailand. Thus, the study concentrates on the ESI, which is one of the vital steps of TBI processes affecting startups' survival.

Theory of Resource-Based View (RBV)

RBV of the firm explained that tangible and intangible resources are important components of the firm's competitive advantage. Basically, the RBV model comprises three components, namely, (1) tangible resources, (2) intangible resources, and (3) organizational capabilities (Barney, 1991; Studdard & Munchus, 2009). Moreover, the RBV also focuses on knowledge as an important resource in BIs (Peters, Rice, & Sundararajan, 2004; Rice, 2002), especially, in preparing the knowledge resource as the suitable resource for the ESI (Macpherson & Holt, 2007; Studdard & Munchus, 2009).

Theory of Knowledge-Based View (KBV) and Knowledge Acquisition (KA)

The KBV, which is a subset of RBV, can be used to explain the incubation process as the accumulation and application of new venture development know-how to the mentoring of the incubatees (Nonaka, 1994). In addition, KBV on Nonaka's theory implies that the interaction among management, organization, and knowledge creation. Furthermore, it is useful for the

challenges that knowledge organizations are facing and to understand KA, transfer, and improvement in BIs. Thus, KBV has become an important factor of TBIs to integrate knowledge-creating organizations (Hansson, 2007; Nonaka, 1994; Veronica & Rojas, 2010). However, the task of KA is to extract knowledge for an information system or expert system by setting up sound, perfect, effective knowledge bases (Hao & Qu, 2013).

As stated in Section 2.1, early-stage entrepreneurs frequently seek resources for the firm during the ESI (Macpherson & Holt, 2007; Thorpe et al., 2005). Moreover, the acquisition of critical outside resources or actors becomes a necessary component in the ESI of startups. While the ability to generate these resources is accomplished through the entrepreneur's personal initiative to gather knowledge (Studdard & Munchus, 2009), resources are difficult to acquire due to circumstances outside the boundaries of the firm (Kirchhoff, 1994). Moreover, startups lack the ability to generate sufficiently substantial amounts of internal know-how due to the limited human capital effect (Macpherson & Holt, 2007; Thorpe et al., 2005; Yli-Renko, Autio, & Sapienza, 2001). If the startup's access to actors in the social structure is limited, then acquisition of resources for firm formation and development becomes limited. Thus, startups can lose or fail to gain their competitive advantage due to resource constraints (Gaskill, Van Auken, & Manning, 1993; Kirchhoff, 1994; Studdard, 2006). Besides, high technology startups

may have a high degree of technological knowledge but may lack knowledge regarding small business management (Lee, Miller, & Hancock, 2000; Rice, 2002). However, BIs are institutions designed to assist with the fundamentals of business process knowledge (Studdard, 2006).

Regarding types of knowledge, they can be divided into categories based on the 10 functional areas: (1) general management, (2) financial management, (3) marketing and selling, (4) market research, (5) product R&D, (6) engineering, (7) production, (8) distribution, (9) legal affairs, and (10) personnel (Studdard, 2006). In addition, these functional categories, needed for ESI, contain knowledge resources (Kazanjian, 1988; Studdard, 2006). However, the essence is that startups require different types of knowledge (technological and business) and the social actors, knowledge providers, within the external environment possess knowledge in various forms and degrees (Macpherson & Holt, 2007; Thorpe et al., 2005).

In addition, the sources for acquiring resources come from the networks available to the firms. Besides, the significant outcome gained by firms in the incubation process is KA through the interaction with the business incubator manager, whose main role is to assist the firm with the ability to acquire knowledge. However, the incubator manager, if unable to contribute knowledge directly, does possess the ability to link the firm with other actors in and outside the social structure of the incubator (Hansson, 2007). Linking the firm to other actors,

inside and outside the BIs, facilitates the entrepreneurial firm's acquisition of knowledge (Rice, 2002). However, the closed structure of an incubator promotes the engagement in social relationships, which gives the firm a better position for motivating trust and increasing business process knowledge; hence, startup firms require business process knowledge to ensure the success of the firm in the marketplace (Studdard, 2006).

By the contexts reviewed in the preceding paragraphs, considering the main issues to cover the questions involving in startups' behaviors toward KA consists of (1) Do startups need to acquire knowledge?, (2) What types of knowledge do startups need to acquire?, and (3) Which sources do startups need to acquire? However, the study has been designed to cover two more research questions both of which were not addressed in recent studies reviewed, to be useful in practical contributions to

improve some of the TBI KM systems, (4) Which methods do startups use to acquire knowledge? and (5) How often do startups acquire the knowledge?

In addition, most past studies focused on exploring startups' KA that occurred during ESI, but they did not investigate the comparison of KA that occurred before and after startups' access to ESI; thus, this study has been designed to cover them.

Conceptual Framework

According to the review of the literature and recent studies, the conceptual framework has been developed by integrating the incubation process explained in Section 2.1 and knowledge model (Naumov, 2011) to find answers to the questions as proposed in Section 2.3. As such, these lead to the development of the framework shown in Figure 1.

According to Figure 1, the framework is proposed overall of our research study as a

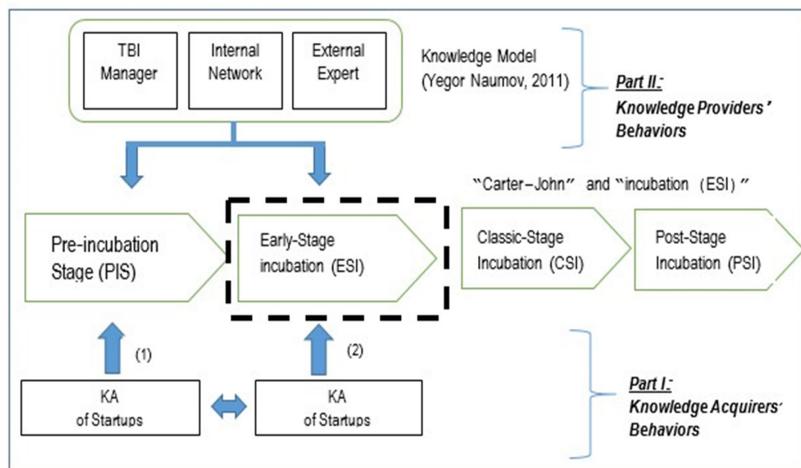


Figure 1. Research conceptual framework (See Supplementary Data File for details)

big picture; divided into two parts expressed as follows:

Part I: the study aims to investigate startups' behaviors toward KA comparing before and after accessing ESI. In addition, the study leads to understanding behaviors involved in acquiring knowledge types, sources, methods, and frequencies.

Part II: the study aims to examine knowledge providers' behaviors toward knowledge transfer comparing before and after startups' access to ESI.

The scope of this article is restricted to the area of Part I, as presented in Figure 1. While the remaining area, Part II, has been proposed as further research as explained in Section 7.

MATERIALS AND METHODS

Research Design

The empirical study draws on extensive qualitative research through multiple case studies, which is often required when the research domain is broad and complex and the context is important (Dul & Hak, 2008; Yin, 2013). In addition, it is useful in new research areas or situations in which researchers know little about the phenomenon (Eisenhardt & Graebner, 2007). Thus, it is typically used to address "What," "Why," and "How" questions (Eisenhardt & Graebner, 2007; Yin, 2013) to develop the research questions as expressed in Sections 1 and 2.3. Thus, qualitative research is highly appropriate for addressing the complex topics we consider (Vanderstraetena & Matthyssens, 2012; Yin, 2013).

Data Collection Process

This study collected data using the qualitative survey method with semi-structured questionnaires; moreover, 114 new ventures or startups within the same institutional environment, TBIs, were investigated and the author conducted research data collection by sending all semi-structured questionnaires through TBI managers and teams, who kindly assisted the author by conducting data collection from their startups, for all cases. When all startups returned the questionnaires to TBI managers and teams, they passed all completed data to the author by either mail or email.

Survey Data Analysis Method

Research data analysis in this paper used a summative approach to qualitative content analysis starting with identifying and quantifying certain keywords or content in text with the purpose of understanding the contextual use of the words or content (Hsieh & Shannon, 2005) and traditional human coding (Conley & Tosti-Kharas, 2014; Krippendorff, 2004). Analyzing for the appearance of a particular word or content in the textual material is referred to as manifest content analysis (Potter & Levine-Donnerstein, 1999). If the analysis stopped at this point, the analysis would be quantitative, focusing on counting the frequency of specific words or content (Kondracki, Wellman, & Amundson, 2002). A summative approach to qualitative content analysis goes beyond mere word counts to include latent content analysis. Latent

content analysis refers to the process of interpretation; moreover, a summative approach to qualitative content analysis has certain advantages. It is an unobtrusive and nonreactive way to study the phenomenon of interest. It can provide basic insights into how words are actually used (Hsieh & Shannon, 2005).

Case Selection and Description

Regarding the five cases as leading TBIs selected in Thailand, they comprise PSU (TBI of Prince of Songkla University), KKU (TBI of Khon Kaen University), SUT (TBI of Suranaree University of Technology), NSTDA (TBI of NSTDA), and STEP (TBI of Chiang Mai University). As the criteria for selecting cases as best practices of TBIs in Thailand, the author has used the criteria of success measurement of TBIs aligned with the Science Park Agency (SPA), which has been delegated by the Ministry of Science and Technology, to monitor planning and operation for all of TBIs in Thailand. Performance indicators have been used by SPA to monitor TBIs, including the number of graduates, number of incubatees, number of startup formations and survival, and so on. With regard to specific characters in each case, the purposes of all cases are to incubate technology startups' survival and all cases have focused on types of technology businesses consisting of Food, Digital, and Healthcare technologies. Besides, all cases show different numbers of startups, consisting of 24, 26, 24, 27, and 13, respectively; moreover, all cases show

numbers of graduated incubatees, namely 132, 87, 10, 141, and 1, respectively.

Sample

The purpose live sampling method (Yin, 2013) was used with drawing on delicate firm-level data collected for a total of 114 startups, who have been incubated from 2014 to 2016, consisting of 24 samples from PSU, 26 samples from KKU, 24 samples from SUT, 27 samples from NSTDA, and 13 samples from STEP. Data collections were gathered by considering primary data with semi-structured questionnaires with the qualitative survey method. In addition, validity and reliability were tested according to Yin (2013); thus, semi-structured questionnaire lists were evaluated by three relevant experts for the index of Item Objective Congruence and the questionnaire lists were evaluated with "Pass" criteria. Besides, considering the respondent rate, a total of 114 samples of all cases (100%) valid questionnaires were returned and analyzed. All respondents were divided into each case including PSU (24 respondents), KKU (26 respondents), SUT (24 respondents), NSTDA (27 respondents), and STEP (13 respondents).

RESULTS AND DISCUSSION

In this section, we describe and interpret through five cases with regard to Figure 1 (1) and (2) and also include a comparison of results that occurred between before and after startups' access to ESI under the discussion. All of these are expressed as follows:

According to Table 1, the survey shows results to cover research questions as identified in Sections 1 and 2.3 expressed as the following:

Regarding the first question with startups' demands toward KA before accessing ESI, the results of all cases indicate that 100% of total respondents need to acquire knowledge.

According to the second question, Table 1 expresses the results with types of knowledge that startups need to acquire before accessing ESI. The results of all cases indicate that the top three knowledge types, which have the results that more than 50% of total participants responded in each case, consist of new product development, technology management, and equipment improvement. By the results, they indicate that startups among five cases need to acquire types of technical knowledge mainly. Types of business knowledge are acquired by less than half of the total respondents.

Following the third question, knowledge sources from which startups need to acquire before accessing ESI, findings of all cases show that the top two types of knowledge sources are higher than half of total respondents consisting of search engine (results of the five cases show at 73–88%) and website (results of all cases are at 62–78%). By the results, they indicate that startups among five cases need to acquire types of knowledge sources mainly through online channels. Of other types of knowledge sources, offline channels

are acquired by less than 50% of total respondents.

In addition, the study was extended to cover two additional research questions, namely (4) and (5), which were not included in recent studies. Thus, the results are expressed as follows:

Regarding the fourth question, methods that startups need to acquire before accessing ESI, the findings of all cases show that two methods express a respondent rate higher than 50% of total respondents consisting of searching knowledge through search engines (findings of the five cases are 59–85%) and searching knowledge through websites (results of the five cases are 58–75%). The findings indicate that startups among all cases use the “searching method” mainly to access knowledge sources and to acquire knowledge that they required. Other methods are used by less than 50% of total respondents.

With regard to the last question, how often startups acquire before accessing ESI. The results of all cases show that frequency types higher than 50 percent of total respondents consisted of “one time a week” (results show at 52–61%) and “more than one time a day” (findings show at 51–59%). The findings indicate that startups of all cases act to acquire knowledge more frequently.

In a discussion regarding Table 1, the results are interpreted as follows:

First, the study found that startups, before accessing ESI, also need to acquire knowledge related to Macpherson and

Table 1

*Types of knowledge that startups need to acquire before accessing ESI.
(See Supplementary Data File for details)*

CASE	Respondents	Types of KA									
		New Product Development	Technology Management	Equipment Improvement	Marketing Management	Business Plan Development	Business Model Canvas	Financial Management	Organization Management	Company Formation	Accounting Management
PSU	24	63%	54%	50%	29%	29%	29%	21%	8%	8%	4%
KKU	26	69%	56%	54%	27%	27%	27%	15%	15%	15%	4%
SUT	24	62%	54%	58%	21%	8%	21%	21%	13%	13%	8%
NSTDA	27	67%	55%	52%	22%	15%	22%	15%	22%	11%	4%
STEP	13	69%	51%	54%	31%	23%	23%	31%	23%	15%	15%

Holt (2007) and Thorpe et al. (2005), who mentioned that early-stage entrepreneurs frequently sought resources for the firm during formation and development of the business. Moreover, Studdard and Munchus (2009) mentioned that the acquisition of critical outside resources or actors became a necessary component in the formation and development of startups.

Second, most types of knowledge that startups need to acquire before accessing ESI are technical knowledge types more than business knowledge types; however, the findings imply that technology startups' behaviors need to acquire knowledge in areas of their interest related to Studdard and Munchus (2009), who mentioned that the ability to generate these resources was

accomplished through the entrepreneur's personal initiative to gather knowledge. However, this can also be implied as related to Kirchoff (1994) that human capital is limited to acquiring all types of knowledge. Similarly, Macpherson and Holt (2007), Thorpe et al. (2005), and Yli-Renko et al. (2001), also mentioned that entrepreneurs lacked the ability to generate sufficiently substantial amounts of internal know-how due to the limited human capital effect. If the entrepreneurial firm's access to actors in the social structure is limited, then the acquisition of resources for firm formation and development becomes limited. Consequently, leading to the third point, the results indicate that startups need to acquire types of knowledge sources through online

channels mostly, such as search engines and websites. These results imply that startups, before accessing ESI, lack the ability to acquire business knowledge although they can search all data online but their abilities to generate sufficient internal know-how are limited, especially acquiring business knowledge types.

In addition, the study has extended the scope to cover two additional research questions, which were not noted in recent studies reviewed and the results are interpreted as follows: regarding the fourth research question, methods that startups need to acquire before accessing ESI, the findings imply that startups among the five cases use the “searching method” mainly to access knowledge sources and this result relates to knowledge sources as in the preceding discussion. Lastly, regarding frequencies of KA, the results are interpreted that startups acquire before accessing ESI. The results are interpreted that startups act to acquire knowledge with more frequencies of KA.

Regarding Table 2, the survey shows findings to cover questions as identified in Sections 1 and 2.3 expressed as follows:

1. Regarding the first question with startups’ demand toward KA after accessing ESI, the results of all cases indicate that 100% of total respondents need to acquire knowledge the same as before accessing ESI.

2. According to the second question, Table 2 expresses the results with types of knowledge that startups need to acquire after

accessing ESI. The results of the five cases indicate that the top eight knowledge types, which express the results more than 50% of total respondents of each case, consist of business plan development, business model canvas, marketing management, finance management, new product development, packaging development, accounting management and company formation. The results show different findings when compared with the results as shown in Table 1; on the other hand, they indicate that startups, after accessing ESI, mostly need to acquire business knowledge types, while types of technical knowledge are acquired less than half of total participants responded in each case.

3. Following the third question, knowledge sources from which startups need to acquire after accessing ESI, the findings of all cases show that the top two types of knowledge sources are higher than half of total respondents consisted of Business Experts (results of all cases show at 79–93%), TBI Manager and Teams (results of all cases show at 58–70%), Search Engine (results of all cases show at 55–79%), and Technical Experts (results of all cases show at 50–69%). The results indicate that startups among the five cases tend to acquire knowledge from knowledge sources through both offline and online channels, especially, startups acquire knowledge with critical offline channels that consisted of business experts, TBI managers and teams; however, technical experts are still acquired as one of the vital knowledge sources. The online

channel, search engine, is still selected as one of the key knowledge sources. Nevertheless, the remaining knowledge sources are acquired by less than 50% of total respondents in each case.

In addition, the study was expanded to cover two additional research questions, consisting of (4) and (5), which were not found from reviewing recent studies. The results are expressed as follows:

4. Regarding the fourth question, methods that startups need to acquire after accessing ESI, the findings of all cases show three methods that startups use to acquire knowledge that express a respondent rate higher than 50% of total respondents consisted of "Advice from business experts" (findings of all cases show at 69–74%) "Advice from TBI managers and teams" (results of the five cases show at 65–70%), "Advice from technical experts" (results of all cases show at 50–69%), and "Searching knowledge from search engine" (results of all cases show at 50–62%). By the findings, they indicate that startups among the five cases use methods related to different knowledge sources, such as using advice in cases of offline channels as knowledge sources and using the searching method in the case of online channels as knowledge sources. Other methods are used by less than 50% of total respondents in each case.

5. With regard to the last extended question, how often startups acquire before accessing ESI. The findings of all cases indicate that frequency types higher than 50% of total respondents consisted of "more than one time a day" (findings show at

51–64%), "one time a day" (results express at 54–71%), and "one time a week" (results express at 51–61%). These findings indicate that startups after accessing ESI among the five cases behave to acquire knowledge more frequently than before accessing ESI.

Regarding Table 2, the survey results are expressed as follows:

First, most types of knowledge that startups need to acquire after accessing ESI are business knowledge types more than technical knowledge types; similarly, findings associated with recent studies; for example, Kazanjian (1988) found that types of knowledge required during formation and development divided into categories including general management, financial management, marketing and selling, market research, product R&D, engineering, production, distribution, legal affairs, and personnel. In addition, these functional categories, needed for firm formation and development, contain knowledge resources that categorized them into technological and general business knowledge bases. However, "Pre-business plan and business model development" are the critical skills mostly acquired by the startups; therefore, this implies that some of the business knowledge types found in our study differed from findings revealed by recent studies and this led to contributing to improving TBIs' KM systems.

Second, regarding discussion of knowledge sources, the results indicate that startups among the five cases tend to acquire knowledge from knowledge sources through both offline and online channels, especially,

Table 2
Types of knowledge that startups need to acquire after accessing ESI (See Supplementary Data File for details)

CASE	Types of KA															
	Respondents	Business Plan Development	Business Model Canvas	Marketing Management	Financial Management	New Product Development	Packaging Design	Accounting Management	Company Formation	Quality System Development	Manufacturing Management	Intellectual Property	Equipment Improvement	Factory System Design	New Technology Development	
PSU	24	79%	79%	75%	54%	53%	57%	51%	53%	8%	8%	4%	4%	4%	4%	4%
KKU	26	69%	69%	77%	58%	50%	55%	55%	50%	8%	8%	4%	4%	4%	4%	4%
SUT	24	83%	83%	79%	67%	58%	56%	52%	58%	8%	8%	33%	29%	4%	8%	8%
NSTDA	27	74%	78%	78%	63%	53%	59%	56%	53%	7%	7%	7%	4%	7%	7%	7%
STEP	13	77%	77%	69%	58%	62%	54%	53%	53%	15%	8%	31%	23%	8%	8%	8%

startups acquire knowledge with critical offline channels consisting of business experts, TBI managers and teams; however, even technical experts are still acquired as a vital knowledge source, which relates to Peters et al. (2004), who mentioned that sources for acquiring the resources came from the networks available to the firms; moreover, the significant outcome gained by the firms in the incubation process is KA through the interaction with the business incubator manager, whose main role is to assist the firm with the ability to acquire knowledge and the results also associate to Hansson (2007), who mentioned that the incubator manager, if unable to contribute knowledge directly, did possess the ability to link the firm with other actors in and outside the social structure of the incubator.

In addition, the study has expanded to cover two additional research questions and further studied to investigate new issues of the study which were not covered by recent studies reviewed and results are interpreted as follows: Third, results are interpreted that startups use methods related to different knowledge sources by using both offline and online channels; however, the results are different when compared with methods used before accessing ESI. Finally, the results are interpreted with frequency types and indicate that startups after accessing ESI in the five cases behave to acquire knowledge more frequently than before accessing ESI.

CONCLUSION

In summary, findings were summarized through the five cases with regard to Table

1 and Table 2. All these are concluded to relevant research questions of the study expressed as follows:

First, according to Table 1, the survey shows results to cover questions involving startups' behaviors toward KA before accessing ESI are summarized as follows: all cases indicate that 100% of total respondents need to acquire knowledge mainly with types of technical knowledge. Results of all cases with knowledge sources indicate that startups need to acquire types of knowledge sources mainly through the online channel. However, the study has been extended to cover two additional questions that were not covered by recent studies and the results show the top two methods used for KA consisted of using "search engines" and searching knowledge through websites. The findings of all cases are interpreted that startups behave to acquire knowledge with more frequencies of KA.

Second, regarding Table 1, the survey shows findings to cover questions as identified in Sections 1 and 2.3 expressed as follows: startups' demands toward KA after accessing ESI, the results of all cases indicate that 100% of total respondents need to acquire knowledge the same as before accessing ESI. Moreover, all cases indicate that startups, after accessing ESI, mostly need to acquire business knowledge types. In addition, findings of all cases show that startups tend to acquire knowledge from knowledge sources through both offline and online channels. Besides, the study was extended to cover two additional research questions that were not covered in recent

studies. The results are expressed as follows: first, regarding the methods, the findings of all cases indicate that startups use methods related to different knowledge sources, such as using advice in cases of offline channels as knowledge sources and using the searching method in the case of online channels as knowledge sources. Lastly, the findings of all cases indicate startups after accessing ESI behave to acquire knowledge more frequently than before accessing ESI.

IMPLICATIONS FOR THEORY AND PRACTICE

The findings contribute to TBIs at ESI and knowledge-based research in two vital ways. First, findings contribute new knowledge to startups' behaviors toward KA that occurred at ESI of leading TBIs in the Thai context because recent studies involving ESI of TBIs are still limited. Lastly, regarding the practical view, results contribute usefulness among TBIs' relevant stakeholders consisting of TBI managers and teams, business experts, technical experts, startups, government, or relevant others, to make all of them understand how to improve KA, which is one of the critical elements and also a weakness under ESI of TBIs in Thailand. All these are critical learning to develop the TBI system to be more effective and to increase startups' survival related to current Thai government's policies known as "Thailand 4.0."

LIMITATIONS AND FURTHER RESEARCH DIRECTIONS

The study focused on examining only startup perspectives, as Figure 1 identified, while the study was not designed to investigate perspectives of knowledge providers and startups' perceptions toward knowledge transferred by knowledge providers. Besides, a summative approach is selected as methodology led to findings from the study limited by the inattention to the broader meanings present in the data. As evidence of trustworthiness, this type of study relies on credibility. A mechanism to demonstrate credibility is to show that the textual evidence is consistent with the interpretation (Hsieh & Shannon, 2005). Consequently, the study could extend the opportunity for further research work by using mixing method or triangulation method (Glaser & Strauss, 2017; Jick, 1979) to develop more confidence in the results because "within-method" triangulation essentially involves cross-checking for internal consistency while "between-method" triangulation tests the degree of external validity. Moreover, the study could extend the scope of study into types of incubators other than TBIs.

ACKNOWLEDGMENT

This research was supported by a grant from Doctoral Degree Chulalongkorn University 100th Year Birthday Anniversary, Chulalongkorn University, Thailand.

REFERENCES

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. doi: 10.1177/014920639101700108
- Benjamins, R. (2009). *Effects of business incubation on knowledge acquisition of incubatees and incubatee performance* (Masters Thesis), Delft University of Technology, Netherlands.
- Conley, C., & Tosti-Kharas, J. (2014). Crowdsourcing content analysis for managerial research. *Management Decision*, 52(4), 675–688. doi: 10.1108/MD-03-2012-0156
- Dietrich, F., Harley, B., & Langbein, J. (2010). *Development guidelines for technology business incubators*. Retrieved July 17, 2017, from www.inwent.org
- Dul, J., & Hak, T. (2008). *Case study methodology in business research*. New York, USA: Elsevier Ltd.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25–32.
- Gaskill, L. R., Van Auken, H. E., & Manning, R. A. (1993). A factor analytic study of the perceived causes of small business failure. *Journal of Small Business Management*, 31(4), 18–31.
- Glaser, B. G., & Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for qualitative research*. Abingdon, England: Routledge.
- Hannon, P. D. (2003). A conceptual development framework for management and leadership learning in the UK incubator sector. *Education + Training*, 45(8/9), 449–460. doi: 10.1108/00400910310508847
- Hansson, F. (2007). Science parks as knowledge organizations – the “ba” in action? *European Journal of Innovation Management*, 10(3), 348–366. doi: 10.1108/14601060710776752
- Hao, T., & Qu, Y. (2013). Toward automatic semantic annotating and pattern mining for domain knowledge acquisition. *Pertanika Journal Science and Technology*, 21(1), 169–182.
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288. doi: 10.1177/1049732305276687
- Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602–611.
- Kazanjian, R. (1988). Relation of dominant problems to stages of growth in technology-based new ventures. *Academy of Management Journal*, 31(2), 257–279.
- Kirchhoff, B. A. (1994). *Entrepreneurship and dynamic capitalism: The economics of business firm formation and growth*. Westport, USA: Green Wood Publishing Group.
- Kondracki, N. L., Wellman, N. S., & Amundson, D. R. (2002). Content analysis: Review of methods and their applications in nutrition education. *Journal of nutrition education and behavior*, 34(4), 224–230. doi: 10.1016/S1499-4046(06)60097-3
- Krippendorff, K. (2004). *Content analysis: An introduction to its methodology* (2nd ed.). Thousand Oaks, USA: Sage Publications, Inc.
- Lee, C.-M., Miller, W. F., & Hancock, M. G. (2000). *The Silicon Valley edge: A habitat for innovation and entrepreneurship*. Palo Alto, USA: Stanford University Press.
- Macpherson, A., & Holt, R. (2007). Knowledge, learning and small firm growth: A systematic review of the evidence. *Research Policy*, 36(2), 172–192. doi: 10.1016/j.respol.2006.10.001
- Naumov, Y. (2011). *Knowledge modeling for innovative companies: Case of business incubator* (Masters Thesis), Lappeenranta University of Technology, Finland.

- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37.
- Organisation for Economic Co-Operation and Development [OECD]. (1997). *Technology incubators: Nurturing small firms*. Retrieved July 17, 2017, from www.oecd.org/sti/inno/2101121.pdf
- Peters, L., Rice, M., & Sundararajan, M. (2004). The role of incubators in the entrepreneurial process. *The Journal of Technology Transfer*, 29(1), 83–91. doi: 10.1023/B:JOTT.0000011182.82350.df
- Potter, W. J., & Levine-Donnerstein, D. (1999). Rethinking validity and reliability in content analysis. *Journal of Applied Communication Research*, 27, 258–284.
- Rice, M. P. (2002). Co-production of business assistance in business incubators: An exploratory study. *Journal of Business Venturing*, 17(2), 163–187.
- Studdard, N. L. (2006). The effectiveness of entrepreneurial firm's knowledge acquisition from a business incubator. *International Entrepreneurship and Management Journal*, 2(2), 211–225. doi: 10.1007/s11365-006-8685-z
- Studdard, N. L., & Munchus, G. (2009). Entrepreneurial firms' acquisition of knowledge using proactive help-seeking behaviour. *International Journal of Entrepreneurial Behavior & Research*, 15(3), 242–261. doi: 10.1108/13552550910957337
- Thorpe, R., Holt, R., Macpherson, A., & Pittaway, L. (2005). Using knowledge within small and medium-sized firms: A systematic review of the evidence *International Journal of Management Reviews*, 7(4), 257–281.
- Vanderstraetena, J., & Matthyssens, P. (2012). Service-based differentiation strategies for business incubators: Exploring external and internal alignment. *Technovation*, 32(12), 656–670. doi: 10.1016/j.technovation.2012.09.002
- Veronica, M., & Rojas, V. (2010). *Business incubators – Knowledge transfer and networks creation as key success factors* (Master's thesis), Linnxus University, Sweden.
- Yin, R. K. (2013). *Case study research: Design and methods*. Thousand Oaks, USA: Sage Publications, Inc.
- Yli-Renko, H., Autio, E., & Sapienza, H. J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. *Strategic Management Journal*, 22(6–7), 587–613. doi: 10.1002/smj.183