

**THE EFFECTS OF KNOWLEDGE CREATION PROCESS UPON THE
ORGANIZATIONAL PERFORMANCE: A STUDY OF THAI BANKING
INDUSTRY**



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Thesis
entitled
**THE EFFECTS OF KNOWLEDGE CREATION PROCESS UPON
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BANKING INDUSTRY**



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Cheewanan Arijitsatien

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ABSTRACT

Business competition drives organizations to adapt themselves to become survivors. As knowledge-based economy emerged, knowledge management (KM) turns to be a principle for organizations to maximize to the value of knowledge. Among KM domains, knowledge creation is the most concerned aspect when it comes to innovation, creativity, performance and learning. Nonaka and Takeuchi (1995) propose the concept of knowledge creation called 'The SECI model' which is the well-known theory of knowledge conversion in organization. Reviewing on academic literatures, the application of SECI model is hardly seen in developing countries especially in banking industry. The objective of this study is to investigate the effects of knowledge creation upon the organizational performance. The research scope is banking industry in Thailand, focusing on commercial banks. Quantitative methods were conducted to analyze data of 400 banking employees. Quality of measurement in term of reliability and validity were tested by using Cronbach's alpha and Factor analysis. The goal of research was achieved by developing statistical testing using multiple regression, independent t-test, and one-way ANOVA. The results indicate that SECI process was adopted in Thai banking industry. Findings also indicate that knowledge creating process positively affected to organizational performance. However, based on Holistic scorecard framework, not all modes of SECI process were significantly affected to each perspective of organizational performance. Knowledge creation process was also influenced by collective culture and the nature of banking industry which made each SECI process affected differently to organizational performance.

KEY WORDS: KNOWLEDGE CREATION PROCESS / SECI MODEL / ORGANIZATIONAL PERFORMANCE / KNOWLEDGE MANAGEMENT

165 pages

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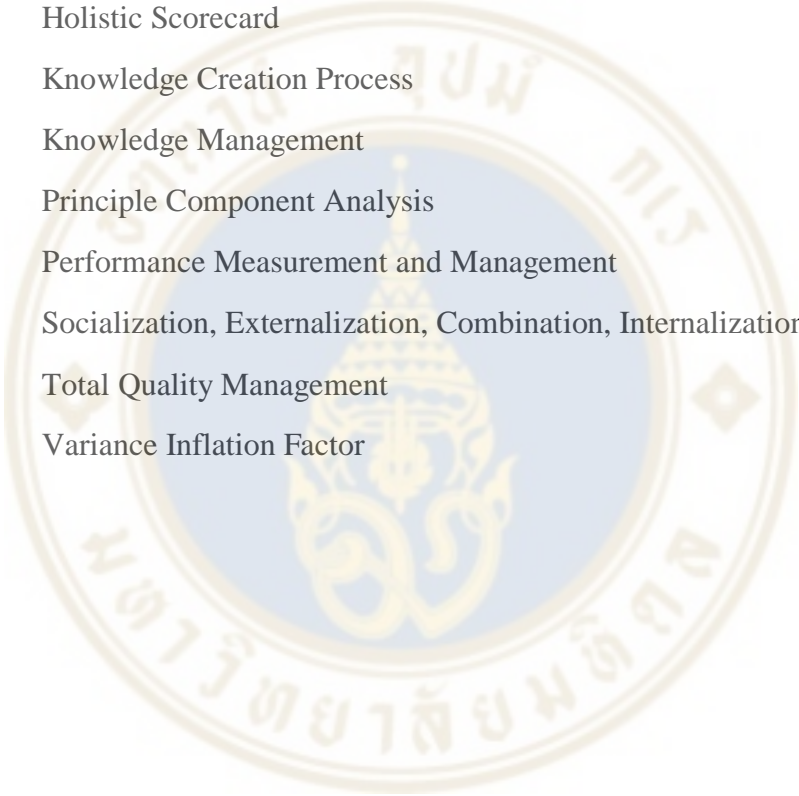
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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BSC	Balanced Scorecard
CSR	Corporate Social Responsibility
HSC	Holistic Scorecard
KCP	Knowledge Creation Process
KM	Knowledge Management
PCA	Principle Component Analysis
PMM	Performance Measurement and Management
SECI	Socialization, Externalization, Combination, Internalization
TQM	Total Quality Management
VIF	Variance Inflation Factor



CHAPTER I

INTRODUCTION

1.1 Background of the study

In the competitive environment, technology change, customer change, or even knowledge change, force companies to adapt themselves to become survivors. Since the world economy has moved to the knowledge based and global economy, success factors of enterprise are not the investment of capital, labor, and raw materials anymore but the capability of knowledge innovation from all members in a company (Rasoulinezhad, 2011). Knowledge has become one of the most important asset in the organization (Ramírez, Morales, & Rojas, 2011). Every company tries to use knowledge to gain the competitive advantage. Why knowledge is so important? It is because knowledge is a powerful resource, which mostly kept inside employees. Knowledge is changing and developing all the time. It is the main factor to differentiate organizations in 21st century (Sohrabi & Naghavi, 2014). As knowing its importance, many organizations still do not know how to manage knowledge (Bhatt, 2002).

Knowledge management (KM) becomes the important principle in organizations to maximize the value of knowledge and capture them from knowledge workers. Schiuma (2012) points out that there are two main perspectives why an organization needs KM. First, knowledge is likewise other resources which requires management to support allocation and development. Second, management mechanisms are needed to change knowledge into business outcomes.

KM has been discussed widely in organizations since 1990s (Sohrabi & Naghavi, 2014). The popularity of KM increases continuously. There are studies of KM on many disciplines such as management, computer science, and information systems theory (Lee, Kwon, Chung, Joung, & Kang, 2002). There is no exact definition for KM as we can see various definitions of KM from researches. From Rašula, Bosilj vukšić, and Štemberger (2012) research, KM is a process of creating, accumulating, organizing and utilizing knowledge. It helps achieve organization goals

and enhance its performance. KM is about how knowledge is acquired, transferred, and shared within the organization (Aktharsha & Anisa, 2011). Townley (2001) also defines KM as “the set of processes that create and share knowledge across an organization to optimize the use of judgment in the attainment of mission and goals (Townley, 2001).” Ramírez et al. (2011) summarize the concept of KM as the involving in managing the learning processes of individual and other members in the organization. No matter what definition of KM in those researches, all of them have the common thing about KM which is the process of using knowledge effectively.

Looking through academic researches, several of them discuss about the link between KM and company's performance. Darroch (2005) explains that KM is a support function that enhances the company's capability to use all resources more efficiently and perform better. From Zack, McKeen, and Singh research in 2009, they conclude that KM practices have direct impact to the organization performance. Schiuma (2012) believes that KM is at the core of organization's growth. Good mechanism in KM can lead to the improvement of the organization performance. Wang, Wang, Cao, and Ye (2016) discuss that alignment of KM strategy and the structure of intellectual capital leads to better firm performance.

1.2 Statement of purpose

As mentioned above that KM is truly important to the organization performance especially in banking industry because banking operations required the higher complexity of knowledge than in most industries (Shih, Chang, & Lin, 2010). KM has become the topic in banking industry since 1996 when World Bank initiated KM concept (Easa, 2012). After that, there are a lot of countries view KM as a major concern such as UK, USA, Japan, Spain, Canada, and Germany. Despite the fact that KM is one of the key success factors in banking business, it seems to have a few interesting of KM within banks in developing countries. As author has reviewed on academic journals so far, there are handful studies of KM in banking sectors. There is one research of Ahmad and Ali (2008) involving KM in risk and Malaysian banks. There are two researches of KM in Iranian banks. There is a study in Lebanese banks on how formal and informal mentoring effect to KM (Karkoulian, Halawi, & McCarthy, 2009).

One research discusses about KM and Organizational Innovativeness in Iranian banking industry (Bidmeshgipour, Omar, & Khairuzzaman, 2010). Another one explaining the measurement of KM processes in commercial banks in Iran (Rasoulinezhad, 2011). Cader, O'Neill, Blooshi, Al Shouq, Fadaaq, & Ali (2013) examine the KM in Islamic banks in the UAE. One more research discussed the role of HR in Delhi-based commercial banks in the context of KM (Gulati & Khera, 2013). Another recent research from Cham, Lim, Cheng, and Lee (2016) determine the key success factors of KM system in Malaysian banks. Scoping down in Southeast Asia, a few researches relate to KM in banking perspective. Therefore, there is still have room for further studies of KM in these countries.

Considering among KM domains which are Knowledge Creation, Knowledge Sharing, Knowledge Storage & Retrieval and Knowledge Application, "Knowledge Creation" is the most concerned aspect when it comes to innovation, creativity, performance and learning. The quicker the creation and consolidation of knowledge in business process, the higher capability to innovate of an organization (Dos Santos Ferreira and Santos, 2014). In Popadiuk and Choo's research discussing a relationship between knowledge creation and innovation, they explain how these concepts are related. Knowledge Creation is mainly about knowledge generation and application which leads to the company's new capabilities while innovation is concerned with turning the new capabilities into value products and services (Popadiuk & Choo, 2006). In term of creativity, Koh (2000) concludes that there is a strong relationship of advanced learning, knowledge creation, and organizational creativity. The larger of knowledge based in organization, the higher level of advanced learning and finally leads to higher organizational creativity. As the view of organizational performance, findings from Ramírez et al. (2011) study is knowledge creation process has a significant connection with organizational learning which is playing the important role in improving organizational performance. One more research from Laeeque, Babar, and Ahmad (2017) confirms a strong relationship between knowledge creation and learning organization practices. Both of them drive the innovation performance. Learning organization practices create the continuous learning environment which leads to the continual creating of knowledge and assists organization in producing innovative offerings or solutions for customers.

With the lack of KM research in developing countries particularly in banking industry and the importance of knowledge creation to the organizational performance, it is time to conduct a study of knowledge creation within banking context. The aim of this study is to explore knowledge creation process towards banking performance. Knowledge creation process is referred to the SECI model proposed by Nonaka and Takeuchi (1995). SECI model has been used as a reference framework in many researches and its results differ in various circumstances. Organizational performance is measured by Holistic scorecard framework (Sureshchandar & Leisten, 2005). However, with the confidentiality, it may be difficult to gain information of banking performance in variety aspects. Therefore, the perception of employees toward organizational performance is used as an alternative because there is a strong relationship between subjective and objective performance measures and it is justified to use subjective performance to quantify organizational performance (Wall, Michie, Patterson, Wood, Sheehan, Clegg, & West, 2004; Vij and Bedi, 2016). Accordingly, it is reasonable to examine knowledge creation process and its effects on the banking performance in Thailand.

1.3 Research questions

Regarding the statement of propose, focusing area has been identified which is banking industry. In order to clarify more on the research aim, research questions are defined as the following:

- Is knowledge creation process affect to banking performance in Thailand?
- What are the variables of knowledge creation process that affect the organizational performance in Thai bank context?

1.4 Research objectives

According to statement of purpose, the research intention is to analyze and explore knowledge creation process of Thailand's banking industry. To be more specific, the objectives of this research are addressed as the following:

- To examine the effects of knowledge creation process towards the performance in Thailand's banks
- To find significant variables of knowledge creation process towards the organizational performance

1.5 Scope of the study

The study area is the banking industry in Thailand to frame the boundary of this research. The research covers knowledge creation activities and processes in these banks as well as the perception of performance in term of tangible and intangible assets.

1.6 Contribution of the study

The author hopes that this study can spark some attention from Thai organizations to realize the importance of knowledge creation process in business context. Findings from this research can increase the understanding of the effects of knowledge creation process in Thailand's banking industry. The results are emphasized on working processes based on SECI model and its effect to the organizational performance. Research findings also provide suggestions to enhance the effectiveness of knowledge creation process, which will be reflected to the organizational performance.

1.7 Structure of the study

The thesis contains five chapters. The first one as stated above is the **introduction** to explain the aim of this research, scope of the study, and contribution of the study.

Chapter 2 provides the literature reviews on knowledge creation concept. This chapter contains four main sections. The first section starts with knowledge definition, types of knowledge and the concept of knowledge creation. SECI model, which is a framework of knowledge creation, is explained including factors to measure

knowledge creation process. The discussion of the external and internal aspects that affect knowledge creation also present in this section. The second section discusses about organizational performance and popular models for performance measurement. The third section explores prior researches of knowledge creation process and organizational performance together with research findings in several countries. The last section explains research hypotheses and depicts research conceptual model.

Chapter 3 explains research methodology. Research strategy is discussed in the first section, followed by methods of data collection. How each variable is measured and all independent and dependent variables are listed in measurement of variables topic. Next, research community and research sample including pilot testing are explained. Quality of measurement is presented in the next section. The remaining chapter discusses on data analysis using variety of statistical techniques to analyze data.

Chapter 4 presents the quantitative results of banking employees in Thailand. Pilot data have been analyzed before performing analysis of 400 respondents. Factor analysis and Cronbach's alpha are used to test validity and reliability. Descriptive statistics e.g. frequency and percentage distribution are used to explore profiles of respondents and describe the perception of knowledge creation process and organizational performance of all respondents. Testing between demographic groups are examined using independent t-test and one-way ANOVA. The last section discusses the hypothesis testing using multiple regression.

Chapter 5 summarizes the findings from this study. The findings are discussed on common practices of knowledge creation process in Thai banks and the effects of SECI process towards organizational performance based on Holistic scorecard framework. Theoretical implications provide the contribution of findings to SECI model regarding Thai banking industry. Practical implications consider the suggestions of SECI activities to improve working processes and enhance organizational performance in Thai banks. The chapter also points out the limitation of study and what can be done for the future research.

CHAPTER II

LITERATURE REVIEWS

This chapter provides academic knowledge that relate to knowledge creation and organizational performance from many literatures. The first section presents the definition of knowledge in different types and the concept of knowledge creation. Knowledge creation framework called SECI model is explained with the measurements of SECI process in organizations. Factors that impact to knowledge creation have also been discussed in this section. Next section is about organizational performance and review on the well-known models in performance measurement. The third section looks into several researches that examine knowledge creation process and organizational performance in variety aspects. The last section proposes the research hypotheses and illustrate research conceptual model.

2.1 What is knowledge?

Before going to further discussion, it is necessary to ground the fundamental elements for knowledge creation which are knowledge and its type. The first attempt to describe knowledge was in Plato's dialogue of the Theaitetos (Eigler, 1990 as cited in Meyer & Sugiyama, 2007) which defines knowledge as "justified true belief". Later, there are many definitions of knowledge in academic publications. Nonaka, Toyama and Konno (2000) extend the traditional definition of knowledge. They explain that Knowledge is transformed from information by individuals' interpretation within specific context and beliefs of individuals. In another way, knowledge is made by making conclusion and identifying unusual patterns or hidden trends in data and information (Easa, 2012). Gurteen (1998) also define knowledge as richer form of information and it was about know-how and know-why.

2.2 Types of knowledge

Plenty of researches indicate that knowledge can be classified into two main groups. Most of them refer from Polanyi's or Nonaka's concept (Polanyi, 1966; Nonaka & Konno, 1998) which is called tacit knowledge and explicit knowledge. Beside tacit and explicit knowledge that has been agreed by a lot of scholars, there are still have many researchers who look at knowledge in different perspectives and proposed other types of knowledge.

2.2.1 Tacit knowledge

Nonaka et al. (2000) explain that tacit knowledge is knowledge that is difficult to describe into words. This kind of knowledge involves with action, procedures, values, experience, and emotion. It is processed in human mind and difficult to share to others. Tacit knowledge is automatic. Polanyi (1966) clarifies tacit knowledge as skill to do something without thinking about it. Enhancing from Polanyi's concept, tacit knowledge can be divided into two dimensions: technical and cognitive (Nonaka, 1994; Sternberg, 1997). Technical tacit knowledge involves mastering specific skills such as craftsmen. While cognitive tacit knowledge combines implicit mental models and perceptions of individuals. Cognitive tacit knowledge is demonstrated when we use common sense or gut feelings.

2.2.2 Explicit knowledge

Explicit knowledge is the process when individuals extract information and process from memory which can be represented into words and/or visuals (Bennet & Bennet, 2008). Explicit knowledge is stored in form of tangible assets such as documents, data, and manuals etc. It is easy to transfer between individuals. However, explicit knowledge requires a level of academic knowledge to gain understanding from this formal knowledge. Once explicit knowledge is codified, it can be reused to solve similar problems (Smith, 2001).

2.2.3 Internalized knowledge

Håkanson (2007) illustrates a taxonomy of knowledge. There are two more kinds of knowledge in term of articulation which are internalized knowledge and procedural knowledge. The second one will be explained in below section after this. He believes that explicit knowledge we perceive and put into our actions in professional and everyday life will once become natural or commonplace, so those actions will be done unconsciously. This creates another kind of knowledge. Anyway, it requires substantial time to transform explicit knowledge into internalized knowledge.

2.2.4 Procedural knowledge

Knowledge can be classified into another kind called procedural knowledge. This sort of knowledge is know-how process. Procedural knowledge demonstrates how something performs. It can be techniques or step-by-step explanations or instructions for example, training modules and method & procedures (Easa, 2012). It is difficult to distinguish between explicit knowledge (know-what and know-why) and procedural knowledge (know-how) though. In fact, difference of these two is often obscured. Explicit knowledge informs the activities of procedural knowledge. “I *can* add these numbers because I *know* (and *understand*) a few simple rules of arithmetic” (Håkanson, 2007). In Polanyi’s (1966) view, there is no significant difference of these two aspects of knowing and both are present together when talking about knowing (Polanyi, 1966: 7).

2.2.5 Encapsulated knowledge

Van den Berg (2013) proposes another classification of knowledge other than tacit and explicit knowledge called encapsulated knowledge. Encapsulated knowledge is transformed from explicit knowledge and included in physical artefacts such as machines or products. It requires only functional knowledge to use these artefacts. Encapsulated knowledge differs from explicit knowledge because the knowledge is hidden from its users. Software and Music instrument are examples of encapsulated knowledge. Software can be classified as encapsulated knowledge because users do not have to understand how programs are coded. Users only need to know how

to use it. Another example is music instrument. Musicians know how to play instruments but no need for them to understand how the instrument is built to emit certain sounds.

In summary, knowledge can be classified into several types depends on contexts or perspectives. With variety of contexts, knowledge can be viewed in economical, technological, or organizational (Earl, 2001). In different perspectives, it can be grouped into local or global knowledge (Jensen, Johnson, Lorenz, & Lundvall 2007). No matter how knowledge is categorized, it is still rooted from human mind (Easa, 2012). In this sense, both tacit and explicit knowledge can cover all kinds of knowledge. The other types are the extended or enhanced forms of these two main knowledge types. Moreover, both tacit and explicit knowledge are complementary because the actions of individuals interact with reflect or influence one another (Johnson et al., 2002). To understand the nature of knowledge, it is necessary to know the relationship, interaction and transformation between these two. Both types are related to knowledge creation concept and will be discussed in details in the next section.

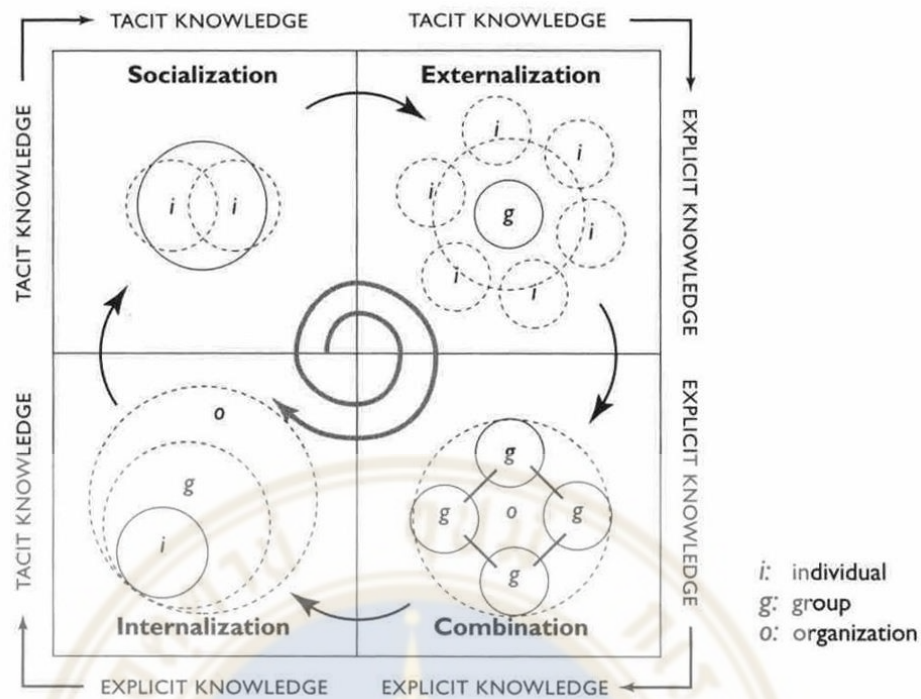
2.3 Knowledge creation

Among the authors regarding KM, Nonaka is one of the famous authors who provided significant contribution to KM and his main interest is organizational knowledge creation. In 1995, Nonaka and Takeuchi (1995) propose the concept of knowledge creation. The book called *The Knowledge Creating Company* and it was cited more than 32,000 times in Google Scholars (as of 3 May 2015). The knowledge creation theory has been enhanced and expanded along the time. Started from two dimensions of knowledge creation, Nonaka (1994) builds up from Polanyi's (1966) concept that knowledge can be classified into two different types of knowledge; tacit and explicit knowledge. A distinction between two types of knowledge is considered to be one dimension of knowledge creation process. As mentioned earlier, tacit knowledge is difficult to explain and communicate. It is stored in human mind. While explicit knowledge can be expressed into formal language and stored in tangible assets. Another dimension is the ontological dimension or the social interaction level. Nonaka (1994) suggests that knowledge is created by individuals at fundamental level. In organization,

knowledge is generated from a group of individuals then it is summarized and connected to a knowledge network in organization. To form knowledge of individuals, it needs social interaction which can be in different levels. First, informal interaction is established as a small community then it becomes more and more formal interaction when spread over organization hierarchy or inter-organizations.

2.4 SECI model

With two dimensions of knowledge creation process, Nonaka (1994) comes up with the spiral shape model which identifies the conversion between tacit and explicit knowledge. The form of knowledge conversion contains four different patterns. From tacit to tacit knowledge (Socialization), From tacit to explicit knowledge (Externalization), From explicit to explicit knowledge (Combination) and From explicit to tacit knowledge (Internalization). The four conversion modes called "the SECI model". SECI model explains the interaction of how tacit and explicit knowledge transform into one another. Meanwhile, the social interaction presents the expansion of knowledge of each level. It is important to understand that the movement from each conversion mode to one another is in a spiral form. The interaction process is amplified and become in larger scale as it moves up through the ontological levels (Nonaka et al., 2000). Nonaka et al. (2000) also explains that knowledge creation process is a self-transcendence process which one reaches out beyond self-knowledge boundary. Transcending process can be between self and other, inside and outside, past and present. Figure 2.1 illustrates the four modes of knowledge conversion, the spiral movement, and the self-transcendence process in each stage.



Source: Nonaka & Toyama & Konno (2000).

Figure 2.1 The SECI process

2.4.1 Socialization

Socialization describes the process that tacit knowledge turn into new tacit knowledge. The new tacit knowledge is created through the sharing experience (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka et al., 2000). Normally, socialization occurs during the apprenticeship rather than from written documents or manuals (Nonaka & Konno, 1998; Nonaka et al., 2000). Tacit knowledge is captured through physical relationship such as observation, imitation, and practice (Nonaka, 1994). In organization, socialization can occur during informal meeting such as talking over meals and drinks (Nonaka, Toyama, & Boysière, 2001). We can say that it is a process of transferring one's idea to another.

2.4.2 Externalization

Externalization is a conversion process of tacit knowledge into explicit knowledge. Out of four modes of knowledge conversion, externalization is the key of

knowledge creation process as it turns tacit knowledge into new explicit knowledge (Nonaka et al., 2001). When tacit is transformed into explicit, knowledge becomes crystalized and can be shared by others, then it becomes the foundation of new knowledge (Nonaka et al., 2000). The transcendence process in externalization involves group integration. Ideas of individuals are integrated into group's knowledge network. There are two important factors that support the process of externalization. The first factor is articulating techniques that help converting ideas into words, concepts, and visuals. The second factor is translating those tacit knowledge into easy and understandable forms (Nonaka & Konno, 1998). One example of externalization is the concept creation of new product development (Nonaka et al., 2000). With the advance of technology nowadays, the activities of externalization often take place in online system e.g. online community groups or forums.

2.4.3 Combination

Combination refers to the process of combining different explicit knowledge and converting into more complex and structured sets of explicit knowledge (Nonaka et al., 2000). Explicit knowledge from externalization stage transcends the groups through exchange mechanism. Combination stage involves three processes (Nonaka & Konno, 1998). Capturing and collecting new explicit knowledge from inside and outside groups. Second, disseminate explicit knowledge among the groups using such media as meetings, telephone conversions or large-scale databases and computerized network. Third, editing or processing knowledge into more useful forms e.g. reports, plans (Nonaka & Konno, 1998; Nonaka et al., 2000; Nonaka et al., 2001). In addition, combination also covers the 'break down' concept in which a vision can break down into operational processes or product concept also turns into product design (Nonaka et al., 2000).

2.4.4 Internalization

Internalization explains a process that shapes explicit knowledge into tacit knowledge. The self-transcendence process is required when individual accesses explicit knowledge created and shared in the group level, then converts into tacit

knowledge. Actions play an important role in the internalization stage (Nonaka, 1994). It is closely related to “Learning by doing” (Nonaka et al., 2000). Internalization process relies on two dimension (Nonaka et al., 1998). The first one is explicit knowledge which is embodied in action and practice. For example, training programs can help trainees to understand about their jobs by reading the manual documents and reflecting these explicit knowledge so that it becomes their tacit knowledge. Second, explicit knowledge is embodied through simulations or experiments. This dimension can trigger the process of learning by doing in which new knowledge is learned in virtual circumstances (Nonaka et al., 1998; Nonaka et al., 2000; Nonaka et al., 2001).

To summarize, new knowledge is created through the interaction between tacit and explicit knowledge. Nonaka and his associates propose knowledge creation process called the SECI model that consists of four different knowledge conversion modes. The process starts with socialization which tacit knowledge is exchanged at individual level then it moves to externalization stage where tacit knowledge is transformed into explicit knowledge. Combination process is used to capture, collect, and process explicit knowledge to be more complex and useful form of explicit knowledge. The last stage is internalization which turns explicit knowledge into tacit knowledge using the concept of learning by doing. The important thing is the movement of knowledge creation process which is a spiral form and moves up along the ontological level (individual, group, organization). The new knowledge is amplified to a larger scale as it passes through the social interaction level. Nonaka et al. (2000) assert that the knowledge creation process is a dynamic and continuous process and when it reaches at organization level, it will be a never ending process.

2.5 Knowledge creation measurement

Even though the explanation of knowledge creation process is presented but how knowledge creation is measured remains the debate subject for scholars. Because of the ambiguousness of knowledge creation definition, it brings to the difficulty of knowledge creation measurement. Currently, researches apply variety of measures. There is no agreed and accurate concept of knowledge creation measurement (Mitchell

& Boyle, 2010). In 2010, Mitchell and Boyle explore different measures used to examine knowledge creation by using classification method. They review the empirical studies that contained knowledge creation measures. Their findings lead to the taxonomy of knowledge creation measures which are classified into three measurement orientations; process, output, and outcome. The process-oriented measures are based on the assessment of knowledge creation process. This refers to steps or activities that lead to the creation of new ideas or objects; for example, using metaphors to explain concepts. The output-oriented measures determine the instant product of knowledge creation process; for example, spoken idea from brainstorming. The outcome-oriented measures assess the value-added objects from knowledge creation. This one is clearly seen as substantive evidences such as new product prototypes or changed routines. It is recommended that research involved with knowledge creation should be defined by clear definition if it is the process, output, or outcome. A clear definition result in precise process toward parameters to measure knowledge creation.

In this study, knowledge creation is defined as a process. SECI model is used as a key model to frame measurement factors according to Nonaka and Takeuchi (1995). Details of each aspect of SECI model can be explained in the following section along with Table 2.1 which summarizes activities and measurements regarding knowledge creation process (KCP) from several literatures.

Socialization refers to social interaction among employees. It can happen inside or outside workplace. Ideas or knowledge are exchanged during informal discussion such as lunch meeting or tea break in the afternoon. Spending time together by having social activities also increase relationship between employees, for example, company outing. Setting up workshops, seminars, or training programs allows employees to have direct interaction and share working experiences (Easa, 2012). Formal meeting or face-to-face meeting creates intense discussion to find solutions, suggestions, and new ideas (Schulze & Hoegl, 2008). Mentoring & Apprenticeship is a way that knowledge is transferred from mentors to apprentices. Moreover, the movement within or across departments such as job rotation or co-operative projects enable employees to share knowledge with new colleagues (Tsai & Li, 2007). Connecting with external parties also encourage socialization process for example,

inviting experts to share experience, customer survey, and dialogues with competitors (Teerajetgul & Charoenngam, 2006; Popadiuk & Choo, 2006). Additionally, creation of collaborative environment allows peer support and enhances employees' relationship (Popadiuk & Choo, 2006).

Externalization process occurs when concept or idea is shared by using metaphors (Teerajetgul & Charoenngam, 2006). Tacit knowledge can be externalized from findings of meeting which can be from seminars, workshops, or training programs, collecting best practice and how to techniques from experts to find deep insights, documenting reports from discussion with customers or competitors (Easa, 2012). Experts' tacit knowledge can also be expressed when allowing them to establish training programs or seminar contents (Tsai & Li, 2007; Easa, 2012).

Combination process involves with combining and shaping explicit knowledge to be more valuable knowledge. The activities include collecting knowledge from employees, sorting and categorizing into well-structured database and repository. Providing accesses to internal web pages that contain documentations promote combination process as it enables employees to reach useful information (Tsai & Li, 2007). Regularly updating database is also important as it adds new knowledge into organizational memory (Easa, 2012). Furthermore, combination activities happen when employees edit and process existing knowledge from different sources and make it more usable such as strategy plan or policy. Disseminating knowledge through presentations and reports by using communication tools e.g. telephone, email, and computerized networks supports employees to easily access and be able to synthesize explicit knowledge (Teerajetgul & Charoenngam, 2006; Popadiuk & Choo, 2006; Schulze & Hoegl, 2008).

Internalization process relates with the activities that turn explicit knowledge into individuals' tacit knowledge. Learning by doing is the key activity for this stage (Teerajetgul & Charoenngam, 2006; Popadiuk & Choo, 2006; Tsai & Li, 2007). Employees learn from taking action by using explicit knowledge from organization's knowledge repository. Experimenting also internalizes knowledge into individuals' mind (Popadiuk & Choo, 2006; Teerajetgul & Charoenngam, 2006, Song, 2008; Schulze & Hoegl, 2008), for example, testing new marketing campaign to see

which promotion offer attracts more customers. On the job training is one activity that enables new joiners to learn their job along with coaching from senior members (Tsai & Li, 2007). Using technology can also encourage the internalization process such as simulation tools, models, or case scenarios Thus, knowledge is internalized as employees learn from predicted outcome (Popadiuk & Choo, 2006; Teerajetgul & Charoenngam, 2006).

Table 2.1 KCP activities and measurements from various researches

KCP Factors	Reference
Socialization	
1. Informal meeting	Easa (2012)
2. Social activities	
3. Workshop & Training program	
4. Face to face meeting	Schulze and Hoegl (2008)
5. Mentoring & Apprenticeship	Tsai and Li (2007)
6. Job rotation	
7. Co-operative project	
8. Sharing experience with external parties	Teerajetgul and Charoenngam (2006); Popadiuk and Choo (2006)
9. Collaborative environment	Popadiuk and Choo (2006)
Externalization	
1. Metaphors	Teerajetgul and Charoenngam (2006)
2. Findings of meetings	Easa (2012)
3. Expert experience	
4. Reports of external parties	
5. Training Topic	Tsai and Li (2007)
Combination	
1. Repository & Database	Tsai and Li (2007)
2. Internal Web-pages	
3. Updating database	Easa (2012)
4. Editing and processing of knowledge	Popadiuk and Choo (2006)
5. Documented communication	
6. Using Communication Tools	

Table 2.1 KCP activities and measurements from various researches (cont.)

7. Presentations & Reports	Teerajetgul and Charoenngam (2006); Popadiuk and Choo (2006); Schulze and Hoegl (2008)
Internalization	
1. Learning by doing	Popadiuk and Choo (2006); Teerajetgul and Charoenngam (2006); Tsai and Li (2007)
2. Experimenting	Popadiuk and Choo (2006); Teerajetgul and Charoenngam (2006); Song (2008); Schulze and Hoegl (2008)
3. On-the-job training	Tsai and Li (2007)
4. Simulation & Forecasting	Popadiuk and Choo (2006); Teerajetgul and Charoenngam (2006)

2.6 Impacts of external factors to knowledge creation

Although knowledge creation theory proposed by Nonaka and Takauchi (1995) is widely known in KM field, there are still have some scholars question on the validity of this model as well as its applicability in different contexts.

Easa and Fincham (2012) provide a critical analysis of this model. They conclude that the results of knowledge creation differ in each country and recommended the universal concept of SECI model by adding culturization into four knowledge conversion processes. As Weir and Hutchings (2005) investigate the workings of the model in Chinese and Arab world, Socialization works well in Arab and Chinese society because they are network society which people are socialized and hold tacit within their trust network. In externalization process, Arab people tend to convert tacit knowledge less than the actual knowledge they have. Externalization may not work effectively in Arab, nevertheless, China is in the opposite way as Chinese people are willing to share knowledge within groups. In respect to combination, there are some limitations in both society. It is more complex and not straight-forward as described in Nonaka and Takeuchi model. Work and personal life are not separated in Arab culture. The confidence in knowledge is directly related to the confidence in people who hold that knowledge and this also affects to internalization process as well. Meanwhile, Chinese

employees are unwilling to share knowledge with managers because they respect seniority and afraid to cause loss of face to managers. Moreover, internalization is limited in China because of fearing to make mistakes of people in society (Weir & Hutchings, 2005). Andreeva and Ikhilchik (2011) also examine SECI model in Russian cultural context, they argue that Russian do not have willingness to share knowledge because they believed that knowledge is power and should not be shared if it is unnecessary. Russian employees have low loyalty to organization. All of these conditions limit socialization process. Russian appears to be less collectivism than Japan, thus the practice in externalization stage may not work well. The combination process is also inefficient due to the competitive attitudes and obsession with the privacy information. Russians are afraid of making mistakes. They act nothing in order to avoid mistakes. The fear of mistake prevents the internalization process which refers to learning by doing. Andreeva and Ikhilchik (2011) conclude that there are some limitations when applying SECI model in Russian context. It needs to be re-framed and should have management practices to increase efficiency of knowledge creation (Andreeva & Ikhilchik, 2011).

In term of organizational environment, Ayub, Hassan, Hassan, and Laghari (2016) study the role of knowledge-centered culture and knowledge-oriented leadership as the key factors that drive knowledge creation process. The results confirm the influence of knowledge-centered culture, including vision and values of organization and knowledge-oriented leadership, concerning training and rewards as the enablers of knowledge creation process to impact effectiveness and efficiency of organization.

Even having some controversies, but most scholars realize the importance of SECI model and have the same agreement that the concept of Nonaka and Takauchi model is the foundation of knowledge creation. Anyway, the universal applicability of this model should be considered. It is undeniable that cultural context affects knowledge creation process according to the analysis in Arab, China, and Russia (Weir & Hutchings, 2005; Andreeva & Ikhilchik, 2011; Easa & Fincham, 2012). Meanwhile, the organizational environment also influences knowledge creation process as in the study of Ayub et al. (2016). To successfully apply SECI model in organization, it is necessary to deeply understand each element of knowledge creation process, the definition behind

tacit knowledge, and the cultural characteristics in adopted environment. The awareness of these aspects can enhance the understanding of knowledge creation including involving processes and impacts to the organization (Easa & Fincham, 2012).

2.7 Impacts of internal factors to knowledge creation

Apart from cultural context and organizational environment which have effects on knowledge creation as stated in the previous section, employee is another important factor that impacts to knowledge creation activities because knowledge is generally in tacit form which is embedded with employees (Curado, 2008). Reid (2014) studies the influence of leader toward knowledge creation process in educational environment. Participants of this research are principals, teacher leaders, teachers, and system leaders. Data are analyzed based on the perception of participants. Findings from research confirm that leaders (i.e. principals and teacher leaders) play an important role in supporting process of knowledge creation and knowledge sharing. They have access to knowledge creation groups at different levels and are able to transfer knowledge between groups. Teacher leaders are vital in engaging teachers and peers at same level to create new knowledge while principals and system leaders encourage discussions in varied perspectives and give challenges to each levels which lead to new ideas. However, the study of Easa (2012) who examines the SECI model and innovation performance indicates that there is a difference but not significant regarding perception of externalization, combination and internalization activities among different job positions. Regard to working experience, Easa (2012) conclude that employee who has working experience less than or equal to five years has more agreement with externalization and combination processes than employee who has experience longer than that. Another interesting perspective is gender. A theoretical analysis from Durbin (2011) explains gender effects to organizational knowledge creation. Knowledge creation is amplified in socialization and women are inclined to be better in creating knowledge and contribute more in knowledge building where the culture supports social interaction and expressive behavior. This is because women's networks are broader and tend to have connection with people who are less similar to them while men are

connected with others who have similar characteristics. Therefore, women are likely to have the ability to manage variety level of knowledge through those networks. Regarding to a culture of employee involvement, a research from Memon, Syed, and Arain (2017) indicate that the empowerment, capability development, and team orientation are the factors that positively affect to knowledge creation process. In the empowerment aspect, knowledge creation, sharing, transfer, and use by employees depend on their authority to contribute ideas at the working place. Concerning the capability development, coaching, training, and allowing employees to carry different tasks improve employees' skills to translate knowledge into tacit and explicit knowledge. In the aspect of team orientation, working as a team creates more new knowledge as it enhance interactions among employees and allows employees to share knowledge and experience.

From what mentioned above, there are a lot of researches study knowledge creation process especially SECI model to see its consequences in organizations as various environments, both external factors such as culture and environmental context, and internal factors in organization such as employees, generate different effects to knowledge creation which also impacts to organizational performance in different ways. The expected findings from research are the ways to improve organizational performance because it is the key of organization. Details of organizational performance should be explored to understand how performance is measured in business world before moving to the applications of SECI model.

2.8 Organizational performance

The main purpose of organization is to sustain competitive advantage and achieve the goal of organization. Performance is the key to indicate firm's position and its survival to compete in the business world (Wang, Bhanugopan, & Lockhart, 2015). Organizational performance has been described into numerous dimensions. According to Venkatraman and Ramanujam (1986) research, it can be generally measured in three different types; financial performance, operational performance, and organizational effectiveness. Financial performance relates to the outcome of the performance and

involves with company's profitability. For example, return on investment (ROI), sales growth, and earning per share (EPS). Operational performance includes non-financial performance which is determined by product-market outcome e.g. market share, product launched onto market, and internal process outcome e.g. employee satisfaction. The third perspective is organizational effectiveness. This can be indicated from the overall effectiveness of the firm e.g. firm's survival, reputation, and goal achievements (Gerschewski & Xiao, 2014). However, the last dimension has received less attention because it is difficult to measure the effectiveness (Venkatraman & Ramanujam, 1986). Wang et al. (2015) also agree with this point. Their research evaluates organizational performance only into two aspects; financial and non-financial performance.

It has been recognized that better organizational performance is from organizations which are managed by using the formalized, balanced, and integrated performance measures (Bititci, Mendibil, Nudurupati, Turner, & Garengo, 2004). There are several management analysis models associate with performance measurement. It uses to evaluate or assess firm's activities, procedures, and professional requirements. The models help organization interprets practical application and decision making results which lead to directions to improve organizational performance (Draghici, Popescu, & Gogan, 2014). Popular models proposed in prior research are Management by Objectives, Balanced Scorecard, and Total Quality Management. Management by Objectives was first introduced by Drucker in 1955. It is a model for organization to manage their employees based on goal alignment. Management by Objectives is the first model that integrates the rational goal model and human relations model into its principle (Dinesh & Palmer, 1998). Balanced Scorecard is another model accepted in wide range of industries. This model is proposed by Kaplan and Norton in 1992. Balanced Scorecard (BSC) emphasizes the balance of measurement between financial and non-financial measurements. It consists of four key dimensions to evaluate organization: financial perspective, customer satisfaction, internal business process, innovation and learning including technological assessment (Wang et al., 2015). Total Quality Management (TQM) refers to the management principle and control processes which aim to improve quality of product and service to satisfy customers. Deming is the first one who initiates the idea of TQM in early of 1980s. TQM includes the concept of

product quality, process control, quality assurance, and quality improvement (Talha, 2004). Apart from the well-known models, large numbers of concepts are proposed in order to effectively measure organizational performance. Yadav and Sagar (2013) provide a comprehensive review of performance measurement systems/models/frameworks in last two decades (from 1991 to 2011) to highlight the research trends in performance measurement and management (PMM) framework. Their research uses chronological review and is divided into 2 periods; 1991-2000 and 2001-2011. In the first period, the research trend firstly involves with financial perspectives then shift to an integrative perspective. Organization performance not only relates to financial and non-financial performance but it includes strategic management as well. During the 21st century, measurement in operational perspective is moved to dynamic and multi-stakeholder perspective. Yadav and Sagar (2013) also classify performance measurement and management framework based on broad characteristics into 5 groups as the following;

1. Classical and dominant PMM frameworks – This group includes the popular models that have been referred by scholars in literature and were developed in the business world. Contribution of these frameworks is in the area of non-financial performance, self-assessment, and quality. Example frameworks are EFQM – Excellence model (European Foundation, 1991), Performance Pyramid (Lynch & Cross, 1991), Balanced Scorecard (Kaplan & Norton, 1992), and Performance Prism (Neely et al., 2001).

2. Holistic and integrated PMM frameworks – Frameworks in this group are shifted from the traditional performance measurement into the integrated performance measurement which include individual performance, firm performance, and integrated operational, functional, and strategic perspectives. Example frameworks are integrated Consistent performance management system (Flapper et al., 1996), Integrated dynamic performance measurement system (Ghalayini et al., 1997), Dynamic performance measurement system (Bititci et al., 2000), Integrated performance measurement (Medori & Steeple, 2000), and Dynamic multi-dimensional performance framework (Maltz et al., 2003).

3. Frameworks updating BSC approach – With the wide discussion of Balanced Scorecard model, some scholars argue that BSC did not consider other important

stakeholders in the framework. Thus, there are frameworks developed and updated from BSC model that include system dynamics methodology and modeling, intellectual and social aspects. Example frameworks are Kanji's business scorecard (Kanji & Sa, 2002), Holistic scorecard (Sureshchandar & Leisten, 2005), Total performance scorecard (Rampersad, 2005), and "System dynamic based" balanced scorecard (Barnabe, 2011).

4. Context-Specific PMM frameworks – Apart from general PMM frameworks, some frameworks are developed to measure performance in some specific context such as economic value, social value, performance value chain etc. Moreover, these frameworks can also be categorized based on driving factors. For instance, process-based frameworks such as Input-process-output-outcome framework (Brown, 1996), the performance planning value chain (Neely & Jarrar, 2004); financial performance framework e.g. economic value added (Stewart, 1991), shareholder value (Rappaport, 1998).

5. Recently developed PMM frameworks – Frameworks which are developed recently in last five years are clustered into this group. Frameworks are mostly contribute to major issues in organizational performance for example, Flexible strategy game-card (Sushil, 2010), Sustainability performance measurement system (Searcy, 2011).

In short, there are various frameworks to measure organizational performance and each framework focus on different perspectives. Traditional frameworks mostly focus on financial performance. After that, non-financial performance is concerned. Hence, frameworks are developed by including key stakeholders in organization and integrated into holistic framework. Performance measurement is continuously evolved to multi-dimensional framework. The widespread model, the BSC approach is updated to the enhance ones. Some frameworks are developed to evaluate specific areas. Until recently, sustainability is taken into account to measure organizational performance in long term. With dynamically changing business environment, it marks the essential for organizations to consider performance measurement framework as it indicates firm's status, helps improve firm performance and maintain competitiveness.

2.9 Organizational performance measurement

As aforementioned, organizational performance can be measured into two perspectives: financial perspective which relates to the numbers in economic factors and non-financial perspective which involves with stakeholders in organization such as customer, employee etc. In this research, “Holistic scorecard (HSC)” framework is adopted to measure organizational performance. HSC is enhanced from the most influential and widespread used performance measurement framework, the BSC, proposed by Kaplan and Norton in 1992 (Sureshchandar & Leisten, 2005; Yadav & Sagar, 2013). HSC adds new perspectives to represent all dimensions of business performance as well as reorganize the existing perspectives to clarify measures of each perspective. Sureshchandar and Leisten (2005) propose the concept of HSC framework in six dimensions which are financial, customer, business process, intellectual capital, employee and social perspective. Details of each perspective are discussed in the subsection below.

Financial perspective

Financial perspective is a common aspect in every organization as the primary objective for all businesses is making profit. Financial measures mostly used data from financial statement. It indicates the achievement of organization on its goals and objectives. Information from financial measures depicts organization’s investment and helps evaluate the profitability. Monitoring financial measures are used for making financial decision and improve the effectiveness in budget planning (Wang et al., 2015). Financial measures is generally represented by Return on Investment (ROI), Return on Asset (ROA), Return on Equity (ROE), Profitable growth, Economic value added etc.

Customer perspective

It is undeniable that customer is the most important stakeholder in business. Customers provide revenue to organization. Without customers, organization cannot move on. In HSC framework, customer perspective are divided into three parts; Customer satisfaction, Customer acquisition, and Return on relationships. Organization should have the ability to satisfy existing customers and obtain new customers to gain higher performance. This leads to customer royalty which is the key to maintain customers in organization. Key indicators to measure customer satisfaction can be

Product and service quality and Product and service satisfaction. Customer acquisition can be measured from No. of new customer over specific period while return on relationships is measured from intention to purchase product or service and market share.

Business process perspective

Business process concerns about a set of processes that create values to customers by using employees and other strategic plans. To achieve customer performance, organization must translates customers' needs into measures of what organization must do to meet customers' expectations (Kaplan & Norton, 1992). In other words, customer performance is the evidence of how good of organization's processes, decisions, and actions. Key performance indicators of regular business process are typically related to productivity measures such as regular monitoring and control, benchmarking, and the effectiveness of general internal process, quality certifications like ISO, CMMI, process improvement etc., and technology and infrastructure level. Apart from regular business processes, HSC framework also covers two more aspects; Risk management process and KM process. Because of rapid change in business situation, it is difficult for organization to avoid uncertainties. As a result, risk management process is needed in order to mitigate problems which may occur and maximize organizational performance. Features of risk management process are risk management planning, risk identification, risk analysis, and risk monitoring and control. Another important aspect in business process is KM process. Organizational knowledge is extensive and need to be managed to optimize its value. KM processes are identified from the effectiveness of knowledge creation, knowledge sharing, and knowledge repository including virtual community to connect all employees together.

Intellectual capital perspective

In previous decades, key resources of organization are natural and physical resources. Later, intellectual capital has emerged recently as the new aspect of performance driver. Intellectual capital becomes a dominant part in business when discussing about management and strategy. It is defined as an intangible asset in which its essential part is an idea or knowledge. It refers to the sum of total intellectual assets in organization that can be used to form competitive advantages. Intellectual capital can

be separated into two aspects; Human capital and Organizational capital. Human capital is associated with employee's ability, whilst organizational capital is related to the cerebral assets, intellectual property, and knowledge asset embedded in processes and culture of organization. Human capital can be assessed from Employee competence, Employee skill sets e.g. problem solving, decision making, and learning etc., Employee Expertise such or know-how, and Employee Attitude. Organization that has higher human capital, will has higher power to create value to organization. Thus, it brings to higher performance. Another aspect of intellectual capital, Organizational capital, which is a part of intellectual capital that employees created and turned into outputs (Robinson & Kleiner, 1996). Organizational capital is belong to the organization itself even employees left the organization (Wang, Wang, & Liang, 2014). It is embedded in organization innovation such as organization know-how, R&D, new technology etc., intangible infrastructure assets like organizational structure and strategy. It can be measured from the numbers of intellectual property such as patents, copyrights, brands, registered designs and processes, trade secrets, trademarks, and research publications. In addition, information technology, for instance, information systems and documentation service can also reflect the level of intellectual capital in organization (Grimald, Cricelli, & Rogo, 2013).

Employee perspective

Employees are the significant stakeholder in organization. However, with the advance in technology nowadays, many organizations tend to focus more on technology and use it to replace human beings without realizing that human is the one who manages technology and other resources to become productive. Therefore, employee perspective is added into HSC framework. Aside from skills and knowledge which are grouped as a part of intellectual capital, employee perspective also considers on four elements. First is Recruitment, selection and retention. Measurements can be the effectiveness of recruitment procedures, retention strategies, structured and rewarding career path. Second is Training and education which is indicated from Training effectiveness, Variety of training program, and the relation between training course and organization's goals. Third element is corporate culture. This reflects the relationship among employees which can be seen from Trust, Openness and good relationships,

Visionary leadership, Co-operation and co-ordination, and Communication effectiveness. The last element is Employee satisfaction. Key indicators are the satisfaction of Job, Career growth, Pay and Benefits, Rewards and Recognitions, and Empowerment.

Social perspective

Social perspective represents quality and value of relationships of organization to society. It points out to the ability in promoting ethical conduct in every organization activities. This perspective is abstract yet significant as it indicates the improvement of organization's image and goodwill. It also influences customer's evaluation on the quality of products and services. Social perspective can be measured in term of impact to society or how the impact is perceived by society. This aspect is categorized into Political image and Social image. Political image refers to the compatibility and consideration with both local and international government. Active participation in society, aid and subsidies, or tax exemption in some situations can boost up political image for organization. Meanwhile, Social image regards corporate citizenship, goodwill, contribution to society such as welfare activities, education and career consulting, employment opportunity for disabilities etc.

Table 2.2 provides sample measures according to six perspectives of HSC framework. Each aspect is classified into subgroups to clearly represent particular perspectives including sample key indicators to measure organizational performance. These key indicators are captured from several literatures. An organization does not require to use all of these measures. It depends on the goal and vision of each organization.

Table 2.2 Organizational performance indicators based on HSC framework from various researches

Organizational perspective	Key indicator	Reference
Financial perspective		
Financial performance	Return on Asset (ROA)	Kianto, Hurmelinna-Laukkanen, and Ritala (2010); Lu, Zhu, and Bao (2015)
	Profitable growth	
	Sales growth	
	Asset growth	

Table 2.2 Organizational performance indicators based on HSC framework from various researches (cont.)

	General organizational success	Garg and Ma (2005); Wang et al. (2015)
	Economic Value Added	Sureshchandar & Leisten (2005); Kianto et al. (2010)
	Return on Investment (ROI)	
Customer perspective		
Customer Satisfaction	Product and service satisfaction	Garg and Ma (2005); Wang et al. (2015)
	Product and service quality	Sureshchandar & Leisten (2005)
Customer Acquisition	No. of new customer over specific period	
Return on relationships	Repurchase intention (Customer Royalty)	Garg and Ma (2005); Wang et al. (2015)
	Market Share	Lu, Zhu, and Bao (2015)
Business Process perspective		
Regular business process	Regular monitoring and control	Sureshchandar & Leisten (2005)
	Benchmarking	
	Quality Certifications	
	Process improvement	
	Technology and infrastructure level	Garg and Ma (2005); Wang et al. (2015)
Risk management process	Risk management planning	Sax and Torp (2015)
	Risk Identification	
	Risk Analysis	
	Risk monitoring and control	
KM Process	Knowledge accumulation	Ho, Hsieh, and Hung (2014)
	Knowledge utilization	
	Knowledge internalization	
	Knowledge sharing	Sureshchandar & Leisten (2005); Ho et al. (2014)
	Knowledge creation	
	Virtual communities	
	Knowledge repository	Sureshchandar & Leisten (2005)
Intellectual Capital perspective		
Human Capital	Employee competence	Kianto et al. (2010)
	Employee skill sets e.g. Problem solving, Decision Making, and Learning	Robinson & Kleiner (1996); Sureshchandar & Leisten (2005); Wang et al. (2015)
	Employee expertise (Know-how)	
		Employee attitude
Organizational Capital	Patents, Copyrights, Registered designs and processes, Research publications	Sureshchandar & Leisten (2005); Kianto et al. (2010); Wang et al. (2014)
Employee perspective		
Recruitment; selection and retention	Effectiveness of the recruitment and selection procedures	Alfes, Shantz, & Truss (2012)
	Effectiveness of retention strategies	Wang et al. (2015)
	Effectiveness of structured and rewarding career path	Alfes, Shantz, & Truss (2012); Wang et al. (2015)

Table 2.2 Organizational performance indicators based on HSC framework from various researches (cont.)

Training and education	Variety of training program (technical, hard and soft skills)	Alfes, Shantz, & Truss (2012); Sureshchandar & Leisten (2005)
	Training effectiveness	Sureshchandar & Leisten (2005)
	Mapping of training programs with the company's long term goal	
Corporate culture	Trust	Wang et al. (2015)
	Openness and good relationships	
	Visionary leadership	
	Co-operation and co-ordination among people at different level	Kianto et al. (2010);
	Communication effectiveness	Sureshchandar & Leisten (2005)
Employee satisfaction	Career growth satisfaction	Sureshchandar & Leisten (2005); Wang et al. (2015)
	Pay and Benefits satisfaction	
	Rewards and Recognitions satisfaction	
	Job satisfaction	
	Empowerment satisfaction	Sureshchandar & Leisten (2005)
Social perspective		
Political image	Compatibility with regulatory bodies and local government	Sureshchandar & Leisten (2005)
	Tax exemptions	
	Active membership in society and communities	Dincer and Dincer (2012)
	Aid and subsidies	
Social image	Corporate citizenship	Sureshchandar & Leisten (2005)
	Goodwill	
	General image among the common public	Dincer and Dincer (2012)
	Contribution to society	

2.10 Knowledge creation and organizational performance

Knowledge and the capability to create and utilize knowledge have been considered as the vital source of organization's sustainable competitive advantage (Nonaka et al., 2000). To reach competitive advantage, it depends on how good of company's performance. The measurement models of organizational performance have been discussed in the above section indicate that organizational performance can be measured in term of financial and non-financial performance. Financial performance involves with tangible assets which can be measured in numeric figures such as

profitability, market share, and sales growth while non-financial performance is related to intangible assets which can be viewed as innovation, creativity, efficiency, and learning (Goh et al., 2012). In the new economy, performance does not reflect from traditional financial performance but non-financial performance seems to have more significant (Cumby & Conrod, 2001). Rasoulinezhad (2011) confirms that organizations must compete through continuous improvement and innovation. Walsh, Bhatt, and Bartunek (2009) argue that the success of firm mostly depends on innovation which can be implied of knowledge creation.

There are numerous researches regarding knowledge creation process and organizational performance in various industries to understand how it relates to organizational performance and what influential factors to stimulate knowledge creation are in different contexts. As discussed in the abovementioned topic, SECI model is well-known framework of knowledge creation process. Despite the fact that the origin of this model is from an industrial context in Japan, but the adoption of SECI model is seen and has been examined in organizations around the world.

2.10.1 Knowledge creation and its applications in organizations

Berraies and Chaher (2014) study the effects of knowledge creation process on firm's innovation performance and mediating effect of organizational learning on ICT companies in Tunisia. The results of research identify the importance of knowledge creation process on firm's innovation performance. There is a strong relationship between these two aspects. The research also confirms that socialization is the strongest influence process on innovation performance among four knowledge conversion processes in SECI model. Moreover, externalization and internalization are also positively relate to innovation performance. However, combination appears to have no direct effect to innovation performance but it has indirectly effect through organizational learning. Finding reveals that knowledge creation process has a positive and significant on organizational learning. They also conclude that knowledge creation process is a fundamental aspect of organizational learning (Berraies & Chaher, 2014). A similar study is conducted in Spain, the work of Ramírez et al. (2011) which is about investigating the relationship between knowledge creation process, organizational

learning, and effects to firm performance. The result is slightly different from Berraies and Chaher (2014) as their study shows a positive direct effect of all four knowledge conversion modes in SECI model on organizational learning. And organizational learning is a mediator to organizational performance. Organizational learning empowers the improvement of firm performance. Therefore, SECI model has indirect effect to organizational performance. (Ramírez et al., 2011).

There is one research explored the impact of knowledge creation practices on both financial and non-financial organizational performance in Korea. Knowledge creation practice or the five-phase model is developed and proposed by Nonaka and Takeuchi (1995) based on the knowledge conversion modes in SECI model. Sharing tacit knowledge in Socialization stage, creating concepts in Externalization stage, justifying concept in Combination stage, building archetypes in Internalization stage, and finally Cross-leveling knowledge refers to the continuous process of knowledge creation through the ontological level. Findings confirmed the positive and significant influence of knowledge creation practices in Korean labor market. The research also points out that knowledge creation practices can be accounted to 40% of organizational performance in term of financial return and knowledge-based performance (Song, 2008).

Different perspectives of knowledge creation process have been examined. Beside of direct effects to firm performance, knowledge creation process has been suggested as a mediator to firm performance as well. Tsai and Li (2007) conduct a research of SECI model and its relationship to new venture strategy and firm performance in Taiwan. New venture strategy refers to the strategy of new firm in the niche market in order to avoid direct competition with large firms. The result indicates the direct support of new venture strategy to enhance the firm performance. However, the relationship between new venture strategy and firm performance is weakened when adding SECI model as a mediator between these two factors. As a result, that new venture strategy is indirectly affected to firm performance via knowledge creation process. Hence, knowledge creation process acts as a mediator in which new venture strategy has positive effect to firm performance (Tsai & Li, 2007). The mediating effect of knowledge creation process to firm performance is also found in the work of Li, Huang,

and Tsai (2009). Their findings show that entrepreneurial orientation positively impacts to firm performance and influences knowledge creation process. In other words, knowledge creation process is a mediator through which entrepreneurial orientation benefits firm performance. This result contrasts with Omar, Aris, and Nazri (2016), who study the effect of entrepreneurial orientation, innovation capability and knowledge creation on firm performance. Omar et al. (2016) find the direct effect of knowledge creation process to firm performance but it has insignificant effect to mediate the relationship of innovation capability and firm performance and the relationship of entrepreneurial orientation and firm performance.

In term of creativity, knowledge creation shows the linkage to increase new generation of product ideas. Schulze and Hoegl (2008) collect information from companies in Germany, Austria, and Switzerland regarding the four modes of knowledge conversion and products launched onto market within last three years. They run statistical analysis to find the relationship between each mode of SECI model and the product generation. The result indicates that SECI model has significant relationship to the novelty of product ideas. However, all four modes of SECI model do not have positive relationship. Socialization and internalization appear to have positive relationship to new product ideas whereas externalization and combination are found to be negatively relate to novelty of product ideas. The reason is new product ideas usually capture from market needs. Customers cannot tell exactly what they really want because their thoughts are familiar with the existing products. Thus, it is difficult for companies to retrieve customers' information and convert it into new product ideas. Moreover, Schulze and Hoegl believe that formal meeting which is one method of externalization tends to hinder the new ideas because some employees may afraid to express their ideas in formal meeting. In addition, combination is the process referring to the existing knowledge. New knowledge from combining existing knowledge is not enough to generate truly new product ideas (Schulze & Hoegl, 2008). A more comprehensive discussion of knowledge creation on creativity is presented by Chang, Hung, & Lin. (2014). They develop a conceptual model to study the effects of knowledge creation on new product performance through creativity in Taiwanese firms. In their research, creativity can be separated into two aspects; novelty of product and appropriateness

perceived by target customers. The results show that knowledge creation has positive and significant influence on new product performance through both product novelty and product appropriateness. They also find that creativity mediates knowledge creation effects on new product performance. Deeper analysis on each knowledge conversion mode is investigated. Socialization enhances novelty and appropriate of products which positively influence new product performance. However, it is found that Socialization has no direct impact to new product performance. This contrasts with the result of Schulze and Hoegl (2008). Chang et al. (2014) explain that Socialization cannot contribute to new product performance unless we take creativity into account. Externalization influences product performance through product novelty but it turns out to be negative and insignificant on product appropriateness because R&D team may not be able to translate new ideas into meaningful contribution and this can decrease product appropriateness. For combination process, the result confirms that combination has positive effect on new product performance but has no significant on novelty and appropriateness which is in line with the result from Schulze and Hoegl (2008). The last one is internalization. The result reveals that internalization helps improve both novelty and appropriateness and it also has positive relationship with new product performance (Chang et al., 2014).

Intellectual capital is another aspect that has been confirmed to be related with knowledge creation process. Mehralian, Nazari, Akhavan, and Rasekh (2014) explore the relationship between knowledge creation process and intellectual capital in the Iran's pharmaceutical industry. Intellectual capital generally refers to the intangible assets in organization that are difficult to measure in term of financial statement. Intellectual capital consists of three elements; human capital, structural capital, and relational capital. In Mehralian et al. (2014) research, human capital can be measured from innovation & creation, experience & expertise, and learning & education. Structural capital includes systems & programs, research & development, and intellectual property rights. Relational capital involves with ALA (Alliance, Licensing, and Agreements), R.PSC (Relation with partners, suppliers, and customers), and K.PSC (Knowledge about partners, suppliers, and customers). Findings from research prove that knowledge creation process positively and directly affect to human capital. And

human capital positively impacts on structural and relational capital. In other words, knowledge creation plays an important role to improve intellectual capital which is the key resource to the success of organization (Mehralian et al., 2014).

In brief, the ability to generate new knowledge is one of key success factors for organizations to maintain competitiveness. As a result, there are several empirical studies on knowledge creation and organizational performance in different perspectives. Table 2.3 shows a summary of studies conducted on KCP and its effects to organization in different perspectives. The studies mainly investigate in non-financial performance as it appears to be more significant to organizational success in knowledge-based economy (Cumby & Conrod, 2001).

Table 2.3 Researches on KCP in different performance perspectives

Performance perspective	Key Findings	Reference
Novelty of product idea	KCP has significant relationship to novelty of product idea but not all four modes positively relate to the novelty of product idea	Schulze and Hoegl (2008)
New product performance	KCP positively relates to new product performance and creativity is a mediator on this relationship	Chang et al. (2014)
Human capital	KCP significantly influences on human capital	Shih et al. (2010)
	KCP is positively affect to human capital and help firm improves intellectual capital	Mehralian et al. (2014)
Organizational learning	KCP plays a mediating role through which organizational learning improves organizational performance	Ramírez et al. (2011)
	KCP has a significant and positive effect on organizational learning	Berraies and Chaher (2014)
Innovation	KCP as a whole or separate process is positively influence innovation process	Easa (2012)
	KCP is a key factor to improve innovation performance in organization	Berraies and Chaher (2014)

Table 2.3 Researches on KCP in different performance perspectives (cont.)

	KCP is a critical driver for innovation performance in firms and acts as a partial mediator in the link between learning organizational practices and innovation performance.	Laeque et al. (2017)
Organizational performance	KCP is positively significant to new venture strategy and acts as a mediator in which new venture strategy is positively affect to new venture performance	Tsai and Li (2007)
	KCP is strongly positive to organizational improvement and is estimated to be 40% of organizational performance	Song (2008)
	KCP has direct affect to organizational performance and mediates the relationship of entrepreneurial orientation and organizational performance	Li et al. (2009)
	KCP has positive impact to organizational performance but its mediating effect in the relationship of entrepreneurial orientation and organizational performance is insignificant.	Omar et al. (2016)

Looking at learning performance aspect, there are researches of knowledge creation in Tunisia (Berraies & Chaher, 2014) and in Spain (Ramírez et al., 2011) indicate that knowledge creation creates direct and indirect effects on organizational performance and has positively direct effect to organizational learning. Regarding efficiency perspective, there are proven results from research conducted in Korea (Song, 2008) and in Taiwan (Tsai & Li, 2007) that knowledge creation practices and process helps increase the efficiency in terms of financial and non-financial performance. Creativity is another point which knowledge creation involves with. Research of knowledge creation and creativity using information from Germany, Austria, and Switzerland (Schulze & Hoegl, 2008) and in Taiwan firms (Chang et al., 2014) are found that knowledge creation process has positive and significant impact to new product

performance. Lastly, knowledge creation shows the positive connection to the improvement of intellectual capital. This has been confirmed from the research of pharmaceutical firms in Iran (Mehralian et al., 2014).

Despite that the positive effect of knowledge creation process reflects to organizational performance, some researches find different impact of each knowledge conversion mode. Research findings state that culture and business environment are factors that influence each process of SECI model (Weir & Hutchings, 2005; Andreeva & Ikhilchik, 2011; Easa & Fincham, 2012). Figure 2.2 presents a summary result from SECI model towards organizational performance at variance culture and business context.

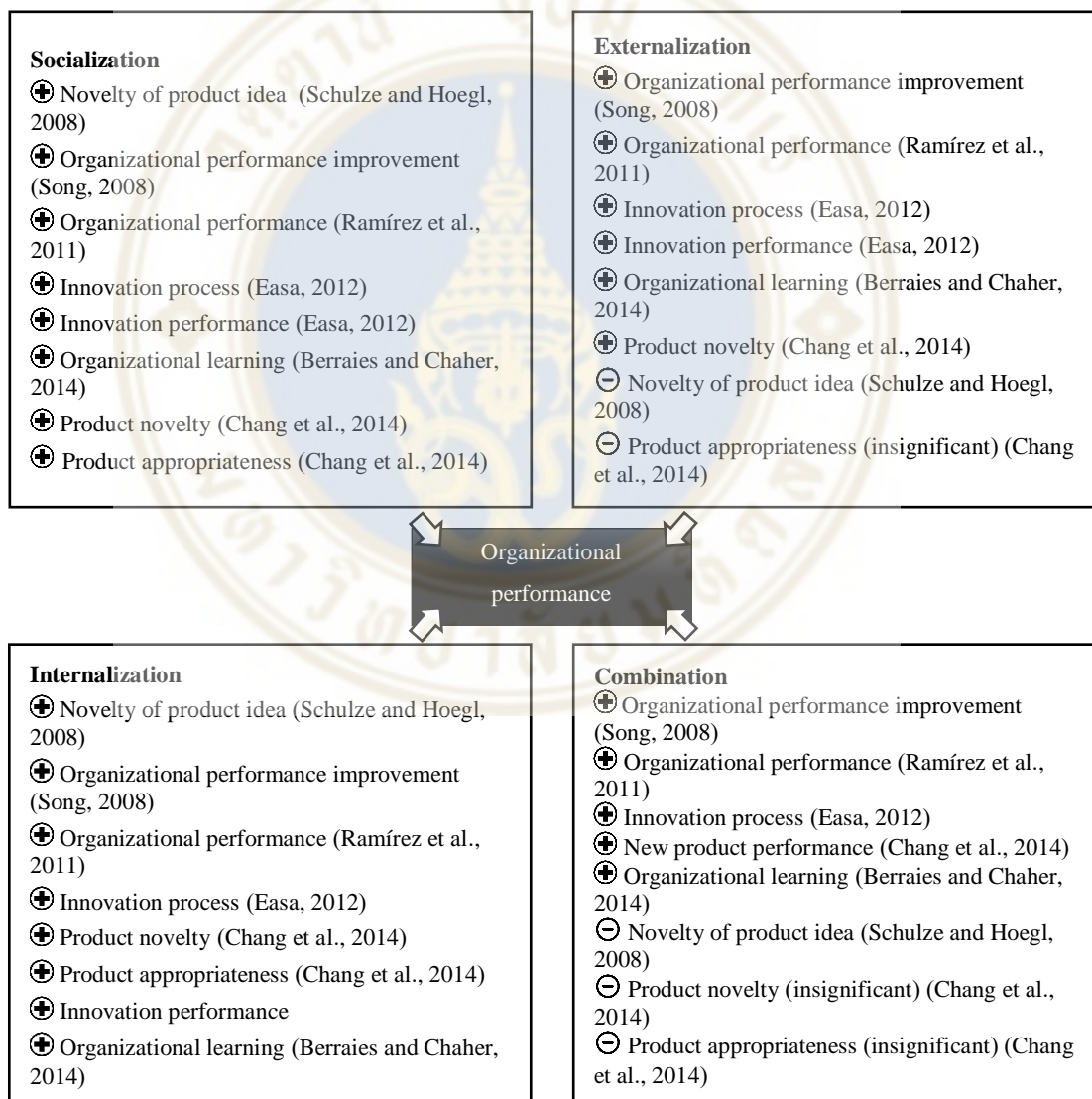


Figure 2.2 SECI effects on organizational performance

The importance of knowledge creation has been recognized and believed to be a key success factor for organizations. It is clearly seen that knowledge creation positively affect to organizational performance in different industries and national countries. SECI model has been proved to be the foundation of knowledge creation in organizations. But when investigating on each knowledge conversion modes, not all modes generate the same impact to organizational performance. All of them point out the effect of knowledge creation to different perspectives such as efficiency, innovation, creativity or learning. Furthermore, empirical studies of knowledge creation are mainly in developed countries. As author has reviewed on researches from several e-journal databases such as Emerald Insight, EBSCO, Science Direct, and Wiley online library (as of May 2015), there is no research regarding knowledge creation and organizational performance in Southeast Asia yet.

With the fact that SECI model generates different results to organizational performance in different context and the lack of knowledge creation research in South East Asia. Hence, there is a room for further study of knowledge creation process and its effects to organizational performance in this area.

2.11 Research hypotheses

Understanding theory of knowledge creation, learning its applications and realizing the gap that still left, hypotheses are discussed in this section. In this study, Nonaka and Takeuchi's concept of knowledge creation process or SECI model is the focus framework and its effects on organizational performance are the consequences that will be analyzed. From the section of knowledge creation and its applications, there are various researches which found that knowledge creation process has both direct and indirect effects to performance in organization. As discussed earlier, knowledge creation process refer to the four modes of knowledge conversion; Socialization, Externalization, Combination, and Internalization. These four knowledge conversion modes combine into continuous processes. Starting from Socialization where an employee gains new tacit knowledge from another employee via social interactions, then pass through Externalization stage where employee transforms tacit knowledge in their mind into

explicit knowledge. The explicit knowledge is shared to other employees and then synthesized into new explicit knowledge during Combination stage. Lastly, employees retrieve the explicit knowledge and absorb into tacit knowledge by practicing. This occurs in Internalization mode. Knowledge creation process expands from individuals to group and organization level. As a result, SECI model creates knowledge memory to organization. It adds value to organizations, helps firms to integrate emerging knowledge into strategic development (Nonaka, 1994), expands organizational learning, utilizes human capital, and enhances processes. New knowledge from knowledge creation process empowers organization to develop new product at lower cost and more efficient than competitors (Li, Huang, & Tsai, 2009). With the reasons mentioned earlier, it is believed that organizations with better knowledge creation process will lead to better performance. Thus, it becomes the first hypothesis;

H1: *Knowledge creation process positively relates to organizational performance*

According to prior literatures, knowledge creation process creates different effects to different perspectives of organization. It should be examined toward each perspective of organizational performance to deeply understand SECI model and its effect to organizational performance using HSC framework.

Financial perspective can be represented by financial measures which involves with budget and cost. Socialization and Externalization activities connect all employees to see the same picture, share mental models and experience (Nonaka et al., 2000). Combination activities create new knowledge that extends organization's ability to improve processes to be more productive (Li et al., 2009). Internalization process enables organization to utilize human resources as employees' skill is improved (Li et al., 2009). By that means, redundancies and costs are reduced. This brings to the second hypothesis;

H2: *Knowledge creation process positively relates to financial performance*

Organization needs to understand customers and be able to create new product and service to serve customers to satisfy and maintain relationship with them. Socialization activities help employees establish the relationship with customers. When relationship is created, organization can understand customer's needs. Externalization enables employees to express their ideas about product and service into solid concepts. Explicit knowledge can be collected from inside and outside organization through Combination process which become new knowledge for product and service. Internalization activities such as trainings promote employees' skill to be able improve product and service innovation (Chang et al., 2014). Mehralian et al. (2014) also add that as employees' competences increase, they will be able to be more understand customers' requirements and develop customer relationship which leads to enhancing in customer satisfaction. Hence, the third hypothesis is proposed as the following;

H3: *Knowledge creation process positively relates to customer performance*

In HSC framework, business process concerns with 3 aspects; regular business process, risk management process, and KM process. Hence, it clearly seen that knowledge creation process is directly related to business process perspective. Socialization creates social activities among employees. Externalization facilitates internal working process as employees share their explicit knowledge which leads to the expansion of organizational knowledge. Combination creates new knowledge from existing knowledge and it is distributed to other organizational members. Employees's knowledge is increased through internalization activities which help them to work better and smarter. Ahmad and Ali (2008) emphasize that knowledge is the important asset and KM drives organization to a good investment decision in mitigating risks. Armistead (1999) also suggest that output of from knowledge creation helps solving problems especially unknown problems and new knowledge improves the existing process. Accordingly, the forth hypothesis is stated;

H4: *Knowledge creation process positively relates to business process performance*

Intellectual capital in organization can be defined in term of tangible and intangible asset. Intellectual capital in term of tangible asset can be identified from explicit knowledge that belongs to organization such as know-how, patents, copyright. Intangible asset involves with employee's skill and competence. In this instance, this is where knowledge creation process assists to create intellectual capital to organization. Socialization process creates new tacit knowledge through shared experiences. Externalization process converts those tacit into explicit knowledge which becomes a part of organizational knowledge. Combination activities allow employees to extend organizational knowledge by synthesize existing knowledge into new ones. Internalization enhances employees' skill sets through learning and training processes. Mehralian et al. (2014) claim that knowledge creation process helps increase intellectual capital and play a mediator role in intellectual capital accumulation. Therefore, the fifth hypothesis is developed;

H5: *Knowledge creation process positively relates to intellectual capital performance*

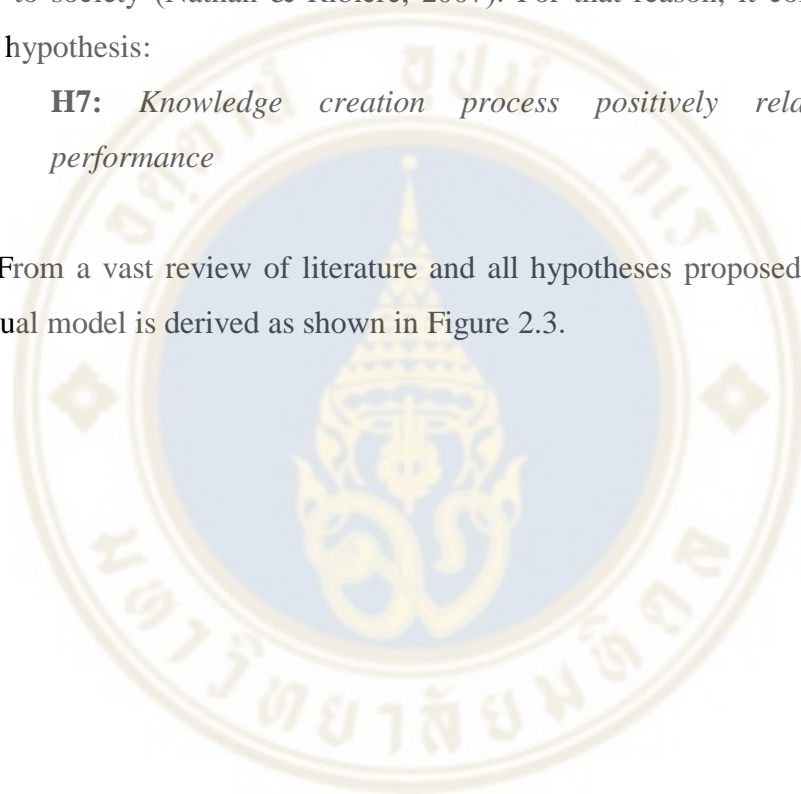
Regarding to HSC framework, employee perspective focus on four aspects: Recruitment, selection and retention, Training and education, Corporate culture, and Employee satisfaction. It is found that there is a strong relationship between HR practices and tacit knowledge sharing that the recruitment, reward system and performance appraisal encourage and induce knowledge sharing activities (Gulati & Khera, 2013) which are indeed occur during SECI process. Experience from expert in Externalization stage help in building powerful training and education programs. Corporate culture which is about trust, openness and working environment can be improved from Socialization activities. As Nonaka et al. (2000) stated that sharing experience using social interactions creates the common view and empathy among employees and encourage them to help each other. With the above discussion, the sixth hypothesis is established;

H6: *Knowledge creation process positively relates to employee performance*

Social perspective in HSC framework is related with the relationship of organization and society. Political image is about compliance with government regulations, being active membership in communities and society. Social image concerns with contributive activities to society. Knowledge creation process may not dominant when discussing in this perspective. However, when combining knowledge with actions along with ethics and social considerations, it becomes wisdom which can be learned and disseminated to all employees through SECI activities. In this sense, the wisdom helps organization gain competitive advantage by doing the right thing that benefits to society (Nathan & Ribière, 2007). For that reason, it comes up with the seventh hypothesis:

H7: *Knowledge creation process positively relates to social performance*

From a vast review of literature and all hypotheses proposed above, research conceptual model is derived as shown in Figure 2.3.



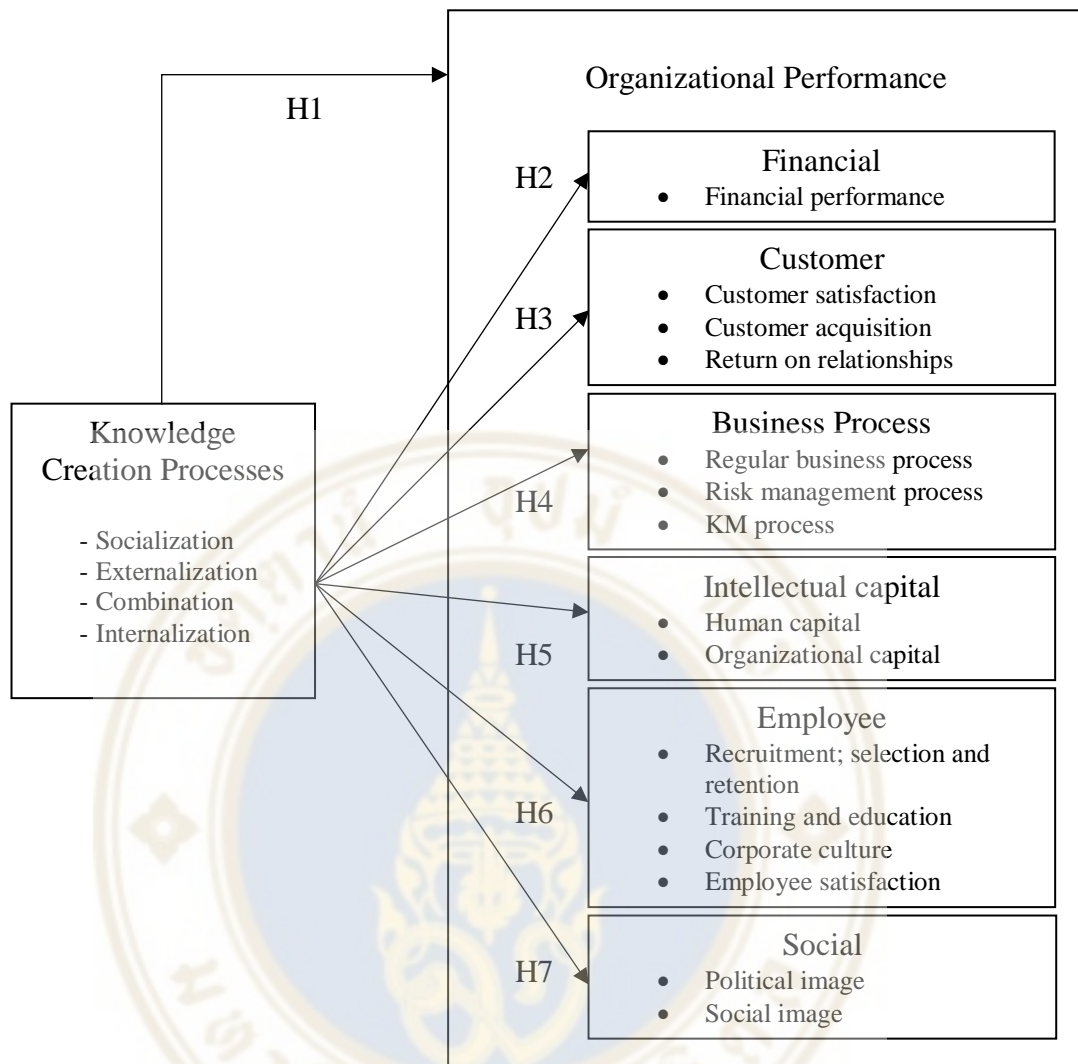


Figure 2.3 Research conceptual model

CHAPTER III

RESEARCH METHODOLOGY

The chapter explains research methodology regarding methods to acquire answers for the research questions and achieve research objectives. The first part discusses about research strategy and data collection. Measurement of independent and dependent variables are listed as the questionnaire items. Next part concerns with research community to specify the boundary of research. The sample size for both full scale survey and pilot testing is calculated to find the suitable numbers for research sample, followed by the quality of measurement. The last part of this chapter presents analytical methods by using statistical techniques to analyze data.

3.1 Research methodology

Research methodology can be categorized into two elements; inductive and deductive strategies (Easa, 2012). The objective of inductive strategy is to study the research context to get a theory. With inductive strategy, relevant data are determined to find the pattern in data, then theory is developed from those patterns. While, deductive strategy refers to the understanding of existing theories then deriving the hypotheses. The outcome of deductive strategy is hypotheses testing whether to accept or reject the hypotheses. In this study, a deductive strategy was used as the goal of this research is to understand the relationship of knowledge creation process and the organizational performance. The research examined existing theory by using SECI model to be a model for knowledge creation process and organizational performance was measured by HSC framework.

3.2 Data collection

Quantitative method was used to collect data as it is suitable for testing hypothesis by using statistical tools to quantify attitudes and perception. This study applied questionnaire as a quantitative tool to collect perception of respondents regard to SECI process which are independent variables and the perception of respondents toward organizational performance which are dependent variables. The questionnaire will be distributed through both online and offline channels. Google form is used to create online survey which is easy to access and be able to reach target group faster than a paper questionnaire. Online survey also reduces time to collect responses and creates more accurate as there is no human error when entering responses into database. Moreover, respondents can choose a time that is best suits for them to answer the questions. However, it needs an up-to-date contact list and needs to wait for respondents to return their survey. With those reasons, offline questionnaire is another option for collecting data. It is good to collect on-the-spot target groups and respondents can also ask questions immediately when they needs clarification.

3.3 Measurement of variables

The questionnaire was divided into three parts. Both part one and two were positive closed-ended questions to measure the knowledge creation process within organization and the organizational performance. The Likert-scale was used as it is one of the most popular formats to measure attitudes (Easa, 2012). The responses were rated on 5-point scale ranging from strongly disagree (1) – disagree (2) – neutral (3) – agree (4) – strongly agree (5). All answers in Part one and two were used the same scale to ease respondents to record their answers. Part three involved with respondent's demographics which were open-ended and multiple-choice questions.

The first part was related to SECI process to determine the activities performed by respondents themselves or respondents' organizations. Table 3.1 shows the list of variables and how they were measured in the questionnaire. SECI process was divided into four sections; Socialization contained 9 items adapted from the study of

Popadiuk and Choo (2006), Teerajetgul and Charoenngam (2006), Tsai and Li (2007), Schulze and Hoegl (2008), and Easa (2012). Externalization consisted of 5 items which were measured using scale indicated in the work of Teerajetgul and Charoenngam (2006), Tsai and Li (2007), and Easa (2012). Combination was listed into 7 items adjusted from the research of Popadiuk and Choo (2006), Teerajetgul and Charoenngam (2006), Tsai and Li (2007), Schulze and Hoegl (2008), and Easa (2012). Internalization was measured using 4 items obtained from the study of Popadiuk and Choo (2006), Teerajetgul and Charoenngam (2006), Tsai and Li (2007), Song (2008), and Schulze and Hoegl (2008).

Table 3.1 List of SECI process variables

Socialization	
Variable	Questionnaire item
1. Informal meeting	I spend time having informal discussion about work during coffee break or lunch
2. Social activities	My company encourages social activities outside workplace. Ex. Outing trip
3. Workshop & Training program	My company provides workshops, seminars and training programs for employees
4. Face to face meeting	I spend time in brainstorming about suggestions, ideas, or solutions in face-to-face meeting
5. Mentoring & Apprenticeship	Knowledge are transferred from mentors to apprentices
6. Job rotation	My company has a plan to rotate staff across areas
7. Co-operative project	My company initiates joint projects across departments
8. Sharing experience with external parties	My company shares experience with customers, partners, experts, and competitors
9. Collaborative environment	My company encourages peer support and collaboration between employees
Externalization	
Variable	Questionnaire item
1. Metaphors	I usually express my ideas or concepts into models, diagrams and metaphors
2. Findings of meetings	I document findings from meeting, seminars, workshops, and training programs

Table 3.1 List of SECI process variables (cont.)

3. Expert experience	My company collects best practices from experts and documents it
4. Reports of external parties	My company provides reports about customers or competitors based on its accumulated experience
5. Training Topic	My company set up training topics for employees based on experts' suggestions
Combination	
Variable	Questionnaire item
1. Repository & Database	My company uses database to collect data and categorizes into well-structured information
2. Internal Web-pages	My company creates internal web-pages contained documentations and provides access for employees to reach to useful information
3. Updating database	My company usually updates its database
4. Editing and processing of knowledge	I edit and process collected information from different sources and make it more usable
5. Documented communication	Information or knowledge are disseminated to employees through presentations, reports or meetings
6. Using Communication Tools	I use communication tools such as telephone, email, and computerized networks to connect with my colleagues
7. Presentations & Reports	I use Information and knowledge from repository and summarize into presentations or reports
Internalization	
Variable	Questionnaire item
1. Learning by doing	My company encourages employees to use knowledge from organizational repository and reflect those knowledge in their jobs
2. Experimenting	My company encourages employees to take actions and allow mistakes to happen e.g. testing new offer to customers, create new working process etc.
3. On-the-job training	My company provides one-on-one training for new joiners to do their works along with coaching from senior members
4. Simulation & Forecasting	My company provides models and case scenarios for simulation which can be used for predicting outcome

The second part of questionnaire is an organizational performance part. Respondents will be asked to specify their perception toward their organizational performance. This part was separated into 6 sections according to HSC framework. Financial perspective consisted of 2 items adapted from Wang et al. (2015) and Lu, Zhu, and Bao, (2015). Customer perspective was adjusted from the study of Wang et al. (2015). The scale contained 3 items. Business perspective was measured using 14 items which are derived from the work of Ho, Hsieh, and Hung (2014), Sax and Torp (2015), and Wang et al. (2015). Intellectual perspective composed of the scale of 4 items adapted from the research of Kianto, Hurmelinna-Laukkanen, and Ritala (2010), Wang et al. (2014), and Wang et al. (2015). Next section is employee perspective contained 9 items modified from the study of Kianto et al. (2010), Gould-Williams and Davies (2005) as cited in Alfes, Shantz, & Truss (2012), and Wang et al. (2015). The last section is social perspective with 4 items which were sourced from the work of Dincer and Dincer (2012). Table 3.2 provides the list of organizational performance variables and how they were measured in the questionnaire.

Table 3.2 List of organizational performance variables

Financial perspective	Variable	Questionnaire item
Financial performance	General organizational success	Overall, my company is performing well
	Profitable growth	My company's profit growth rate maintains a high level in the same industry
Customer perspective	Variable	Questionnaire item
Customer Satisfaction	Product and service satisfaction	Relative to our competitors, my company's customers are satisfied with our products/services
Customer Acquisition	No. of new customer over specific period	My company has effective strategies to acquire new customers
Return on relationships	Customer royalty	In general, my company has good relationship with our customers
Business Process perspective	Variable	Questionnaire item

Table 3.2 List of organizational performance variables (cont.)

Regular business process	Regular monitoring and control	Overall, my company is productive
	Quality Certifications	My company passes quality certification such as ISO, CMMI etc.
Risk management process	Risk Identification, Risk Analysis, Risk monitoring and control	My company has ability to hedge important known risks and uncertainties
	Risk management planning	My company has ability to react to and reduce unforeseen risks
KM Process	Knowledge creation	<ul style="list-style-type: none"> - I was adequately trained by my predecessor(s) to assume my duties - Through brainstorming sessions, I can obtain useful information and recommendations without incurring excessive time cost
	Knowledge accumulation	<ul style="list-style-type: none"> - We try to preserve work-related expertise, techniques, and guidelines - We can use the management system to store required knowledge for future use
	Knowledge sharing	<ul style="list-style-type: none"> - We use information systems to facilitate information/knowledge sharing and thus improve work efficiency - We share information and knowledge when working with other department(s)
	Knowledge utilization	<ul style="list-style-type: none"> - We promote teamwork through inter-departmental information and knowledge circulation - My company encourages a culture of knowledge sharing (i.e. rewarding employees who have new knowledge, ideas, and/or suggestions)

Table 3.2 List of organizational performance variables (cont.)

	Knowledge internalization	<ul style="list-style-type: none"> - My company provides education and training to raise employee proficiency at new work tasks - Professional knowledge and information are regularly updated and properly maintained within my company
Intellectual Capital perspective	Variable	Questionnaire item
Human Capital	Employee competence	The people with whom I work are clever and creative
	Employee skill sets e.g. Problem solving, Decision Making, and Learning	The people with whom I work have the appropriate skill set to contribute to the firm's success (e.g. problem-solving, decision making etc.)
Organizational Capital	Patents, Copyrights, Registered designs and processes, Research publications	<ul style="list-style-type: none"> - My company has a lot of useful information in documents and databases - The overall operating procedure of my company is very efficient
Employee perspective	Variable	Questionnaire item
Recruitment; selection and retention	Effectiveness of the recruitment and selection procedures	A rigorous selection process is used to select new recruits
	Effectiveness of retention strategies	Compared with other companies in the industry, my company has lower employee turnover
Training and education	Training effectiveness	My company provides effective training programs to employees
	Mapping of training programs with the company's long term goal	Training programs are mapped with the company's long term goal
Corporate culture	Trust, Openness and good relationships	Relative to other companies, my company is enjoyable place to work
	Visionary leadership	I have confidence in the leadership of my company's management team

Table 3.2 List of organizational performance variables (cont.)

Employee satisfaction	Career growth satisfaction	I am satisfied with my career progress in the company
	Pay and Benefits satisfaction	- I am satisfied with my pay - I am satisfied with the benefits program
Social perspective	Variable	Questionnaire item
Political image	Compatibility with regulatory bodies and local government	My company complies with regulatory bodies and local government
	Active membership in society and communities, Aid and subsidies	My company sponsors and finances voluntary service
Social image	General image among the common public	My company integrates charitable contributions into its business activities
	Contribution to society	My company regularly makes donations to charity

Last part of questionnaire covered respondent's information. The respondent will be asked to fill in personal details including gender, educational level, company name, working department, job position, year of experience and salary. The questionnaire was developed in English and translated into Thai by an expert translator. This is to minimize misunderstandings because not all employees understand English. Then, the questionnaire in Thai version was translated back to English and compare with the original version to ensure that all contents were carried without changing the meaning. Full questionnaire in English and Thai version are provided in Appendix 1.

3.4 Research community

According to statement of purpose in chapter 1, knowledge is one of the most important asset in organization especially in banking industry which plays an important role in both national and global economy (Easa, 2012). However, there is still lack of investigation regarding to Knowledge creation process. Therefore, it is interesting to examine knowledge creation process in banking industry. This study

focused on banking industry in Thailand. The primary priority would be Thai commercial banks as they have the share of 47.9% of total asset of financial institutions which is the largest share in Thailand's financial institutions (Bank of Thailand, 2014). Commercial bank in Thailand contains 14 banks as shown below (Bank of Thailand, 2015);

1. BANGKOK BANK PUBLIC COMPANY LIMITED
2. BANK OF AYUDHYA PUBLIC COMPANY LIMITED
3. CIMB THAI BANK PUBLIC COMPANY LIMITED
4. INDUSTRIAL AND COMMERCIAL BANK OF CHINA (THAI) PUBLIC COMPANY LIMITED
5. KASIKORN BANK PUBLIC COMPANY LIMITED
6. KIATNAKIN BANK PUBLIC COMPANY LIMITED
7. KRUNG THAI BANK PUBLIC COMPANY LIMITED
8. LAND AND HOUSES BANK PUBLIC COMPANY LIMITED
9. SIAM COMMERCIAL BANK PUBLIC COMPANY LIMITED
10. STANDARD CHARTERED BANK (THAI) PUBLIC COMPANY LIMITED
11. THANACHART BANK PUBLIC COMPANY LIMITED
12. TISCO BANK PUBLIC COMPANY LIMITED
13. TMB BANK PUBLIC COMPANY LIMITED
14. UNITED OVERSEAS BANK (THAI) PUBLIC COMPANY LIMITED

3.5 Research sample

As data of the whole population cannot be collected, it is important that sample size is needed to be a representative from the large population. There are several ways to determine sample size. In this study, applying formula is used to quantify sample size. Cochran developed the equation to calculate a representative sample of population (Israel, 1992). The equation is

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where n_0 = number of sample size

Z = the abscissa of the normal curve that cuts off an area α at the tails

p = the estimated proportion of an attribute that is present in the population

$q = 1 - p$

e = the desired level of precision

From the formula above, target size can be calculated. The value of Z can be found from Z table according to the desired confidence level. In general, the desired confidence level is 95% with $\pm 5\%$ of precision level. In this case, the exact degree of variability is unknown. Therefore, the maximum variability in proportion which equals to 0.5 is used to derive more conservative target size. The resulted sample size is illustrated below.

$$\frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384.16$$

The sample size was rounded up to 400 respondents to acquire more reliable data. The first priority is Thailand's four largest commercial banks which are Bangkok Bank (BBL), Siam Commercial Bank (SCB), Kasikornbank (KBANK) and Krung Thai Bank (KTB). These large banks are commercial banks with market share of Total Assets > 10% (Bank of Thailand, 2015). The majority of sample should be from these banks as they can be representatives for the whole picture of Thai commercial bank sector.

3.5.1 Pilot testing

Since the questionnaire is quite long and require at least 20 minutes for respondent to complete all questions. Pilot testing will be conducted in a small group of employees. It was suggested by Johanson and Brooks (2010) that the minimum target size is 30 respondents for preliminary survey or scale development. Again, target size was rounded up to 50 respondents to increase precision rate. The objectives of pilot testing is to check whether all questions are necessary and have sufficient significant to be the measurement scale. Statistical technique will be used to remove double meaning questions or insignificant measures to shorten the questionnaire which lead to higher valid response.

3.6 Quality of measurement

There are two key criteria to ensure the quality of questionnaire; reliability and validity. Reliability concerns with the degree of consistency to which the research measure is free from random error. That is to say, the research measure needs to provide the same result whenever it is used under the same conditions. Validity refers to the degree of accuracy to which the research measure is intended to measure. In other words, the research measure should actually measures what it is supposed to measure.

3.6.1 Reliability

In order to assess reliability, Cronbach's alpha is the most common measure to evaluate the internal-consistency reliability particularly when using the Likert scale in the questionnaire. It measures how closely of questionnaire items in a set are related. If the items are closely related, then it means that the items are measuring the same thing and the questionnaire is consistent and reliable. This research uses SPSS to calculate Cronbach's alpha for reliability analysis.

3.6.2 Validity

There are three kinds of validity that were using frequently in quantitative researches; content, construct and criterion (Gloet & Terziovski, 2004). Content validity is used to ensure that the research measures can represent the universe of the variable being measured. In this study, the selection of variables and theoretical frameworks including SECI model and HSC framework were based on comprehensive review of the literatures. Thus, adequate variables were captured. It can be concluded that the questionnaire has a reasonable degree of content validity.

Construct validity involves with the validation of measures to find if a research measure reflects what it was designed to measure. Factor Analysis method is used to assess the construct validity. This study uses principle component analysis which is a variable-reduction technique to remove insignificant variables from measurement scale and to verify that all measurement scale in the questionnaire contains construct validity in the acceptance level.

The last kind of validity is criterion validity. Criterion validity is also called Predictive validity or External validity (Gloet & Terziowski, 2004). It refers to the extent to which the questionnaire items are related to the outcome. In this instance, to examine that SECI model is related to Organizational performance, multiple correlation coefficient is used to indicate the quality of prediction of the independent variables.

3.7 Data analytical methods

This study uses variety of statistical methods to analyze data by using SPSS statistics software. Each method aims to investigate data according to research questions and hypotheses. The statistical methods are explained as the following:

Cronbach's alpha is used to indicate the inter-consistency reliability of all variables in the questionnaire.

Principle component analysis (PCA) is used to test the construct validity. As stated in validity section above, this method ensures that SECI measures in the questionnaire are well correlated to measure each SECI process. PCA technique also indicates the insufficient representative of scale. Therefore, it is used to minimize the internal correlation of SECI variables regarding the effect on the organizational performance.

Frequency and percentage distribution is used to represent basic descriptive statistics of respondents' profiles as well as their responses on the SECI activities and the perception of organizational performance.

Multiple regression indicates the importance of each independent variables toward the dependent variables. It is used to test all hypotheses to understand the relationship of SECI process, the independent variables and the organizational performance, the dependent variables.

Independent t-test is the statistical method for testing difference between 2 unrelated groups. It is used to determine the significant difference of means between genders.

One-way analysis of variance (ANOVA) is used to compare 3 or more unrelated groups on the same dependent variables. In this study, this technique is used to examine different responses based on age, educational level, position status, years of working experience, and salary.



CHAPTER IV

FINDINGS

The chapter provides the quantitative results from data analysis. Pilot testing was performed to analyze small size of data before testing with the large sample size. Reliability and validity were analyzed to ensure the quality of measurements. Next part explores the descriptive profiles of all respondents and examine the perception of knowledge creation process and organizational performance between demographic groups. The results from hypotheses testing were discussed, followed by the summary of findings at the end of this chapter.

4.1 Pilot testing analysis

As stated in Chapter 3, pilot testing was launched in a small group of employees. Questionnaires were distributed to 65 participants. 51 responses were returned or 78.5% return rate. One response was excluded due to out of target group as respondent answered to be a non-bank employee. There were 50 valid responses. The distribution of respondents is shown in Table 4.1.

Table 4.1 Distribution of pilot responses

Bank Name	Bank Type	Frequency	%
Krung Thai Bank	Thai commercial bank	26	52%
Kasikorn Bank	Thai commercial bank	14	28%
Siam Commercial Bank	Thai commercial bank	6	12%
Standard Chartered Bank (Thai)	Thai commercial bank	1	2%
Thanachart Bank	Thai commercial bank	1	2%
Bank of Ayudha	Thai commercial bank	1	2%
TMB Bank	Thai commercial bank	1	2%
Total		50	100%

4.1.1 Data preparation

Before running analysis, it is necessary to arrange format of response data when importing into SPSS software. All questionnaire items were defined into codes. Perception towards Knowledge Creation Process and Organizational Performance were ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Table 4.2 and 4.3 displays the list of questionnaire items with its codes and label.

Table 4.2 Code and label of knowledge creation items

No	Questionnaire Item	Code	Label
1	I spend time having informal discussion about work during coffee break or lunch	K_S1	Informal meeting
2	My company encourages social activities outside workplace. Ex. Outing trip	K_S2	Social activities
3	My company provides workshops, seminars and training programs for employees	K_S3	Workshop & Training program
4	I spend time in brainstorming about suggestions, ideas, or solutions in face-to-face meeting	K_S4	Face to face meeting
5	Knowledge are transferred from mentors to apprentices	K_S5	Mentoring & Apprenticeship
6	My company has a plan to rotate staff across areas	K_S6	Job rotation
7	My company initiates joint projects across departments	K_S7	Co-operative project
8	My company shares experience with customers, partners, experts, and competitors	K_S8	Sharing experience with external parties
9	My company encourages peer support and collaboration between employees	K_S9	Collaborative environment
10	I usually express my ideas or concepts into models, diagrams and metaphors	K_E1	Metaphors
11	I document findings from meeting, seminars, workshops, and training programs	K_E2	Findings of meetings
12	My company collects best practices from experts and documents it	K_E3	Expert experience
13	My company provides reports about customers or competitors based on its accumulated experience	K_E4	Reports of external parties

Table 4.2 Code and label of knowledge creation items (cont.)

14	My company set up training topics for employees based on experts' suggestions	K_E5	Training Topic
15	My company uses database to collect data and categorizes into well-structured information	K_C1	Repository & Database
16	My company creates internal web-pages contained documentations and provides access for employees to reach to useful information	K_C2	Internal Web-pages
17	My company usually updates its database	K_C3	Updating database
18	I edit and process collected information from different sources and make it more usable	K_C4	Editing and processing of knowledge
19	Information or knowledge are disseminated to employees through presentations, reports or meetings	K_C5	Documented communication
20	I use communication tools such as telephone, email, and computerized networks to connect with my colleagues	K_C6	Using Communication Tools
21	I use Information and knowledge from repository and summarize into presentations or reports	K_C7	Presentations & Reports
22	My company encourages employees to use knowledge from organizational repository and reflect those knowledge in their jobs	K_I1	Learning by doing
23	My company encourages employees to take actions and allow mistakes to happen e.g. testing new offer to customers, create new working process etc.	K_I2	Experimenting
24	My company provides one-on-one training for new joiners to do their works along with coaching from senior members	K_I3	On-the-job training
25	My company provides models and case scenarios for simulation which can be used for predicting outcome	K_I4	Simulation & Forecasting

Table 4.3 Code and label of organizational performance items

No	Question	Code	Label
1	Overall, my company is performing well	P_F1	General organizational success

Table 4.3 Code and label of organizational performance items (cont.)

2	My company's profit growth rate maintains a high level in the same industry	P_F2	Profitable growth
3	Relative to our competitors, my company's customers are satisfied with our products/services	P_C1	Customer Satisfaction
4	My company has effective strategies to acquire new customers	P_C2	Customer Acquisition
5	In general, my company has good relationship with our customers	P_C3	Return on relationships
6	Overall, my company is productive	P_B1	Regular monitoring and control
7	My company passes quality certification such as ISO, CMMI etc.	P_B2	Quality Certifications
8	My company has ability to hedge important known risks and uncertainties	P_B3	Risk Identification, Risk Analysis, Risk monitoring and control
9	My company has ability to react to and reduce unforeseen risks	P_B4	Risk management planning
10	I was adequately trained by my predecessor(s) to assume my duties	P_B5	Coaching and Mentoring
11	Through brainstorming sessions, I can obtain useful information and recommendations without incurring excessive time cost	P_B6	Brainstorm
12	We try to preserve work-related expertise, techniques, and guidelines	P_B7	Best Practice
13	We can use the management system to store required knowledge for future use	P_B8	Database
14	We use information systems to facilitate information/knowledge sharing and thus improve work efficiency	P_B9	Information System
15	We share information and knowledge when working with other department(s)	P_B10	Knowledge sharing
16	We promote teamwork through inter-departmental information and knowledge circulation	P_B11	Knowledge circulation

Table 4.3 Code and label of organizational performance items (cont.)

17	My company encourages a culture of knowledge sharing (i.e. rewarding employees who have new knowledge, ideas, and/or suggestions)	P_B12	Knowledge sharing culture
18	My company provides education and training to raise employee proficiency at new work tasks	P_B13	Education and Training program
19	Professional knowledge and information are regularly updated and properly maintained within my company	P_B14	Updated knowledge
20	The people with whom I work are clever and creative	P_IC1	Employee competence
21	The people with whom I work have the appropriate skill set to contribute to the firm's success (e.g. problem-solving, decision making etc.)	P_IC2	Employee skill sets
22	My company has a lot of useful information in documents and databases	P_IC3	Useful database
23	The overall operating procedure of my company is very efficient	P_IC4	Operating procedure
24	A rigorous selection process is used to select new recruits	P_E1	Effectiveness of the recruitment and selection procedures
25	Compared with other companies in the industry, my company has lower employee turnover	P_E2	Effectiveness of retention strategies
26	My company provides effective training programs to employees	P_E3	Training effectiveness
27	Training programs are mapped with the company's long term goal	P_E4	Training programs with the company's goal
28	Relative to other companies, my company is enjoyable place to work	P_E5	Working atmosphere
29	I have confidence in the leadership of my company's management team	P_E6	Visionary leadership
30	I am satisfied with my career progress in the company	P_E7	Career growth satisfaction
31	I am satisfied with my pay	P_E8	Pay Satisfaction
32	I am satisfied with the benefits program	P_E9	Benefit Satisfaction

Table 4.3 Code and label of organizational performance items (cont.)

33	My company complies with regulatory bodies and local government	P_S1	Regulatory compliance
34	My company sponsors and finances voluntary service	P_S2	Sponsorship
35	My company integrates charitable contributions into its business activities	P_S3	Social contribution
36	My company regularly makes donations to charity	P_S4	Charity donation

4.1.2 Pilot data analysis

The purposes of pilot testing are to ensure that all questions are clear to respondents and reduce redundancy among independent variables. The high correlated variables can cause multicollinearity problem in regression model which leads to decreasing in reliability and misleading results. There are two simple ways to detect multicollinearity; correlation analysis and variance inflation factor (Stevens, 2002). Correlation analysis indicates the relationship between variables. In this research, independent variables are classified as ordinal data. Thus, it is suitable to use Spearman correlation which is a technique to analyze the association between two rank ordering. The value of correlation coefficient ranges from -1 to 1. Negative value or less than 0 implies a negative correlation while value greater than 0 implies a positive correlation (Rosenthal, 2012). Qualitative descriptors explain the strength of association and interpret the correlation. Table 4.4 provides size and strength of association for correlation coefficient.

Table 4.4 Size and strength of association for correlation coefficient

Source: Rosenthal, 2012.

Correlation	Size of Association	Strength of Association
About 0.10 (or – 0.10)	Small	Weak
About 0.30 (or – 0.30)	Medium	Moderate
About 0.50 (or – 0.50)	Large	Strong
About 0.70 (or – 0.70)	Very large	Very strong

After running correlation on all independent variables, it is found that there are very strong association (correlation ≥ 0.70) among variables which were listed in Table 4.5. Collaborative environment was highly related to Experimenting while Repository & Database had strong association with Updating database, Documented communication, and Presentations & Reports. Internal Web-pages was strongly correlated with Updating database and Simulation & Forecasting. Lastly, there was a high correlation between Updating database and Simulation & Forecasting. Full result of pairwise correlations of all independent variables can be found in Appendix 2.

Table 4.5 Items of independent variables with very strong association (correlation ≥ 0.70)

Items	Collaborative environment	Repository & Database	Internal Web-pages	Updating database
Updating database	.571	.725	.759	1.000
Documented communication	.699	.703	.561	.557
Presentations & Reports	.508	.737	.681	.618
Experimenting	.724	.587	.407	.516
Simulation & Forecasting	.681	.636	.717	.705

According to result from correlation analysis, it is undeniable that there were some redundancies between independent variables. Another method to signal redundancy is to find variance inflation factor of each predictor (independent variable). Variance inflation factor (VIF) is calculated from $1/(1 - R_j^2)$ where R_j^2 is the squared multiple correlation by regressing the j^{th} predictor on all other predictors (Stevens, 2002). VIF indicates how much the variances of the estimated regression coefficients are inflated when compared to having uncorrelated predictors in model. The higher the VIF value, the higher correlation among the predictors. Generally, the VIFs > 10 is a sign of serious multicollinearity and then should be removed from the model to lessen the multicollinearity and reduce standard errors of the estimated regression coefficients of the remaining variables (Kutner, Nachtsheim, Neter, & Li, 2005). The VIF values of very strong correlation are provided in Table 4.6. Considering each pairwise of strong association in Table 4.5, the higher VIF value should be eliminated to minimize

multicollinearity problem. VIF of Collaborative environment and Experimenting were 8.46 and 4.67 respectively. Thus, Collaborative environment was removed. Repository & Database was highly related with another three variables; Updating database, Documented communication, and Presentations & Reports. Among them, Updating database had the smallest VIF. Therefore, the rest variables were removed. Next pairwise was Internal Web-pages and Updating database. Comparing the VIF value, Internal Web-pages was deleted. Last pairwise was Updating database and Simulation & Forecasting. It is clearly that Simulation & Forecasting should be deleted.

Table 4.6 VIF of very strong correlation items

Items	VIF
Collaborative environment	8.46
Repository & Database	7.85
Internal Web-pages	9.66
Updating database	7.08
Documented communication	9.91
Presentations & Reports	8.82
Experimenting	4.67
Simulation & Forecasting	11.50

In summary, Pilot testing is a process to validate and improve questionnaire. Unnecessary questions should be erased. Ambiguous questions should be corrected before starting full survey. Correlation analysis and VIF were used as diagnosed methods to identify redundancy variables. In the end, very strong association and high VIF variables were eliminated to shorten the questionnaire. There are 6 variables that were deleted which are Collaborative environment, Repository & Database, Documented communication, Presentations & Reports, Internal Web-pages, and Simulation & Forecasting.

4.2 Data analysis

After conducted pilot testing, full survey was launched via online and offline channels. Six hundred and fifty six questionnaires were sent out to target groups and

424 questionnaires were returned which is 64.6% response rate. There were 24 invalid responses which were 15 non-bank employees and 9 uncompleted questionnaires. The remaining were 400 valid responses which perfectly met the target sample size. Table 4.7 shows the frequency distribution by type of bank. The majority of responses were from 4 large commercial banks. The highest contribution was Siam Commercial Bank followed by Kasikorn Bank, Krungthai Bank, and Bangkok Bank respectively. These four banks contributed to 69% of total responses.

Table 4.7 Distribution of responses

Bank Name	Bank Type	Frequency	%
Bangkok Bank	Thai Commercial Bank	57	14.3%
Bank of Ayudha	Thai Commercial Bank	13	3.3%
CIMB Thai Bank	Thai Commercial Bank	5	1.3%
Industrial and Commercial Bank of China (Thai)	Thai Commercial Bank	2	0.5%
Kasikorn Bank	Thai Commercial Bank	72	18.0%
Kiatnakin Bank	Thai Commercial Bank	14	3.5%
Krung Thai Bank	Thai Commercial Bank	69	17.3%
Land and Houses Bank	Thai Commercial Bank	5	1.3%
Siam Commercial Bank	Thai Commercial Bank	78	19.5%
Standard Chatered Bank (Thai)	Thai Commercial Bank	7	1.8%
Thanachart Bank	Thai Commercial Bank	30	7.5%
Tisco Bank	Thai Commercial Bank	6	1.5%
TMB Bank	Thai Commercial Bank	12	3.0%
United Overseas Bank (Thai)	Thai Commercial Bank	20	5.0%
Citibank	Foreign Bank Branch	2	0.5%
Mizuho Bank	Foreign Bank Branch	2	0.5%
Export-Import Bank of Thailand	Specialized Financial Institution	1	0.3%
The Government Housing Bank	Specialized Financial Institution	4	1.0%
The Government Savings Bank	Specialized Financial Institution	1	0.3%
Total		400	100%

4.2.1 Data preparation

In the stage of data preparation, data were arranged into codes and labels. To prevent confusion, codes and labels of variables were the same as preparing pilot data according to Table 4.2 and 4.3 except 6 variables that were removed after the pilot stage.

4.2.2 Profiles of respondents

Before conducting quantitative data analysis, respondents' profiles were explored in term of gender, age, educational level, working experience, working position, and salary to understand characteristic of respondents. Then, validity and reliability test were developed prior to multiple regression analysis which is for hypothesis testing and clarify the first two research questions. Lastly, one-way ANOVA was performed to explain the last research question.

Profiles of respondents are summarized into Table 4.8. From gender perspective, the larger part of respondent was female which accounted for 75% of total respondents. Approximately 66% was 25 to 34 years old and the majority of the highest education was bachelor degree with 71% of total respondents. Regarding the department that respondents were working for, half of them were in Retail banking department. Officer level was the greatest part in respondents as it took almost 48% of total respondents while only 11% were in manager or executive level. In term of working experience, more than half of respondents or 55% were working for over 6 years. The highest frequency was falling into 6 to 10 years of working experience and this was also in line with banking experience. Looking at the salary, 50% of respondents had salary at 15,000 to 30,000 Baht. The frequency decreased as the salary got higher to only 2 respondents which had salary more than 250,000 Baht.

Table 4.8 Profiles of respondents

	Profile	Frequency	%
Gender	Male	102	25.5
	Female	298	74.5
Age	21 - 24 years old	40	10.0
	25 - 29 years old	147	36.8
	30 - 34 years old	119	29.8
	35 - 39 years old	52	13.0
	40 - 44 years old	19	4.8
	45 - 49 years old	11	2.8
	50 - 54 years old	7	1.8
	55 - 60 years old	5	1.3
Education	Diploma level	3	0.8

Table 4.8 Profiles of respondents (cont.)

	Bachelor level	285	71.3
	Master level	111	27.8
	Doctoral level	1	0.3
Department	Retail Banking	205	51.3
	SME Business	17	4.3
	Corporate Banking	21	5.3
	Information Technology	39	9.8
	Financial Management	63	15.8
	Capital Markets Business	21	5.3
	Credit Restructuring and Asset Management	2	0.5
	Risk Management	12	3.0
	Compliance & Legal Management	3	0.8
	Internal Audit	3	0.8
	Human Resources and Corporate Governance	5	1.3
	Corporate Strategy Management	9	2.3
	Positional level	Operational Worker	76
Officer		190	47.5
Senior Officer		90	22.5
Manager / Executive		44	11.0
Working experience	<= 1 Year	37	9.3
	2 - 3 Years	75	18.8
	4 - 5 Years	65	16.3
	6 - 10 Years	146	36.5
	11 - 15 Years	39	9.8
	16 - 20 Years	17	4.3
	> 20 Years	21	5.3
Banking experience	<= 1 Years	53	13.3
	2 - 3 Years	92	23.0
	4 - 5 Years	74	18.5
	6 - 10 Years	125	31.3
	11 - 15 Years	29	7.3
	16 - 20 Years	11	2.8
	> 20 Years	16	4.0
Salary	< 15,000 THB	5	1.3
	15,000 – 30,000 THB	201	50.3
	30,001 – 45,000 THB	93	23.3
	45,001 – 60,000 THB	44	11.0
	60,001 – 75,000 THB	23	5.8

Table 4.8 Profiles of respondents (cont.)

	75,001 – 100,000 THB	19	4.8
	100,001 – 250,000 THB	13	3.3
	> 250,000 THB	2	0.5

4.2.3 Reliability analysis

Cronbach's alpha is a coefficient value that was used to estimate the reliability of variables. It ranges from 0 to 1. Increasing in alpha value indicates more correlation between variables and describes the extent that variables are measuring the same concept. The acceptance values of alpha recommended in many researches vary from 0.70 to 0.95 (Tavakol & Dennick, 2011). Using SPSS program, the Cronbach's alphas of all variables are listed in Table 4.9. The alpha value of all variables exceeded the minimum of recommended value. This is a proof of high reliability in the questionnaire.

Table 4.9 Cronbach's alpha

Variables	Cronbach's Alpha	N of Items
Knowledge Creation (SECI)	.930	19
Socialization	.838	8
Externalization	.741	5
Combination	.740	3
Internalization	.785	3
Organizational Performance	.976	36
Financial Performance	.833	2
Customer Performance	.825	3
Business Process Performance	.959	14
Intellectual capital Performance	.828	4
Employee Performance	.922	9
Social Performance	.883	4
All variables	.980	55

4.2.4 Validity analysis

Validity analysis is required to ensure that Knowledge Creation and Organizational Performance variables are valid to represent what they are intended to measure. Content validity, as indicated in Chapter 3, research variables had an adequate level of content validity because they were based on broad academic researches. For construct validity, factor analysis by using PCA method was used to separate variables that were insignificant for measurement and arrange variables into groups. KMO and Bartlett's test were used to verify if the data is suitable for factor analysis or not. The rule of thumb is Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy should be above 0.5 to determine that the sample size was appropriate. The Bartlett's Test of Sphericity must be significant at $p < 0.05$ to confirm that there are relationships among the variables (Yong & Pearce, 2013). Table 4.10 shows the KMO and Bartlett's test of all variables. The independent variables were categorized into 4 aspects based on SECI model. The dependent variables were separated into 6 perspectives; Financial, Customer, Business process, Intellectual capital, Employee and Social perspectives. The KMO measures of all variables were greater than 0.5 and the Bartlett's Test of Sphericity were significant at $p < 0.01$.

Table 4.10 KMO and Bartlett's test

Variables	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
		Approx. Chi-Square	df	Sig.
Knowledge Creation (SECI)	0.938	4021.044	171	0.000
Socialization	0.870	1084.280	28	0.000
Externalization	0.743	512.848	10	0.000
Combination	0.657	291.859	3	0.000
Internalization	0.688	353.243	3	0.000
Organizational Performance	0.966	12169.855	630	0.000
Financial Performance	0.500	287.452	1	0.000
Customer Performance	0.705	460.711	3	0.000
Business Process Performance	0.956	4807.321	91	0.000

Table 4.10 KMO and Bartlett's test (cont.)

Intellectual Capital Performance	0.722	664.348	6	0.000
Employee Performance	0.919	2407.334	36	0.000
Social Performance	0.815	921.638	6	0.000

The factor loading value is an indicator to explain how strong the factor affects the variable. In other words, it is just a simple Pearson correlation of the factor and the variable (Stevens, 2002). Factor loading value ranges from -1 to 1. The closer of absolute loading value to 1 indicates the stronger effect of factor to the variable. The absolute loading value which closes to 0 is considered to have weak effect to the variable. Stevens (2002) recommended the cut-off loading is to doubling the critical value by testing each loading for significant at $\alpha = 0.01$ (two-tailed test). Table 4.11 presents the critical value for correlation coefficient at $\alpha = 0.01$ (two-tailed test) with different sample sizes. The sample size of this study is 400. Thus, the critical value is $2 * 0.129 = 0.258$. As a result, factor loading value in absolute which is greater than 0.258 is considered to be significant.

Table 4.11 Critical values for a correlation coefficient at $\alpha = 0.01$ for a two-tailed test

N	CV	N	CV	N	CV
50	.361	180	.192	400	.129
80	.286	200	.182	600	.105
100	.256	250	.163	800	.091
140	.217	300	.149	1000	.081

Examining the eigenvalue as presented in Table 4.12, the results revealed that each SECI variable contained only 1 factor in which the eigenvalue was higher than 1. Socialization factor accounted for 48.34% of total variance. Externalization factor accounted for 50.28% of total variance while Combination and Internalization factor accounted for 66.55% and 69.98% of total variance respectively. Table 4.13-16 show factor loading of items in each factor. The factor loading of all items were higher than the suggested critical value as explained in the above section. This is an evidence that

the questionnaire items are well represented for each SECI variable, revealing the acceptance level of construct validity.

Table 4.12 Total variance explained

Variable	Component	Initial Eigenvalues		
		Total	% of Variance	Cumulative %
Socialization	1	3.867	48.338	48.338
Externalization	1	2.514	50.275	50.275
Combination	1	1.996	66.549	66.549
Internalization	1	2.099	69.975	69.975

Table 4.13 Component matrix of Socialization

Socialization items	Component
	1
Workshop & Training program	.797
Face to face meeting	.781
Social activities	.726
Co-operative project	.725
Sharing experience with external parties	.705
Mentoring & Apprenticeship	.631
Job rotation	.631
Informal meeting	.525

Table 4.14 Component matrix of Externalization

Externalization items	Component
	1
Expert experience	.848
Reports of external parties	.790
Training Topic from experts	.770
Findings of meetings	.599
Metaphors	.520

Table 4.15 Component matrix of Combination

Combination items	Component
	1
Editing and processing of knowledge	.869
Using Communication Tools	.794
Updating database	.782

Table 4.16 Component matrix of Internalization

Internalization items	Component
	1
Experimenting	.868
On-the-job training	.847
Learning by doing	.793

Exploring more on validity, another validity that needed to examine is criterion validity. As stated in Chapter 3, this kind of validity refers to the degree of independent variables that related to dependent variables. Multiple regression was used to indicate the predictive level of independent variables and assess the criterion validity. In this study, it is associated with the extent to which knowledge creation process is related to the organizational performance. Criterion validity can be assessed by examining the multiple correlation coefficient (R). Summary results in Table 4.19-25, multiple correlation coefficients were greater 0.5. This indicates that knowledge creation process has a high degree of criterion validity.

4.2.5 Descriptive data analysis

Descriptive data analysis unveiled patterns and information from raw data by summarizing data in a meaningful way. Frequency and percentage distribution is the most common way to simply represent the data. In this research, frequency and percentage distribution describes the agreement of knowledge creation activities within Thai banks and the perception regarding banking performance are shown in Table 4.17-18. For easy understanding and interpretation, the activities were arranged in descending

order by total agreement which is the sum of frequency in somewhat agree and strongly agree.

Table 4.17 Frequency and percentage distribution of knowledge creation (N=400)

Activities	Responses N (%)		
	Somewhat Agree	Strongly Agree	Total Agree
Socialization			
Mentoring & Apprenticeship	179 (44.8%)	154 (38.5%)	333 (83.3%)
Face to face meeting	209 (52.3%)	111 (27.8%)	320 (80.0%)
Workshop & Training program	183 (45.8%)	133 (33.3%)	316 (79.0%)
Co-operative project	191 (47.8%)	79 (19.8%)	270 (67.5%)
Sharing experience with external parties	178 (44.5%)	80 (20.0%)	258 (64.5%)
Social activities	164 (41.0%)	82 (20.5%)	246 (61.5%)
Informal meeting	148 (37.0%)	50 (12.5%)	198 (49.5%)
Job rotation	132 (33.0%)	61 (15.3%)	193 (48.3%)
Externalization			
Findings of meetings	202 (50.5%)	134 (33.5%)	336 (84.0%)
Expert experience	182 (45.5%)	117 (29.3%)	299 (74.8%)
Training Topic from experts	168 (42.0%)	124 (31.0%)	292 (73.0%)
Reports of external parties	185 (46.3%)	91 (22.8%)	276 (69.0%)
Metaphors	184 (46.0%)	50 (12.5%)	234 (58.5%)
Combination			
Using Communication Tools	140 (35.0%)	214 (53.5%)	354 (88.5%)
Editing and processing of knowledge	213 (53.3%)	105 (26.3%)	318 (79.5%)
Updating database	165 (41.3%)	127 (31.8%)	292 (73.0%)
Internalization			
Learning by doing	177 (44.3%)	112 (28.0%)	289 (72.3%)
Experimenting	173 (43.3%)	99 (24.8%)	272 (68.0%)
On-the-job training	168 (42.0%)	100 (25.0%)	268 (67.0%)

The first group is **Socialization** activities. From Table 4.17, more than 80% of respondents agreed that knowledge within employees were transferred higher experienced employees to lower ones (83.3%). Majority of respondent said that they spend time in brainstorming about suggestions, ideas, or solutions in face-to-face meeting (80%), and 79% of them agreed that their banks provide workshops, seminars and training programs for employees. Approximately two-thirds of respondents (67.5%) agreed that their banks initiate joint projects across departments allowing employees to

coordinate and share knowledge with several teams. Meanwhile, the agreement slightly dropped to 64.5% of respondents who agreed that their banks share experience with customers, partners, experts, and competitors, and 61.5% of respondents who thought that banks encourage social activities outside workplace. About half of respondents (49.5%) had informal discussion about work during coffee break or lunch, and only 48.3% agreed that their banks have a plan to rotate staff across different departments.

In regard to **Externalization** activities, the result from Table 4.17 indicates that 84.0% of respondents normally document findings from meeting, seminars, workshops, and training programs. Almost three-quarters (74.8%) of them agreed that their banks follow the processes to collect best practices from experts and documents it, set up training topics for employees based on experts' suggestions (73.0%), develop reports about customers or competitors based on its accumulated experience (69.0%). Lastly, the agreement percentage dropped to 58.5% of respondents who usually express their ideas or concepts into models, diagrams and metaphors.

Regarding **Combination** activities, almost 90% of respondents said that they use communication tools such as telephone, email, and computerized networks to connect with their colleagues (88.5%). About four-fifths of them (79.5%) edit and process collected information from different sources into more usable forms. There are 73.0% of respondents agreed that their banks update their database from time-to-time.

For **Internalization** activities, 72.3% of respondents thought that their banks encourage employees to use knowledge from organizational repository and reflect those knowledge in their jobs, and 68.0% agreed that their banks encourage employees to take actions and allow mistakes to happen while 67.0% of them agreed that banks provide one-on-one training for new joiners to do their works along with coaching from senior members.

Table 4.18 Frequency and percentage distribution of organizational performance (N=400)

Activities	Responses N (%)		
	Somewhat Agree	Strongly Agree	Total Agree
Financial Performance			
General organizational success	203 (50.8%)	131 (32.8%)	334 (83.5%)
Profitable growth	188 (47.0%)	125 (31.3%)	313 (78.3%)
Customer Performance			
Return on relationships	223 (55.8%)	130 (32.5%)	353 (88.3%)
Customer Satisfaction	212 (53.0%)	99 (24.8%)	311 (77.8%)
Customer Acquisition	192 (48.0%)	103 (25.8%)	295 (73.8%)
Business Process Performance			
Quality Certifications	196 (49.0%)	146 (36.5%)	342 (85.5%)
Knowledge sharing	207 (51.8%)	118 (29.5%)	325 (81.3%)
Regular monitoring and control	199 (49.8%)	121 (30.3%)	320 (80.0%)
Risk Identification, Risk Analysis, Risk monitoring and control	216 (54.0%)	104 (26.0%)	320 (80.0%)
Brainstorm	215 (53.8%)	102 (25.5%)	317 (79.3%)
Knowledge circulation	209 (52.3%)	108 (27.0%)	317 (79.3%)
Risk management planning	228 (57.0%)	85 (21.3%)	313 (78.3%)
Knowledge sharing culture	193 (48.3%)	120 (30.0%)	313 (78.3%)
Updated knowledge	197 (49.3%)	111 (27.8%)	308 (77.0%)
Best Practice	201 (50.3%)	106 (26.5%)	307 (76.8%)
Education and Training program	164 (41.0%)	143 (35.8%)	307 (76.8%)
Information System	192 (48.0%)	111 (27.8%)	303 (75.8%)
Coaching and Mentoring	196 (49.0%)	104 (26.0%)	300 (75.0%)
Database	186 (46.5%)	113 (28.3%)	299 (74.8%)
Intellectual Capital Performance			
Employee skill sets	194 (48.5%)	133 (33.3%)	327 (81.8%)
Employee competence	206 (51.5%)	112 (28.0%)	318 (79.5%)
Useful database	200 (50.0%)	106 (26.5%)	306 (76.5%)
Operating procedure	209 (52.3%)	83 (20.8%)	292 (73.0%)
Employee Performance			
Visionary leadership	192 (48.0%)	130 (32.5%)	322 (80.5%)
Training programs with the company's goal	196 (49.0%)	118 (29.5%)	314 (78.5%)
Training effectiveness	195 (48.8%)	115 (28.8%)	310 (77.5%)
Working atmosphere	171 (42.8%)	138 (34.5%)	309 (77.3%)
Benefit Satisfaction	205 (51.3%)	98 (24.5%)	303 (75.8%)
Career growth satisfaction	168 (42.0%)	113 (28.3%)	281 (70.3%)

Table 4.18 Frequency and percentage distribution of organizational performance (N=400) (cont.)

Effectiveness of the recruitment and selection procedures	179 (44.8%)	94 (23.5%)	273 (68.3%)
Pay Satisfaction	168 (42.0%)	75 (18.8%)	243 (60.8%)
Effectiveness of retention strategies	143 (35.8%)	87 (21.8%)	230 (57.5%)
Social Performance			
Regulatory compliance	201 (50.3%)	136 (34.0%)	337 (84.3%)
Sponsorship	185 (46.3%)	148 (37.0%)	333 (83.3%)
Charity donation	200 (50.0%)	116 (29.0%)	316 (79.0%)
Social contribution	188 (47.0%)	117 (29.3%)	305 (76.3%)

In term of **Financial** perspective, majority of respondents (83.5%) believed that their banks are performing well, and 78.3% of them said that profit growth rate of their banks is high when comparing within banking industry.

Considering on **Customer** perspective, Table 14.8 shows that 88.3% of respondents stated that their banks have good customer relationship. The percentage decreased to 77.8% and 73.8% regarding customer satisfaction on products/services and customer acquisition strategy respectively.

With regard to **Business Process** perspective, 85.5% of respondents stated that their banks pass many quality certifications such as CMMI, ISO etc. Relatively high percentage of respondents (81.3%) share information and knowledge when working with other departments. 80% of respondents agreed that their banks are productive which reflect to good monitoring and control processes and also thought their banks have ability to protect known risk and uncertainties. Nearly 80% of respondents gained useful information during brainstorming sessions and worked as a team through inter-departmental information and knowledge circulation (79.3%). In a meanwhile, 78.3% perceived that their banks have ability to react to and reduce unforeseen risks and also encourage a culture of knowledge sharing. 77.0% of respondents stated that knowledge and information are regularly updated and properly maintained within their banks. Preserving work-related expertise, techniques, and guidelines is the practice that was agreed by 76.8% of respondents while the same portion of respondents (76.8%) agreed that their banks provide education and training to raise employee proficiency at new

work tasks. 75.8% of them confirmed that employees in their banks use information systems to facilitate information/knowledge sharing and thus improve work efficiency. Just three-quarters (75.0%) said that they adequately trained by their predecessors to assume their duties. 74.8% of respondents revealed that their banks use the management system to store required knowledge for future use.

Looking at **Intellectual Capital** perspective in Table 4.18, over 80% of respondents (81.8%) believed that their colleagues have the appropriate skill sets that contribute to the bank's success. Around 80% perceived that their colleagues are clever and creative (79.5%). 76.5% agreed that their banks have a lot of useful information in documents and databases and 73.0% thought that operating procedures of their banks are very efficient.

Examining on **Employee** perspective, 80.5% of respondents had confidence in the leadership of their management teams and 78.5% of them agreed that training programs are mapped with their banks' long term goal. Approximately three-quarters of respondents believed in the effectiveness of training programs (77.5%), enjoyed with working environment (77.3%), and satisfied with their banks' benefit programs (75.8%). The percentage slightly decreased to 68.3% of agreement when asking about the effectiveness process for recruiting new employees. The degree of agreement moderately dropped to 60.8% regarding pay satisfaction. Only 57.5% agreed that their banks have lower employee turnover when comparing to other banks. This is the lowest degree of agreement among all organizational performance items.

The last perspective is **Social** perspective, 84.3% of respondents confirmed that their banks comply with regulatory bodies and local government. 83.3% of them stated that their banks sponsor and finance voluntary services, 79.0% said that their banks regularly make donations to charity, and 76.3% agreed that their banks integrate charitable contributions into their business activities.

4.3 Testing the difference between demographic groups

Regarding the descriptive profiles of all respondents, there are different aspects among demographic groups that can be analyzed to understand more on

knowledge creation process within Thai's banking industry. Therefore, it is interesting to examine the perception of knowledge creation process among different characteristics. There are 2 methods for comparing the means of different groups; independent t-test and one-way ANOVA. Independent t-test is used to test whether there is a statistically significant difference between the means of two unrelated groups while one-way ANOVA is for testing the difference of means across 3 or more unrelated groups. Before proceeding the analysis, there are assumptions underlying the comparing means of groups that are needed to examine. Both independent t-test and one-way ANOVA have the same assumptions (Lane, n.d.):

1. Each observation is random and independent from the populations. This assumption requires one observation to provide only one score and the score of one observation is not systematically related to the score of the other observations. This is called the **assumption of independence**.

2. The populations are normally distributed within each grouping variable. This is referred as the **assumption of normality**.

3. The populations have the same variance; that is the variances of the populations are equal across all groups. It is known as the **assumption of homogeneity of variance**.

4.3.1 Independent t-test

In this study, independent t-test was used to test the mean difference between male and female and between educational level (bachelor and master degree). Examining the above assumptions, the assumption of independence was met as the groups of dependent variables are independent of each other. The assumption of normality was identified from the Kolmogorov-Smirnov test using SPSS. When assessing the normality of the perception of knowledge creation process between male and female and between bachelor and master degree. The p value was less than 0.05 which indicated that data are non-normally distributed. To conform the assumption of normality, data transformation was used for improving normality of data. Osborne (2010) recommends the Box-Cox transformation as a potential technique where normalizing or equalizing variance of data is required. The concept of the Box-Cox

transformation is developed by Box and Cox. It is a procedure to estimate an appropriate exponent (λ) to use to transform each variable to become normal distribution. The lambda indicates the power to transform the variable. In this research, the lambda was identified by using Minitab which is a statistical package. The estimated λ value was 2 which means that all observations should be transformed by square method. The Box-Cox plot was provided in Appendix 3. After transformed data, the data were normally distributed as shown in Table 4.19

Table 4.19 Normality test for independent t-test

Tests of Normality: Kolmogorov-Smirnov ^a				
Knowledge Creation Process		Statistic	df	Sig.
Gender	Male	.083	102	.080
	Female	.050	298	.067
Educational level	Bachelor	.051	285	.068
	Master	.078	111	.090
a. Lilliefors Significance Correction				

The last assumption is the assumption of homogeneity of variance. This assumption can be assessed by the Levene's F Test for Equality of Variances. The first step is examining the equality of variances then analyzing the t-test for Equality of Means. If Levene's F Test is significant ($P < 0.05$), the equal variances not assumed row was used for the t-test. Otherwise, the equal variances assumed row was used for the t test for equality of means results. Independent samples test table in Table 4.20 gives the result of t-test between male and female and between bachelor and master degree. Full results are available in Appendix 4.

Table 4.20 Independent t-test results

Independent Samples Test							
Knowledge Creation Process		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Gender (Male and Female)	Equal variances assumed	.256	.613	-.107	398	.915	-.05438

Table 4.20 Independent t-test results (cont.)

	Equal variances not assumed			-.104	166.746	.917	-.05438
Educational level (Bachelor and Master degree)	Equal variances assumed	.419	.518	2.645	394	.008	1.29638
	Equal variances not assumed			2.691	207.811	.008	1.29638

Male N = 102, Female N = 298 / Bachelor N = 285, Master N = 111

In gender perspective, from the Levene's Test for Equality of Variances, the F test was not significant as P value was higher than the alpha value ($P > 0.05$), indicating that the null hypothesis was accepted. This means that the assumption of homogeneity of variance was met. The equal variances assumed row was used for t-test which was found that the significance value (0.915) was also higher than 0.05. Therefore, it can be concluded that there is no difference on the perception of knowledge creation process between male and female employees in Thai's banking industry.

In term of educational level, the mean comparison only tested between bachelor and master degree because diploma and doctoral degree had few samples which were too small to do statistic testing. The F value was 0.419 with P value = 0.518 which was greater than 0.05. As such, the null hypothesis was accepted that the variance of bachelor and master degree were equal. The p value in equal variances assumed row was 0.008 which was significant at 1% level ($P < 0.01$), meaning that there is a significant difference between the means of bachelor's and master's degree-employees. Looking at the mean difference, it can be concluded that banking employees in Thailand who have bachelor's degree have more agreement in knowledge creation process than employees with master's degree.

4.3.2 One-way ANOVA

The analysis of one-way ANOVA was used to compare means among groups in different aspects which are age range, positional level, working experience, banking experience, and salary. The assumption of independence was met as the observation of each group was independent from each other. The normality test was

performed with the transformation data as explained in section 4.3.1 to test the assumption of normality. Results were presented in Table 4.21. In each category group, p value is greater than 0.05 which can be interpreted that all groups were normally distributed.

Table 4.21 Normality test for one-way ANOVA

Tests of Normality: Kolmogorov-Smirnov ^a				
Knowledge Creation Process		Statistic	df	Sig.
Age	21 - 24 yrs	.075	40	.200*
	25 - 29 yrs	.044	147	.200*
	30 - 34 yrs	.079	119	.062
	35 - 39 yrs	.117	52	.071
	40 - 44 yrs	.141	19	.200*
	45 - 49 yrs	.173	11	.200*
	50 - 54 yrs	.198	7	.200*
	55 - 60 yrs	.287	5	.200*
Positional level	Operational Worker	.074	76	.200*
	Officer	.061	190	.085
	Senior Officer	.085	90	.117
	Manager/Executive	.086	44	.200*
Working Experience	<= 1 Yrs	.100	37	.200*
	2 - 3 Yrs	.095	75	.088
	4 - 5 Yrs	.078	65	.200*
	6 - 10 Yrs	.053	146	.200*
	11 - 15 Yrs	.120	39	.172
	16 - 20 Yrs	.196	17	.082
	> 20 Yrs	.082	21	.200*
Banking Experience	<= 1 Yrs	.071	53	.200*
	2 - 3 Yrs	.089	92	.067
	4 - 5 Yrs	.086	74	.200*
	6 - 10 Yrs	.078	125	.059
	11 - 15 Yrs	.153	29	.081
	16 - 20 Yrs	.159	11	.200*
	> 20 Yrs	.108	16	.200*
Salary	< 15,000 THB	.298	5	.166
	15,000 – 30,000 THB	.047	201	.200*
	30,001 – 45,000 THB	.090	93	.058
	45,001 – 60,000 THB	.101	44	.200*
	60,001 – 75,000 THB	.106	23	.200*
	75,001 – 100,000 THB	.190	19	.071

Table 4.21 Normality test for one-way ANOVA (cont.)

	100,001 – 250,000 THB	.130	13	.200*
	> 250,000 THB	.260	2	
*. This is a lower bound of the true significance. a. Lilliefors Significance Correction				

Testing the assumption of homogeneity of variance can be identified from the Levene's F Test for Equality of Variances. The null hypothesis assumes no variance difference between groups. If P value is greater than 0.05, the null hypothesis is accepted which means that the assumption of homogeneity of variance was satisfied. Thus, the significant difference of means can be identified from the ANOVA table. In case that the Levene's F test is significant, the assumption of homogeneity is violated. The significant difference of means can be used from the Welch or the Brown-Forsythe statistic (Khelifa, n.d.). The ANOVA F test evaluates a difference between subgroups but cannot identify which subgroup is differ from the others. To specify which group means are differ, the post-hoc test should be conducted for further analysis. The Scheffe's test which is the most flexible and conservative post-hoc procedure (Stevens, 1999) was used to consider the different size between subgroups. Table 4.22 provides the result of homogeneity of variances test of each category group. The result marks equal variance of knowledge creation process in all category groups.

Table 4.22 Homogeneity of Variances for one-way ANOVA

Test of Homogeneity of Variances				
Knowledge Creation Process	Levene Statistic	df1	df2	Sig.
Age	.866	7	392	.534
Position	1.737	3	396	.159
Working experience	.711	6	393	.641
Banking experience	1.429	6	393	.202
Salary	.453	7	392	.868

As the assumption of homogeneity of variance was met for all groups, testing difference of means were assessed from the ANOVA table. Below table summarizes the ANOVA F test result for all groups.

Table 4.23 One-way ANOVA results

ANOVA						
Knowledge Creation Process		Sum of Squares	df	Mean Square	F	Sig.
Age (8 groups)	Between Groups	243.798	7	34.828	1.810	.084*
	Within Groups	7542.147	392	19.240		
	Total	7785.944	399			
Positional level (4 groups)	Between Groups	48.780	3	16.260	.832	.477
	Within Groups	7737.165	396	19.538		
	Total	7785.944	399			
Working Experience (7 groups)	Between Groups	37.120	6	6.187	.314	.930
	Within Groups	7748.824	393	19.717		
	Total	7785.944	399			
Banking Experience (7 groups)	Between Groups	83.224	6	13.871	.708	.644
	Within Groups	7702.720	393	19.600		
	Total	7785.944	399			
Salary (8 groups)	Between Groups	216.993	7	30.999	1.605	.132
	Within Groups	7568.952	392	19.309		
	Total	7785.944	399			

*Significant at 0.1 level.

The ANOVA results in Table 4.23 indicated that there is no difference between the mean of agreement in knowledge creation process among positional level, working experience, banking experience, and salary as the P value of these groups were higher than 0.05. However, in the age perspective, the mean of agreement in knowledge creation process differed between subgroups with significant at 10% level ($P < 0.1$). As such, the post-hoc test was conducted to know which group means differed from the others. After running the post-hoc test, it is found that the difference between these groups were not significant, meaning that there is a difference between the mean of agreement in knowledge creation process regarding age groups of employee in Thai's banking industry but the difference was insignificant. The post-hoc result was provided in Appendix 5.

4.4 Hypotheses testing

As explained in section 4.2.4, factor analysis was used to obtain factors and reduce variables by assessing the eigenvalue and factor loading as shown in Table 4.12-16. The variables were extracted into 4 factors; socialization, externalization, combination, and internalization. SPSS program then generated the regression based factor score for each factor. These 4 factor scores were named as Socialization score, Externalization score, Combination score, and Internalization score respectively. The factor scores were used as the input of independent variables. The organizational performance was obtained from average perception scores of the questionnaire items and it was used as the dependent variables in the statistical analysis.

To accept or reject null hypothesis is based on alpha (α) level or the level of significance. Alpha value is a threshold to identify whether test statistic is statistically significant. It ranges from 0 to 1. The most commonly used of alpha level are 0.01, 0.05, and 0.1 (Noymer, 2008). In social research, alpha value is usually set at 0.05 (Singh, 2007). If the probability of a statistical test (P or P value) is less than the chosen alpha level, the null hypothesis is rejected and the alternative hypothesis is accepted.

4.4.1 Multiple regression

The statistical technique that can be used to find the relationship between many independent variables and one dependent variable is multiple regression analysis. The goal of multiple regression is to predict the value of dependent variable from a set of independent variables. The result of multiple regression is in the following equation form:

$$Y' = A + B_1X_1 + B_2X_2 + \dots + B_kX_k + \varepsilon$$

Where Y' is the predicted value of dependent variable (Y), A is the Y' intercept (the value of Y' when all the X values are zero), X's represent the various independent variables, Bs are the regression coefficients assigned to each independent variable and ε represents the estimated error (Tabachnick & Fidell, 1989; Stevens, 2002). Regression Coefficient indicates the average change in the dependent variable when an independent

variable changes by 1 unit and other independent variables are constant. The sign of coefficient (+/-) marks the direction of influence of each independent variable whether it is positive or negative to dependent variable (Easa, 2012).

Before running regression, it is important to understand the assumptions of regression to justify the use of it for inference or prediction. Osborne & Waters (2002) suggest that there are four assumptions that researchers should aware; Normality, Linearity, Reliability, and Homoscedasticity. **Normality** refers to the assumption that errors in the regression model are normally distributed (Williams & Grajales & Kurkiewicz, 2013). There are several ways to test normality. It can be assessed by visual methods such as histogram, boxplot etc. or using statistical test. In SPSS, the well-known normality test is Kolmogorov-Smirnov (K-S) test and Shapiro-Wilk test (Ghasemi & Zahediasl, 2012).

The second assumption is linearity. **Linearity** means that the relationship of independent and dependent variables are linear. If the data are not linear, the results of regression will under-estimate the true relationship (Osborne & Waters, 2002). Linearity can be assessed by using scatter plot between independent and dependent variables or residual plot which is a plot of standardized residuals and standardized predicted values. The residuals should randomly scatter around the horizontal line to indicate the linear relationship.

Reliability means that the variables are measured without error to ensure that the regression model is accurately express the real relationship between independent and dependent variables (Osborne & Waters, 2002). For this study, the reliability analysis has been examined in section 4.2.3 and the result shows that all variables are reliable.

The forth one is homoscedasticity. **Homoscedasticity** is the assumption that the standard deviation of errors of prediction is approximately the same for all predicted dependent variable scores (Tabachnick & Fidell, 1989; Osborne & Waters, 2002; Williams et al., 2013). If the variance of errors differs at different of independent variable, it is called heteroscedasticity which can distort the findings and weaken the analysis (Osborne & Waters, 2002). Homoscedasticity can be checked from a plot of the standardized residuals by the regression standardized predicted value and the

residuals should randomly scatter in a relatively distribution around 0 or the horizontal line.

Moreover, Williams et al. (2013) add a few more assumptions about the model errors. The **zero conditional mean of errors** means that the errors have a mean of zero for any given value on independent variables. The violation of this assumption causes the bias on regression coefficients. Another assumption is the **independence of errors**. The residuals should be independent of one another. Non-independence of errors can lead to biased estimates of standard errors and significance (Tabachnick & Fidell, 1989). This assumption associates with the time-series data. Therefore, no need to investigate this assumption in this study.

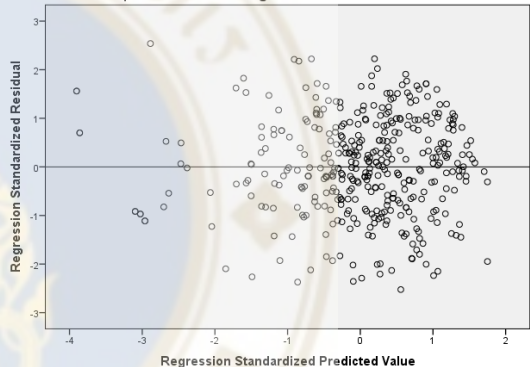
One more problem that should be concerned is the **multicollinearity** which occurs when there are strong relationships between independent variables. Multicollinearity can lead to unstable estimate of coefficients for each independent variables as the standard errors and the confidence interval of coefficients are inflated (Williams et al., 2013). As explained in section 4.1.2, the diagnosis of multicollinearity is to examine the correlation between independent variables or investigate the VIF. The VIF which is higher than 10 indicates the multicollinearity problem (Stevens, 2002).

4.4.2 Testing hypothesis 1

H1: Knowledge creation process positively relates to organizational performance

In order to identify the proportion of variance of each independent variable accounted on organizational performance variance, the *stepwise* method was selected. This method also removed the unnecessary independent variables that are insignificant for dependent variable from the equation (Stevens, 2002). The summary result of the first hypothesis is shown in Table 4.24. Full results can be found in Appendix 6.

Table 4.24 Summary regression result of H1

Model Summary				$R = .915$ $R^2 = .838$ Adjusted $R^2 = .836$				
ANOVA				$F = 510.638$ Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		3.988	.013		313.5	.000		
Socialization	.735	.199	.025	.317	7.924	.000	.257	3.896
Externalization	.067	.188	.024	.299	7.702	.000	.272	3.676
Internalization	.028	.155	.021	.247	7.493	.000	.378	2.644
Combination	.006	.091	.022	.144	4.121	.000	.335	2.986
Residual statistics				Mean = .000				
Residual test of normality				Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .200				
Residual plot				<p>Scatterplot</p> <p>Dependent Variable: Organizational Performance</p>  <p>Regression Standardized Residual</p> <p>Regression Standardized Predicted Value</p>				

Dependent Variable: Organizational Performance

According to the regression assumptions, it is required to investigate the residuals in term of normality, linearity, homoscedasticity, and means of zero condition. From the result in Table 4.24, residual mean was 0.000. The test of normality on unstandardized residual has P value = 0.200 which is greater than 0.05. Hence, the null hypothesis was accepted which means that residuals were normally distributed. The linearity and homoscedasticity can be seen from the residual plot that the error randomly scattered around 0 horizontal line. The VIF value for all independent variables did not exceed 10, therefore, no sign of multicollinearity. As a result, all assumptions were not violated, indicating the trustworthy result of regression model. The adjusted R^2 was 0.836 which means that the variances of knowledge creation process accounted for

83.6% of total variance in organizational performance in Thailand's banking industry. The P value of overall model was 0.000 which marked the statistically significant result. The calculated F from ANOVA table needed to be higher than the critical F from the statistical table to reject the null hypothesis of regression model. The calculated F was 510.636 while the critical F was 2.394 (df: 4, 395 and $P < 0.05$). Accordingly, the null hypothesis was rejected, revealing the statistically significant relationship between knowledge creation process and the organizational performance.

The positive coefficient and significant ($P = .000$) of all predictors mean that knowledge creation process has positive relationship with organizational performance. The standardized regression coefficient or Beta value represents the strength of the effect of each independent variable on the dependent variable. The higher beta value, the larger effect of that independent variable. Socialization had the largest effect toward organizational performance (.317). Other variables were sorted by the strength of effect which are Externalization (.299), Internalization (.247) and Combination (.144) respectively. With the stepwise method, the proportion of variance that each variable contributed to the total variance of organizational performance can be indicated. In table 14.9, Socialization was found to have the highest proportion with the contribution of 73.5% of total variance in organizational performance. Externalization accounted for 6.7%, Internalization accounted for 2.8%, and Combination contributed to only 0.6% of total variance in organizational performance.

In brief, the first hypothesis was accepted. The result stated that knowledge creation process, as a whole or separate, positively related to organizational performance in Thai banking industry. The largest effect to organizational performance is Socialization, followed by Externalization, Internalization and Combination. The highest variance contribution is Socialization, followed by Externalization, Internalization, and Combination to the total variance in organizational performance. The regression equation can be defined as equation below.

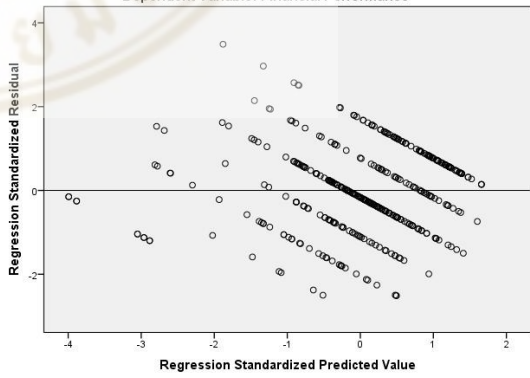
$$\text{Organizational Performance}' = 3.988 + 0.199\text{Socialization} + 0.188\text{Externalization} + 0.155\text{Internalization} + 0.091\text{Combination}$$

4.4.3 Testing hypothesis 2

H2: *Knowledge creation process positively relates to financial performance*

This hypothesis aims to examine the relationship of knowledge creation process and financial performance. Again, stepwise method was used to identify the variance proportion of each SECI process. Table 4.25 summarizes the regression result of H2 and full results can be found in Appendix 7.

Table 4.25 Summary regression result of H2

Model Summary				$R = .688$ $R^2 = .473$ Adjusted $R^2 = .470$				
ANOVA				$F = 118.786$ Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		4.089	.027		153.7	.000		
Socialization	.416	.216	.048	.296	4.542	.000	.312	3.200
Combination	.035	.170	.043	.233	3.933	.000	.379	2.641
Internalization	.019	.165	.042	.226	3.910	.000	.398	2.514
Externalization		Excluded						
Residual statistics				Mean = .000				
Residual test of normality				Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .200				
Residual plot				Scatterplot Dependent Variable: Financial Performance 				

Dependent Variable: Financial Performance

Examining on regression assumptions, mean of error was zero. The null hypothesis for testing normality on residual is accepted with P value = .200, indicating normally distribution of errors. Linearity and homoscedasticity were acceptable as residuals relatively scattered above and below the horizontal line. No sign of multicollinearity because VIF values were below 10. The adjusted R^2 was 0.470 which means that the variances of knowledge creation process accounted for 47% of total variance in financial performance. The overall model was significant with P value = 0.000. The calculated F value was 118.786 and the critical F was 2.627 (df: 3, 396 and $P < 0.05$). Hence, the hypothesis was accepted that there is a relationship between knowledge creation process and financial performance in Thai banking industry. However, not all independent variables are significant. Socialization, Combination, and Internalization were significantly positive to financial performance as P value = 0.000 and the positive sign of coefficients. Externalization was removed from the regression result as P value > 0.05 . The variance proportion of Socialization accounted for 41.6% of total variance of financial performance, followed by Combination which accounted for 3.5% and last variable is Internalization that accounted for 1.9%. Socialization had the highest beta value (.296) which means it had the highest effect toward financial performance. The second factor was Combination (.233) and the last factor was Internalization (.226).

In short, the second hypothesis was accepted that knowledge creation process positively related to financial performance in Thai banking context. The beta values exhibits that Socialization was the most important factor, followed by Combination and Internalization. In term of variance contribution, variance of Socialization covered the highest proportion of total variance, followed by Combination and Internalization. But Externalization was excluded from the regression which can be interpreted that there is no relationship between Externalization and financial performance. The regression equation is expressed as the following:

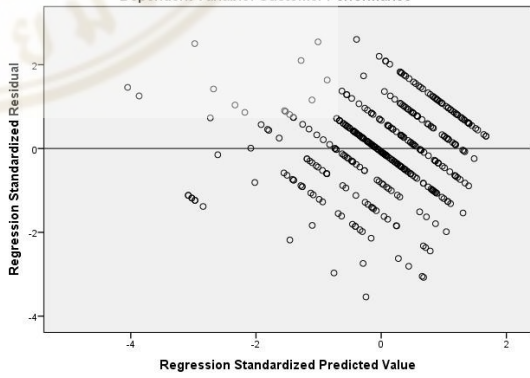
$$\text{Financial Performance}' = 4.089 + 0.216\text{Socialization} + 0.17\text{Combination} + 0.165\text{Internalization}$$

4.4.4 Testing hypothesis 3

H3: *Knowledge creation process positively relates to customer performance*

The third hypothesis studied the relationship between knowledge creation process and customer performance. Regression analysis with stepwise method, the same method as the first 2 hypotheses, was used. Summary of regression result is shown in Table 4.26 and full results are provided in Appendix 8.

Table 4.26 Summary regression result of H3

Model Summary				$R = .747$ $R^2 = .558$ Adjusted $R^2 = .553$				
ANOVA				$F = 124.514$ Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		4.034	.022		180.9	.000		
Socialization	.472	.136	.044	.204	3.082	.002	.257	3.896
Combination	.054	.166	.039	.249	4.303	.000	.335	2.986
Internalization	.020	.133	.036	.199	3.665	.000	.378	2.644
Externalization	.007	.117	.043	.175	2.724	.007	.272	3.676
Residual statistics				Mean = .000				
Residual test of normality				Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .015				
Residual plot				Scatterplot Dependent Variable: Customer Performance 				

Dependent variable: Customer Performance

Analyzing the assumptions of regression, the assumption of normally distributed residuals was violated. The result from normality testing indicates that P value was 0.015 which was less than significance level at 5% ($P < 0.05$). It means that the residuals were non-normally distributed which lead to the untrustworthy regression model (Williams et al., 2013). In other words, making inference about knowledge creation process towards the customer performance may be inaccurate even though the overall model was significant with P value = 0.000 and the calculated F was greater than the critical F; 2.394 (df: 4, 395 and $P < 0.05$). This can be interpreted that knowledge creation process cannot fully explain the variance of customer performance in Thai banking context or there were more important variables that did not include into the model. As such, hypothesis 3 was accepted but the accuracy of the regression model was weakened by non-normality of residuals.

4.4.5 Testing hypothesis 4

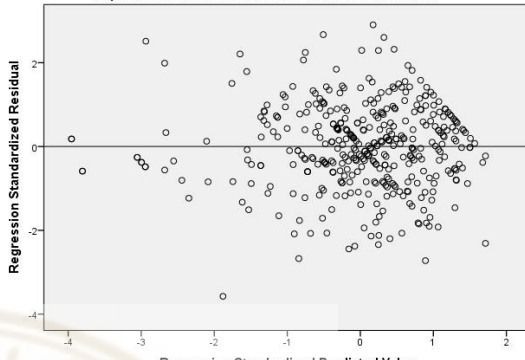
H4: *Knowledge creation process positively relates to business process performance*

Multiple regression analysis was applied to explore whether knowledge creation process has relationship with business performance or not. Table 4.27 gives a summary of regression result for hypothesis 4. Full results are presented in Appendix 9.

Table 4.27 Summary regression result of H4

Model Summary				$R = .898$ $R^2 = .807$ Adjusted $R^2 = .805$				
ANOVA				F = 412.742 Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		3.995	.015		259.2	.000		
Socialization	.690	.179	.030	.257	5.880	.000	.257	3.896
Internalization	.069	.196	.025	.281	7.817	.000	.378	2.644
Externalization	.034	.184	.030	.263	6.202	.000	.272	3.676
Combination	.012	.134	.027	.193	5.042	.000	.335	2.986
Residual statistics				Mean = .000				

Table 4.27 Summary regression result of H4 (cont.)

Residual test of normality	Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .200
Residual plot	<p style="text-align: center;">Scatterplot</p> <p style="text-align: center;">Dependent Variable: Business Process Performance</p>  <p style="text-align: center;">Regression Standardized Residual</p> <p style="text-align: center;">Regression Standardized Predicted Value</p>

Dependent variable: Business Process Performance

Results from Table 4.27 shows that four regression assumptions were met. The residuals had a mean of zero. P value for normality test was 0.200 which was greater than alpha value (0.05). The null hypothesis was accepted, indicating normal distribution of errors. Linearity and homoscedasticity assumptions were met from the residual plot between standardized residuals against the predicted value of Y. The residuals randomly scattered around 0 line. When assessing multicollinearity problem, VIF value of all variables were lower than 10, meaning that no sign of this problem. Looking at model summary, variances of knowledge creation process covered 80.5% of total variance in business process performance which can be indicated from the adjusted $R^2 = 0.805$. P value of overall model was 0.000 and the calculated F value was 412.742. This was greater than the critical F value; 2.394 (df: 4, 395 and $P < 0.05$), accordingly, the hypothesis was accepted, meaning that there was a relationship between knowledge creation process and business process performance. The standardized coefficient of all variables were positive and significant ($P < 0.01$). This can be interpreted that knowledge creation process had positive relationship with business process performance. The strength of effect was identified from the beta value. Internalization had the strongest effect toward business process performance (.281). The next factor is Externalization (.263), then Socialization (.257) and Combination (.193) respectively. When looking at the variance contribution of each variable, Socialization had the highest

proportion of variance which accounted for 69% of total variance of business process performance. Internalization accounted for 6.9%, followed by Externalization, accounting for 3.4% and Combination, accounting for only 1.2%.

To summarize, the fourth hypothesis was accepted. There was a positive relationship of knowledge creation process and business process performance in the context of Thailand's banking industry. Internalization was the most important factor, then Externalization, Socialization, and Combination respectively. Considering the proportion of variance of each variable, Socialization accounted the highest proportion of variance from total variance in business process performance, followed by Internalization, Externalization, and Combination respectively. Results from regression become the equation for Business Process Performance in equation below.

$$\text{Business Process Performance}' = 3.995 + 0.196\text{Internalization} + 0.184\text{Externalization} + 0.179\text{Socialization} + 0.134\text{Combination}$$

4.4.6 Testing hypothesis 5

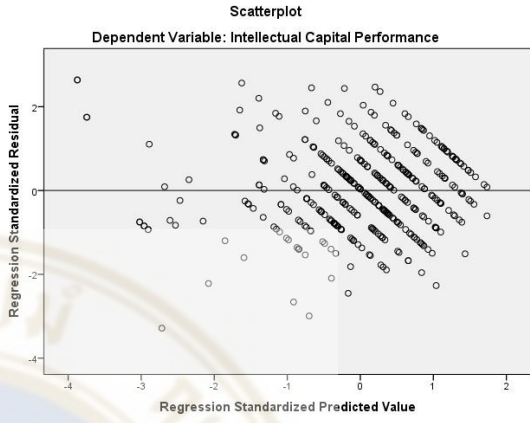
H5: *Knowledge creation process positively relates to intellectual capital performance*

The fifth hypothesis explores the relationship of knowledge creation process and intellectual capital performance using stepwise regression method. Summary regression results are presented in Table 4.28. Full results are provided in Appendix 10.

Table 4.28 Summary regression result of H5

Model Summary				$R = .843$ $R^2 = .710$ Adjusted $R^2 = .707$				
ANOVA				F = 242.071 Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		3.987	.018		219.1	.000		
Socialization	.608	.170	.036	.252	4.716	.000	.257	3.896
Internalization	.067	.200	.030	.298	6.759	.000	.378	2.644

Table 4.28 Summary regression result of H5 (cont.)

Externalization	.029	.179	.035	.266	5.130	.000	.272	3.676
Combination	.003	.076	.031	.112	2.398	.017	.335	2.986
Residual statistics				Mean = .000				
Residual test of normality				Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .200				
Residual plot								

Dependent variable: Intellectual Capital Performance

All regression assumptions are required to verify the trustfulness of regression model. From Table 4.28, zero conditional mean of errors was met. Normality test of errors can be assessed from Kolmogorov-Smirnov test. P value is greater than 0.05, leading to accepting the null hypothesis. This means that errors were normally distributed. Linearity of errors was shown from residual plot that errors evenly distributed above and below the zero horizontal line. The fit line of error was at zero horizontal line indicating homoscedasticity of errors. Collinearity statistics showed that VIF values of all variables were below 10. As such, no multicollinearity issue. The adjusted R^2 was 0.707, standing for 70.7% of total variance in intellectual capital in Thailand's banking was from variances of knowledge creation process. The overall model was significant with P value = 0.000 ($P < 0.01$). The calculated F was higher than the critical F; 2.394 (df: 4, 395 and $P < 0.05$). Hence, the null hypothesis was rejected. This can be explained that knowledge creation process had a relationship with intellectual capital performance in Thai banking industry. P values of all variables were less than 0.05 and beta coefficients were positive. This result indicated that knowledge creation process was positively influenced intellectual capital performance. The beta values from high to low which indicated the effected strength toward intellectual capital

performance were as follows: Internalization (.298), Externalization (.266), Socialization (.252), and Combination (.112). The variance contribution of each variable to intellectual capital can be identified from the proportion of the adjusted R^2 . Socialization had 60.8% contribution to total variance of intellectual capital while Internalization accounted for 6.7%, Externalization accounted for 2.9%, and Combination accounted for only 0.3%.

In conclusion, the fifth hypothesis was accepted. The results confirmed that knowledge creation process positively related to intellectual capital performance within Thai's banks. The strength of effects from strong to weak were Internalization, Externalization, Socialization, and Combination respectively. All four knowledge creation modes significantly related to intellectual capital performance with different variance contributions. Socialization was the main process that related to intellectual capital as it contributed the highest proportion of variance, then followed by Internalization, Externalization, and Combination. The regression equation can be expressed as:

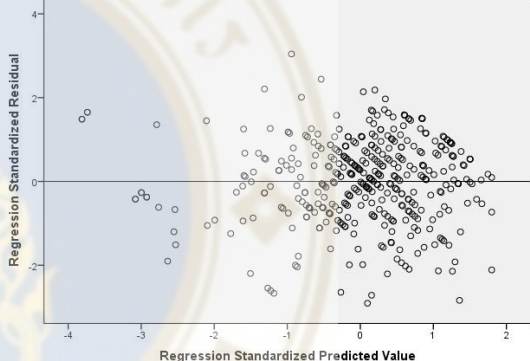
$$\text{Intellectual Capital Performance}' = 3.987 + 0.2\text{Internalization} + 0.179\text{Externalization} + 0.17\text{Socialization} + 0.076\text{Combination}$$

4.4.7 Testing hypothesis 6

H6: *Knowledge creation process positively relates to employee performance*

Multiple regression using stepwise method was used for this hypothesis to find the relationship between knowledge creation process and employee performance. Stepwise method can identify the proportion of variance in employee aspect which accounted for by knowledge creation process. Summary results of regression are listed in Table 4.29 and full results are shown in Appendix 11.

Table 4.29 Summary regression result of H6

Model Summary				$R = .829$ $R^2 = .687$ Adjusted $R^2 = .685$				
ANOVA				F = 289.943 Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		3.891	.020		193.2	.000		
Socialization	.607	.236	.038	.329	6.222	.000	.282	3.546
Externalization	.059	.248	.036	.346	6.822	.000	.308	3.251
Internalization	.019	.160	.032	.223	4.961	.000	.389	2.568
Combination		Excluded						
Residual statistics				Mean = .000				
Residual test of normality				Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .118				
Residual plot				<p>Scatterplot</p> <p>Dependent Variable: Employee Performance</p>  <p>Regression Standardized Residual</p> <p>Regression Standardized Predicted Value</p>				

Dependent variable: Employee Performance

Testing the assumptions of regression is required to ensure that the results are trustworthy. In the sixth hypothesis, four assumptions of errors were met. The first one, mean of errors was zero. Secondly, normality test showed that the null hypothesis was accepted as $P = 0.118$ which was higher than the significant level at 5%. Thus, the second assumption was met as errors were normally distributed. The third and fourth assumptions were about linearity and homoscedasticity which can be assessed by plotting graph between predicted values and standardized residuals. In Table 4.29, the scatter of residuals with randomly pattern and relatively around the zero horizontal line indicated that the assumption of linearity and homoscedasticity were met. No sign of multicollinearity issue. The VIF values of all variables were less than 10. The prediction

accuracy of model can be defined from the adjusted R^2 . The adjusted R^2 was 0.685 which means that the variances of knowledge creation process accounted for 68.5% of total variance in employee performance in Thailand's banking industry. The overall model was significant with $P = 0.000$. The null hypothesis was rejected as the calculated F was greater than the critical F ; 2.627 (df: 3, 396 and $P < 0.05$). In consequence, the hypothesis was accepted which stated that there was a relationship between knowledge creation process and employee performance. Examining the significance of each knowledge creation process, Socialization, Externalization, and Internalization were found to be significant as $P < 0.05$. The beta values with positive sign can be described that Externalization (.346), Socialization (.329), and Internalization (.223) were positively related to employee performance. Externalization was the strongest factor followed by Socialization and Internalization. The excluded variable was Combination which had $P > 0.05$, indicating that Combination was not related to employee performance. The proportion of adjusted R^2 revealed that Socialization accounted for 60.7% while Externalization contributed to 5.9% and Internalization contributed to 1.9% of total variance in employee performance.

To conclude, the sixth hypothesis was accepted. The result from regression stated that knowledge creation process positively related to employee performance in Thai's banking. There were 3 variables in the regression model, saying that these 3 variables were positively significant to employee performance. Externalization is the most important factor then followed by Socialization and Internalization respectively. Combination was excluded which can be interpreted that there was no relationship between Combination and employee performance in the context of banking in Thailand. The equation of employee performance is stated below.

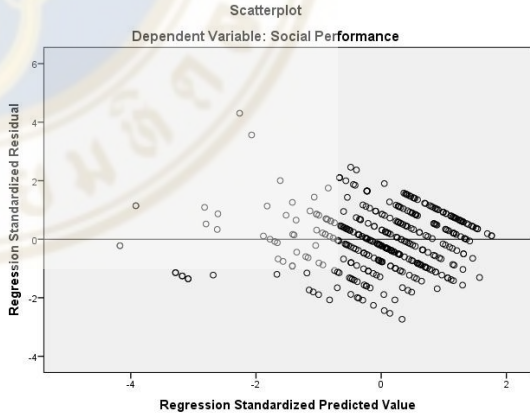
$$\text{Employee Performance}' = 3.891 + 0.248\text{Externalization} + 0.236\text{Socialization} + 0.16\text{Internalization}$$

4.4.8 Testing hypothesis 7

H7: *Knowledge creation process positively relates to social performance*

The last hypothesis aims to study the relationship between knowledge creation process and social performance. Multiple regression was used to test this hypothesis. The stepwise method was selected to find the variance contribution of each predictor to dependent variable. Summary of regression results are provided in Table 4.30 and full results are presented in Appendix 12.

Table 4.30 Summary regression result of H7

Model Summary				$R = .722$ $R^2 = .522$ Adjusted $R^2 = .518$				
ANOVA				$F = 143.873$ Sig. = .000				
Predictors	Proportion of Adjusted R^2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		4.100	.023		178.1	.000		
Socialization	.479	.247	.043	.373	5.766	.000	.289	3.463
Externalization	.030	.151	.043	.228	3.512	.000	.286	3.495
Combination	.009	.116	.039	.174	2.944	.003	.345	2.900
Internalization		Excluded						
Residual statistics				Mean = .000				
Residual test of normality				Lilliefors Significance Correction of Kolmogorov-Smirnov Sig. = .200				
Residual plot				 <p>Scatterplot Dependent Variable: Social Performance</p>				

Dependent variable: Social Performance

Before testing hypothesis, the regression assumptions should be evaluated. From Table 4.30, the mean of errors was zero, meaning that the assumption of zero mean of errors was met. The residual test of normality showed that P value was 0.200

which was greater than 0.05. The null hypothesis was accepted and the assumption of normally-distributed errors was satisfied. Residual plot illustrated the fairly distribution of errors above and below the zero horizontal line. The errors also scattered randomly around the horizontal line. These can be the proof of linearity and homoscedasticity of errors. VIF values of predictors were lower than 10 which gave no signal of multicollinearity issue. Looking at model summary, the adjusted R^2 was 0.518 which can be interpreted that the variances of knowledge creation process covered 51.8% of total variances of social performance. The regression result was statistically significant as P value = 0.000 ($P < 0.01$). The calculated F was 143.873 and the critical F was 2.627 (df: 3, 396 and $P < 0.05$) which led to rejecting the null hypothesis. This confirmed that there was a relationship between knowledge creation process and social performance in Thai's banking industry. The standardized coefficients of Socialization, Externalization, and Combination were positive with significance level at 5% ($P < 0.05$), identifying the positive relationship of these predictors to social performance. Internalization was left out from the regression as $P > 0.05$ which means that there was no relationship between Internalization and social performance in Thai's banks. Socialization, Externalization and Combination had beta value of .373, .228 and .174 respectively, meaning that Socialization had the largest effect toward social performance, followed by Externalization and Combination. Considering the proportion of adjusted R^2 , the majority of variance came from Socialization which accounted for 47.9% of total variance in social performance, followed by Externalization (3%) and Combination (0.9%) respectively.

To sum up, hypothesis H7 was accepted. The regression results confirmed that knowledge creation process positively related to social performance in Thai banking context. Socialization, Externalization, and Combination were found to have positive relationship with social performance while Internalization had no relationship with social performance because it was excluded from regression model. The value of standardized coefficients showed that Socialization is the most important factor. The next factor is Externalization and the last factor is Combination. The regression equation is shown below.

$$\text{Social Performance}' = 4.1 + 0.247\text{Socialization} + 0.151\text{Externalization} + 0.116\text{Combination}$$

With all hypotheses testing, Table 4.31 shows the results of each hypothesis that was accepted and passed all regression assumptions. The Adjusted R^2 indicates variance contribution of SECI process towards each perspective of organizational performance. Proportion of Adjusted R^2 pointed out the proportion of variance that each SECI process contributed to the total variance. Regression equation identifies the regression coefficient of each SECI process. The coefficient marks the direction of influence and its effect toward each perspective of organizational performance.

Table 4.31 Hypothesis testing summary

Hypothesis	Result	Adjusted R^2	Proportion of Adjusted R^2	Independent variable	Regression equation
H1	Accepted	.836	.735	Socialization	<i>Organizational Performance'</i> = 3.988 + 0.199Socialization + 0.188Externalization + 0.155Internalization + 0.091Combination
			.067	Externalization	
			.028	Internalization	
			.006	Combination	
H2	Accepted	.470	.416	Socialization	<i>Financial Performance'</i> = 4.089 + 0.216Socialization + 0.17Combination + 0.165Internalization
			.035	Combination	
			.019	Internalization	
H4	Accepted	.805	.069	Internalization	<i>Business Process Performance'</i> = 3.995 + 0.196Internalization + 0.184Externalization + 0.179Socialization + 0.134Combination
			.034	Externalization	
			.690	Socialization	
			.012	Combination	

Table 4.31 Hypothesis testing summary (cont.)

H5	Accepted	.707	.067	Internalization	<i>Intellectual Capital Performance'</i> = 3.987 + 0.2Internalization + 0.179Externalization + 0.17Socialization + 0.076Combination
			.029	Externalization	
			.608	Socialization	
			.003	Combination	
H6	Accepted	.685	.059	Externalization	<i>Employee Performance'</i> = 3.891 + 0.248Externalization + 0.236Socialization + 0.16Internalization
			.607	Socialization	
			.019	Internalization	
H7	Accepted	.518	.479	Socialization	<i>Social Performance'</i> = 4.1 + 0.247Socialization + 0.151Externalization + 0.116Combination
			.030	Externalization	
			.009	Combination	

4.5 Summary results

This section summarizes the quantitative results into short discussion. The main part of respondents came from 4 largest commercial banks in Thailand; Siam Commercial bank, Kasikorn bank, Krungthai bank, and Bangkok bank. Respondents of these banks covered almost 70% of total respondents. Majority of respondents were female with age 25-34 years old. The highest distribution in education was bachelor degree. Half of respondents were working in Retail banking department in the position of officer or senior officer. These respondents were working in the bank for quite long (6-10 years) and salary between 15,000 – 45,000 THB. The quality of questionnaire was examined by testing on reliability and validity which the results confirmed that the questionnaire was reliable and be able to represent both independent and dependent variables. Descriptive statistics presented the high level of agreement of almost all knowledge creation activities except informal meeting and job rotation activities which were the two lowest percentage of agreement among all activities. This suggests that knowledge creation activities according to SECI model were applied in working

activities of banks in Thailand. However, informal meeting was not received much agreement which means that employees in Thai banks did not prefer to have work-related discussion during their off-hours. The lowest agreement of job rotation showed that employee rotation across departments may not be supported in Thai banks.

Regarding the difference perception of knowledge creation process among employee groups, the independent t-test and one-way ANOVA were used to investigate the mean difference. The independent t-test did not find any difference on the perception of knowledge creation process between genders but it highlighted the difference between bachelor and master employees that bachelor employees were found to have more agreement of knowledge creation process than master employees in Thai banking context. The result from one-way ANOVA indicated no significant difference on knowledge creation process among groups of age, positional level, working experience, banking experience, and salary.

The statistical techniques were adopted by using SPSS to test the hypothesis and answer research questions. The multiple regression with stepwise method was used to identify the relationship between knowledge creation process and the perception of organizational performance including each perspective of organizational performance. The results found that all hypotheses were accepted, meaning that knowledge creation process positively related to organizational performance within Thai banking industry but not all four modes of SECI process were significant when specify to each perspective of organizational performance. In financial perspective, externalization was found to be insignificant. Looking at customer perspective, the regression model was significant but failed to pass the assumption of normality of residuals. The regression result may invalid and inaccurate. It can be concluded that knowledge creation process was not the important factor toward customer performance. In the aspect of business process and intellectual capital, all four modes of SECI model were found to be significant. While, the employee perspective was not affected from combination as it showed insignificant effect. In the last aspect, social perspective, internalization was pointed out to be an insignificant factor. From the result of all hypotheses, socialization was found to have the highest contribution in every aspect of organizational performance except customer performance which confirmed its important role in Thai banks. Comparing the

magnitude of adjusted R^2 from regression models, it can be concluded that knowledge creation process produced the highest effect to business process, followed by intellectual capital, employee, social, and financial performance within Thai banks.



CHAPTER V

CONCLUSION

The chapter presents findings from this study. Findings are summarized into two topics; the practices of knowledge creation process within Thai banking industry and the effects of SECI process upon organizational performance based on Holistic scorecard framework. Next section discussed on Theoretical implications regarding SECI model in Thai banking industry, followed by practical implications which suggest the activities of SECI process to reinforce and improve knowledge creation process which finally reflect to better organizational performance. Limitations and recommendations for future research are mentioned as the last section of the chapter.

5.1 Summary of findings

The objective of the study was to examine the effect of knowledge creation process towards the organizational performance in Thai banks. Knowledge creation process was measured based on SECI model which consisted of socialization, externalization, combination, and internalization mode. Organizational performance was measured from employees' perception under the Holistic framework which covered 6 perspectives; financial, customer, business process, intellectual capital, employee, and social perspective. Measurement items were developed based on various literature reviews. The quantitative method was used to investigate the research questions. Questionnaire of 400 respondents who are banking employees in Thailand were collected during June-September 2016 via online and offline channels. The statistical analysis was conducted and the main findings were as follows:

5.1.1 Practices of KCP in Thai banking industry

Knowledge creation process was commonly used in Thai banking industry. Mentoring and apprenticeship had the highest average score among all socialization items. This reveals that Thai banks use this approach to transfer knowledge from higher experience employees to lower ones. Informal meeting was found to have fairly low agreement which showed that Thai banking employees were likely to have less work-related discussion during breaks or meal periods. This could be the strict working hour of banking industry that limited this activity. Job rotation had the lowest average score, showing that employee rotation across departments was not support in Thai banks. This could be from the required different speciality of each role especially at the front end (branch) which was difficult to build employee's skill and led to limit in regular job rotation across departments. Documenting the findings from meetings, seminars, and training programs was a common practice in Thai banks. In contrast, metaphor received the lowest agreement among externalization activities. This indicated that communication through diagrams, pictures, or illustrations was not a preferable exercise within Thai banks. Considering the combination activities, with technology nowadays, communication tools such as email, telephone and computerized networks become fundamental instruments for daily communication. Therefore, it was unsurprised that using communication tools to connect with colleagues gained the highest agreement among all SECI activities. On the contrary, although updating database had a rather high average score but it was the lowest agreed activity when compared to other combination activities. It marked the concern on the quality of organizational knowledge in Thai banks. In addition, learning by doing was a general activity in Thai banks as it showed the highest average score among internalization items. Employees in Thai banks were encouraged to learn by using organizational knowledge in their jobs. Meanwhile, on-the-job training had the lowest average score. This could be reflected from the training process for new employees before working at branch that lowered this activity.

In term of demographic, there is no difference between employees in Thai banks (age, gender, positional level, working experience, banking experience, and salary) regarding applying knowledge creation process in their working activities. It

means that there is no difficulty for Thai bank's employees to perform knowledge creation activities even there are belong to different groups of employees. This could be from the compliance and regulations in banking industry that frame the direction of working process for all employees. Hence, it might not see the difference of knowledge creation process in their working activities. However, it is found that employees with bachelor's degree adopted knowledge creation process more than employees who held master's degree. This could be described by the recruitment strategy of banks and normal practice in branches. Majority of employees in branches are bachelor's degree-employees and branches of Thai banks normally have morning and evening meeting every day to ensure that employees understand the same target and create action plans together for each day. The everyday meeting is a key that foster SECI process activities. This could be the reason why bachelor's degree-employees made use of knowledge creation process more than master's degree-employees. The activity of everyday meeting indicates the team-working environment which is align the study of Memon et al. (2017) that team-oriented culture positively affects to knowledge creation process.

5.1.2 The effects of KCP upon banking performance

Knowledge creation process positively affected to the banking performance but not all SECI process had the significant effect toward each perspective of organizational performance. Surprisingly, SECI process was found to be the unimportant factor for customer performance, revealing that the activities of knowledge creation in Thai banks cannot reflect to customer satisfaction, strategy to acquire new customers, and maintaining good relationship with customers. This can be implied that the spiral movement of SECI process in Thai banks could not reach beyond the boundary of organization.

Socialization was the main process in Thai banking industry as it positively affected to every perspective of organizational performance (except customer perspective) with the highest magnitude comparing to the other SECI processes. This reveals that employees in Thai banks focused more on tacit knowledge sharing to perform their jobs which resulted to the outcome of organizational performance. Socialization not only affect to the business performance but also impact to the working

atmosphere such as trust, openness and good relationships among employees. The result aligns with the research from Kulangara, Jackson, and Prater (2016) that formal socialization increases trust in business environment. The large effect of socialization in Thai banks could be from collectivist society in Thailand which impelled these social activities. Moreover, banking industry is a service industry. Thus, it required a lot of social interactions in the working process when compared with other industries such as manufacturing industry.

Externalization positively affected to 4 perspectives in organizational performance; business process, intellectual capital, employee, and social perspectives. However, externalization was not affect to financial performance. This could be from the nature of banking industry which is required to comply with the regulations and acts. Banking employees needed to consider organizational norms and expectations along with regulations and acts before expressing their tacit knowledge. It led to fear of making mistakes issue and hindered externalization process. Activities of externalization create new explicit knowledge for organization which can be shared to other members in organization. It helps reduce time and cost as other members can learn from that explicit knowledge. In this sense, fear of making mistakes limited externalization and minimized its benefits within Thai banks in financial aspect. This could be the explanation why externalization was found to be an unimportant factor in financial performance.

The activities of collect and rearrange existing explicit knowledge into more usable forms positively affected to financial, business process, intellectual capital, and social performance. Having said that, the effect size of combination towards intellectual capital and social performance were in minor degrees. This could related to the concerned point that updating organizational database received the lowest agreement among combination activities. Outdated database hindered the combination processes as employees felt unconfident to use data which resulted in less new explicit knowledge and therefore, lowered the intellectual capital in Thai banks. Moreover, the small extent of combination toward social performance could be from the perception of activities in social perspective as Thai organizations perceived social activities such as CSR activities as non-related working activities. As a result, combination processes which

focused more on creating new explicit knowledge for working purpose had relatively low effect to social performance. Additionally, combination was identified to be a non-essential factor for employee performance. This could be from the individual perception in employee perspective such as working atmosphere, pay and benefit satisfaction which cannot be fulfilled by the combination activities.

Furthermore, internalization processes positively affected financial, business process, intellectual, and employee performance. Comparing the effect size with other SECI processes, internalization had the highest effect size on business process and intellectual capital perspectives. This marks the importance of converting explicit into tacit knowledge which drives business activities and increases knowledge assets in Thai banks. The important role of internalization aligns with the research of Hubers, Poortman, Schildkamp, Pieters, and Handelzalts (2016). Their findings indicate that the more engagement in socialization and internalization, the deeper knowledge that employees gain in educational context. In the opposite way, internalization was not affect to organizational performance in social perspective. This could be explained by the perception of non-related working activities in social perspective which limited the internalization processes within Thai banks. With the above findings according to the relationship between knowledge creation process and organizational performance, the key points were summarized into Figure 5.1 for clearly understanding.

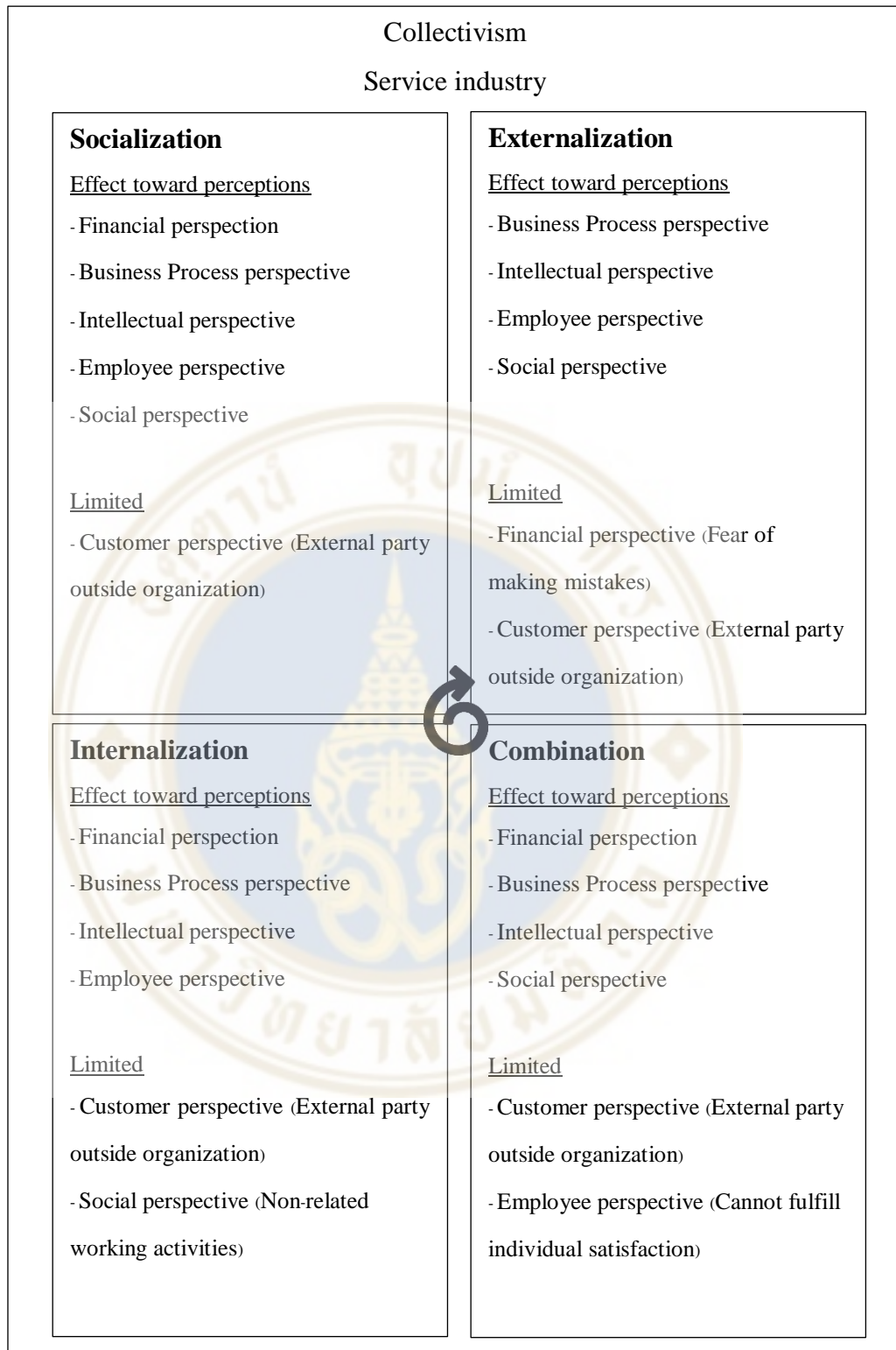


Figure 5.1 SECI model toward perception of organizational performance in Thai banking industry

5.2 Theoretical implications

Theoretical implications refer to the discussion of findings based on theory. Findings from this study create understanding on the relationship of SECI process and the perception of organizational performance using HSC framework. The study contributes to the implications of SECI model in several points as follow:

1. It is confirmed that SECI model is universal and applicable in Thailand's banking industry. However, it is influenced by cultural and business context. Thailand is collective societies in which people are prefer to stay as a group. Collectivism encourages employee engagement which drives the use of socialization. In term of business context, banking industry is a service industry where the majority of work are related to administrative work which social interaction among employees are occurred more often when compared with other industries such as manufacturing industry.

2. Nonaka et al. (2000) stated that the spiral movement of knowledge creation process was amplified into larger scale through the ontological level. The ontological level began with individual, group, organizational, and inter-organizational level. Having said that, it is difficult to go beyond the boundary of organization as there is no shared identity between organization and external parties. Each party perceives to belong with their own identity and no need to consider contribution across parties. The result is in line with the study of Lievre and Tang (2015). Lievre and Tang found that the obstacle in inter-organizational knowledge transfer is due to a deficiency of socialization as lack of shared context between organizations. In this study, even banks used external knowledge from competitors, experts, or customers but customers did not considered themselves as a part of organization which resulted in hindering SECI process between banks and customers and gave rationale why SECI process did not affect to customer performance apparently.

3. Not all modes of SECI process significantly affected to each perspective of organizational performance. Some processes were limited by the attitude and perception of employees in organization which can be confirmed from the findings in this study. The attitude of fearing in making mistakes obstructed externalization activities which led to increasing in learning time and cost of employees and reduced its benefit in financial perspective. This supports Easa's work that externalization is not a

key resource of knowledge creation process because it is limited by fear of making mistakes and lack of trust. (Easa, 2012). Perception towards social performance also shaped the activities of SECI process. CSR activities in Thailand are considered to be more likely of social activities without focusing on return and mostly not related to working activities (Srisuphaolarn, 2013). This perception increased socialization while impeded combination and internalization as both processes were focusing more on utilizing and internalizing knowledge based on working objectives.

4. SECI process was rooted within business process. In other words, it was a foundation of business processes. SECI process had the highest effect to business process performance when compared with other perspectives of organizational performance. This is a proof of how important of SECI process to business process perspective. Additionally, the large proportion of socialization and internalization to intellectual capital performance highlighted the importance of tacit knowledge over explicit knowledge. The important role of tacit knowledge is also discussed in the study of Okuyama (2017). The findings found that tacit knowledge plays an important role in problem solving and increases innovation processes which influence product development and the new products are considered to be parts of intellectual capital in organization.

5.3 Practical implications

Practical implications provided suggestions for Thai banks to maximize the benefits of KCP based on SECI model. The discussion presents the ways to enhance knowledge creation activities and accordingly lead to higher organizational performance in each perspective based on HSC framework. The implications are divided into two parts in term of development and improvement. Development refers to the practices for Thai banks to strengthen knowledge creation activities. Meanwhile, improvement is relevant to the suggestions to fill the gap in knowledge creation activities. For development, the practical contributions of this study are stated as follow:

1. With the importance of internalization in business process and intellectual capital performance, it is recommended to increase internalization activities to boost up

performance in both perspectives. On-the-job training is the easiest activity to implement as it can be a part of working processes. Pairing program between employees encourages this activity. The pairing program can be in different dimensions such as between new and existing employees like buddy program or trainees and supervisors who are expert in specific area like coaching program. On-the-job training motivates face-to-face discussions and increases trust between employees which means that it increases growth in both socialization and internalization processes.

2. In the aspect of employee performance, banks should maximize the benefits of externalization process by using knowledge from expert to set up training programs, recruitment strategy, or career path. Additionally, HR department should know the existing knowledge that organization have to recruit employees whose competence are be able to fulfill knowledge gap in organization.

3. The largest effect of socialization towards financial and social performance indicates its impacts to both perspectives. Hence, increasing socialization activities help banks to achieve better performance in financial and social aspects. Mentoring and apprenticeship allows lower experienced employees to improve their skills from experience sharing with higher experienced employees. Banks should encourage this activity to build up employees' interactions and reduce training cost for new employees which leads to better financial performance. Additionally, banks should support social activities that contribute to society such as an outing program for welfare activity. This activity creates engagements among employees and uplifts social performance in organization.

In the improvement dimension, practical implications are provided in below section.

1. The practice of SECI process can be used to gain insight information from customers to extend the boundary of knowledge creation process with customers. Banks must deal with customers' demand and satisfaction. For example, employees at branches can do face-to-face discussion with customers then document the needs of customers and pass out to the relevant teams. The relevant teams gather information from all branches, analyze it and come out with new products/services that serve customers' needs. Sometimes it is difficult to gain insights as customers cannot point

out what they really need. The other way around is to imply from customers actions when using, purchasing, or not purchasing products/services (Nonaka et al., 2000). With technology nowadays allows banks to get close to customers. The relationship and interactions between banks and customers can be established not only in the physical space but also in the virtual space. Customers' information can be obtained from social media and virtual community of practice. In this way, it is similar to the findings from Bartolacci, Cristalli, Isidori, and Niccolini (2016) that virtual space enhances and supports SECI activities at the inter-organizational level.

2. The lack of job rotation across departments lowered knowledge sharing among employees. To improve that, banks should consider more job rotation across departments to expand employees' knowledge through on-the-job training and increase face-to-face discussions. Job rotation allows employees to learn variety of knowledge regarding banking business from different departments. This is in line with the study of Stanica and Peydro (2016) that the cross-training has a positive effect to knowledge transfer and enhances SECI activities such as learning by doing and experience sharing. In addition, it increases the opportunity for employees to share knowledge with other colleagues. The period of job rotation should not be too short because of insufficient time to learn and develop skills but it also should not be too long as it makes employees feel more anxious about uncertainty after a long rotation.

3. Banks should create the knowledge sharing environment to facilitate the knowledge expression which helps increasing the effectiveness of communication and creates more solid knowledge from tacit knowledge. Creating the environment of knowledge sharing by offering rewards or recognitions for employees who have shared useful knowledge is another way to increase employees' motivation. Furthermore, managers or executives need to encourage employees to express their ideas. It can be setting up sharing session among employees and allow them to share any knowledge that is useful for work. The key is to allow mistakes to happen. This can reduce fear of making mistakes attitude and help employees express more knowledge. On top of that, employees can also learn from mistakes and reduce the same mistakes that may happen from other employees. When a lot of tacit knowledge is converted into explicit knowledge, it can be discovered by other members in organization. Thus, time and cost

of learning will be reduced and it is reflected to better financial performance. Moreover, this also increases the intellectual capital in banks when knowledge is expanded to organizational level.

4. Regarding the lowest effect of combination toward organizational performance, it indicates the low activities in utilizing organizational knowledge. Therefore, it is recommended to promote the combination activities in Thai banks. To do that, banks need to ensure that the organizational knowledge is up-to-date. Moreover, low score in updating database causes lack of confidence in organizational knowledge and hinder combination processes. Hence, banks need to verify and update database from time to time. Updating is not just only add new data and information but also clean out the unqualified or invalid information from organizational database. The issue of outdated database should be aware as data and information in banking industry is one of the most important keys for competitive advantage. If banks cannot maintain their internal database, then banks cannot survive in the age of big data, fintech, and blockchain. High quality and up-to-date database increase trust in organizational knowledge and make employees feel confident to use organizational knowledge through combination activities. Once employees use and combine explicit knowledge into new ones, it enlarges organizational knowledge which reflects to better intellectual capital performance.

5. Lessons in training before working are not exactly the same as on boarding. The absence or infrequency of on-the-job training can lower the performance quality especially for new employees. Tacit knowledge is generated when new employees learn from other employees which make them perform their tasks better. It can be setting up pairing program between employees to encourage this activity. The pairing program can be in different dimensions such as between new and existing employees like buddy program or trainees and supervisors who are expert in specific area like coaching program. On-the-job training motivates face-to-face discussions and increases trust between employees which means that it increases growth in both socialization and internalization processes.

6. Banks should consider welfare activities as a part of business's activities to increase organizational knowledge and gain benefits from those activities. It should

be the activities that can turn into business's values. For example, loan offering to eco-friendly product inventors or deposit account with special interest rate for children to encourage saving habit. Contribution to society with business-related objective increases the use of SECI process and brings benefits to both organization and society which finally reflects to better social performance.

5.4 Limitations of the study

The study was designed to perform analysis with a cross-sectional data. The data were collected regardless the differences in time. Hence, it is limited to examine the effect of KCP upon organizational performance over a period of time. In addition, it is limited to collect objective performance because of confidential issue in banking industry. Thus, the subjective performance from banking employees were used instead as explained in statement of purpose section. The study was also limited to examine the use of knowledge creation process among departments as the sample sizes of each department were too small to perform statistical testing. It was difficult to reach the employees from every department in banks. Moreover, the organizational structure of each bank was different. Some departments had the same function but were named differently and the scope of work of each department in each bank may not be the same. Hence, it was not easy to examine the difference in knowledge creation across all departments. The sample size issue also happened with the sample size of diploma and doctoral degree employees. A small number of diploma's employees was from the recruitment policy that banks preferred to recruit employees who had bachelor's degree or higher. The number of doctoral degree employees in banking are small as the number of higher education of employed persons in Thailand was still low compared to other educational level (elementary level or lower than that) employees (National Statistics Office, 2016).

5.5 Recommendations for further study

There are a number of additional areas for further study. The study used quantitative method to achieve research objectives and answer research questions. It is suggested to use qualitative method to enhance the quantitative results. It can obtain insight information as qualitative method allows participants to answer openly. The open-ended questions can bring true feeling and behavior of participants and may expand to the new topics which were not considered by researchers. It is also recommended to investigate the effect of knowledge creation process toward organizational performance in other countries and business contexts. It can be the comparison between banks in Thailand and other countries with different cultures or conduct the studies on different business contexts. This will contribute to the implication of universal applicability of SECI model. Another suggestion is to explore the effect of SECI process toward different aspects in banking industry such as innovation, organizational learning etc. to expand the extent of SECI process in a variety of dimensions in banks. In addition, knowledge creation process is a part KM domains. The study showed the relationship of knowledge creation toward organizational performance. It will be useful to explore the link of other KM domains which are knowledge sharing, knowledge storage & retrieval, and knowledge application toward organizational performance and the link between knowledge creation with other KM domains. This will increase more understanding not only on knowledge creation but a whole domain of KM toward organizational performance.

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APPENDICES

APPENDIX 1: Survey questionnaire

English version



This questionnaire is conducted by a thesis student from College of Management Mahidol University in order to examine the knowledge creation process and its effect to organizational performance in Thai commercial banks. The aim of this research is to provide suggestions to enhance the effectiveness of knowledge creation process which will be reflected to organizational performance. Filled-in information will be kept confidential and also will be used for this thesis only. Please kindly answer all the questions; it will take you only 15-20 minutes. Thank you for your collaboration.

Part 1: Banking industry information

1. Are you currently working as an employee in Thai commercial bank?

- Yes
- No (If No, please end this questionnaire and thank you for your time.)

2. Please select your current organization.

- | | |
|--|---|
| <input type="checkbox"/> BANGKOK BANK | <input type="checkbox"/> SIAM COMMERCIAL BANK |
| <input type="checkbox"/> BANK OF AYUDHYA | <input type="checkbox"/> STANDARD CHARTERED BANK (THAI) |
| <input type="checkbox"/> CIMB THAI BANK | <input type="checkbox"/> THANACHART BANK |
| <input type="checkbox"/> ICBC BANK | <input type="checkbox"/> TISCO BANK |
| <input type="checkbox"/> KASIKORNBANK | <input type="checkbox"/> TMB BANK |
| <input type="checkbox"/> KIATNAKIN BANK | <input type="checkbox"/> UNITED OVERSEAS BANK (UOB) |
| <input type="checkbox"/> KRUNG THAI BANK | <input type="checkbox"/> Others (Please specify)..... |
| <input type="checkbox"/> LH BANK | |

Part 2: Knowledge Creation Process

Instruction: Please answer all questions by marking ✓ **only one** option that exactly corresponds to your opinion regarding knowledge creation process in your **current organization**. Please indicate how strongly you agree or disagree with all the following statements.

	Activities	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Disagree
1	I usually express my ideas or concepts into models, diagrams and metaphors					
2	I document findings from meeting, seminars, workshops, and training programs					
3	I spend time having informal discussion about work during coffee break or lunch					
4	Knowledge are transferred from mentors to apprentices					
5	My company has a plan to rotate staff across areas					
6	My company initiates joint projects across departments					
7	My company encourages employees to use knowledge from organizational repository and reflect those knowledge in their jobs					
8	My company shares experience with customers, partners, experts, and competitors					
9*	My company encourages peer support and collaboration between employees (Only in pilot testing)					
10	My company collects best practices from experts and documents it					
11	My company provides reports about customers or competitors based on its accumulated experience					
12	I use communication tools such as telephone, email, and computerized networks to connect with my colleagues					
13*	I use Information and knowledge from repository and summarize into					

	presentations or reports (Only in pilot testing)					
14	My company encourages social activities outside workplace. Ex. Outing trip					
15	My company provides workshops, seminars and training programs for employees					
16*	My company uses database to collect data and categorizes into well-structured information (Only in pilot testing)					
17*	My company creates internal web-pages contained documentations and provides access for employees to reach to useful information (Only in pilot testing)					
18	My company usually updates its database					
19*	My company provides models and case scenarios for simulation which can be used for predicting outcome (Only in pilot testing)					
20	I spend time in brainstorming about suggestions, ideas, or solutions in face-to-face meeting					
21	My company set up training topics for employees based on experts' suggestions					
22	I edit and process collected information from different sources and make it more usable					
23	My company encourages employees to take actions and allow mistakes to happen e.g. testing new offer to customers, create new working process etc.					
24*	Information or knowledge are disseminated to employees through presentations, reports or meetings (Only in pilot testing)					
25	My company provides one-on-one training for new joiners to do their works					

	along with coaching from senior members					
--	---	--	--	--	--	--

Part 3: Organizational performance

Instruction: Please answer all questions by marking ✓ **only one** option that exactly corresponds to your opinion regarding your **current organization's performance**. Please indicate how strongly you agree or disagree with all the following statements.

	Activities	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Disagree
1	Overall, my company is performing well					
2	Overall, my company is productive					
3	My company's profit growth rate maintains a high level in the same industry					
4	In general, my company has good relationship with our customers					
5	My company passes quality certification such as ISO, CMMI etc.					
6	The people with whom I work have the appropriate skill set to contribute to the firm's success (e.g. problem-solving, decision making etc.)					
7	Relative to our competitors, my company's customers are satisfied with our products/services					
8	My company has effective strategies to acquire new customers					
9	I was adequately trained by my predecessor(s) to assume my duties					
10	We try to preserve work-related expertise, techniques, and guidelines					
11	The people with whom I work are clever and creative					
12	We can use the management system to store required knowledge for future use					
13	My company has ability to hedge important known risks and uncertainties					
14	My company has ability to react to and reduce unforeseen risks					

15	We promote teamwork through inter-departmental information and knowledge circulation					
16	My company encourages a culture of knowledge sharing (i.e. rewarding employees who have new knowledge, ideas, and/or suggestions)					
17	We use information systems to facilitate information/knowledge sharing and thus improve work efficiency					
18	Through brainstorming sessions, I can obtain useful information and recommendations without incurring excessive time cost					
19	My company provides education and training to raise employee proficiency at new work tasks					
20	We share information and knowledge when working with other department(s)					
21	Professional knowledge and information are regularly updated and properly maintained within my company					
22	My company has a lot of useful information in documents and databases					
23	The overall operations procedure of my company is very efficient					
24	A rigorous selection process is used to select new recruits					
25	My company regularly makes donations to charity					
26	Compared with other companies in the industry, my company has lower employee turnover					
27	My company provides effective training programs to employees					
28	Training programs are mapped with the company's long term goal					
29	Relative to other companies, my company is enjoyable place to work					

30	I have confidence in the leadership of my company's management team					
31	I am satisfied with my career progress in the company					
32	I am satisfied with my pay					
33	I am satisfied with the benefits program					
34	My company complies with regulatory bodies and local government					
35	My company sponsors and finances voluntary service					
36	My company integrates charitable contributions into its business activities					

Part 4: Personal Information

Instruction: Please mark a ✓ next to your choice and fill in the gap

1. Gender: Male Female

2. Age:

3. Educational level:

- Diploma Doctorate degree
- Bachelor's degree Others (Please specify)
- Master's degree

4. Department:

- Retail Banking Risk Management
- SME Business Compliance & Legal Management
- Corporate Banking Internal Audit
- Information Technology Human Resources and Corporate Governance
- Financial Management Corporate Strategy Management
- Capital Markets Business Others (Please specify)
- Credit Restructuring and Asset Management

5. Position status:

- Operational Worker Manager
- Officer Executive
- Senior Officer

6. Years of working experience (Total year of working):

7. Years of banking experience (Years of working in banking industry):

8. Salary:

- | | | | |
|--------------------------|---------------------|--------------------------|-----------------------|
| <input type="checkbox"/> | < 15,000 THB | <input type="checkbox"/> | 60,001 – 75,000 THB |
| <input type="checkbox"/> | 15,000 – 30,000 THB | <input type="checkbox"/> | 75,001 – 100,000 THB |
| <input type="checkbox"/> | 30,001 – 45,000 THB | <input type="checkbox"/> | 100,001 – 250,000 THB |
| <input type="checkbox"/> | 45,001 – 60,000 THB | <input type="checkbox"/> | > 250,001 THB |

***** Thank you for your cooperation *****



Thai version



แบบสอบถามนี้จัดทำโดยนักศึกษาระดับปริญญาโท จากวิทยาลัยการจัดการ มหาวิทยาลัยมหิดล เพื่อศึกษากระบวนการสร้างความรู้ และผลกระทบที่เกิดขึ้นกับผลการดำเนินงานของธนาคารพาณิชย์ในประเทศไทย วัตถุประสงค์ของการวิจัยนี้เพื่อนำเสนอแนวทางที่จะช่วยปรับปรุงประสิทธิภาพของกระบวนการสร้างความรู้ ซึ่งจะสะท้อนถึงผลการดำเนินงานขององค์กร ข้อมูลที่ได้รับจะถูกเก็บเป็นความลับและใช้สำหรับการวิจัยในวิทยานิพนธ์นี้เท่านั้น ขอความกรุณาจากท่านตอบคำถามให้ครบทุกข้อ โดยใช้เวลาประมาณ 15-20 นาที และขอขอบคุณที่ท่านให้ความร่วมมือ

ส่วนที่ 1: ข้อมูลของธนาคาร

1. ปัจจุบันท่านเป็นพนักงานธนาคารหรือไม่?

- ใช่
- ไม่ใช่ (หากตอบ ไม่ใช่ กรุณาจบแบบสอบถามและขอขอบคุณที่สละเวลาของท่านในการตอบแบบสอบถาม)

2. กรุณาเลือกธนาคารที่ท่านทำงานอยู่ในปัจจุบัน

- | | |
|--|--|
| <input type="checkbox"/> ธนาคารกรุงเทพ | <input type="checkbox"/> ธนาคารไทยพาณิชย์ |
| <input type="checkbox"/> ธนาคารกรุงศรีอยุธยา | <input type="checkbox"/> ธนาคารสแตนดาร์ดชาร์เตอร์ด (ไทย) |
| <input type="checkbox"/> ธนาคารซีไอเอ็มบี | <input type="checkbox"/> ธนาคารธนาชาด |
| <input type="checkbox"/> ธนาคารไอซีบีซี | <input type="checkbox"/> ธนาคารทีสโก้ |
| <input type="checkbox"/> ธนาคารกสิกรไทย | <input type="checkbox"/> ธนาคารทหารไทย |
| <input type="checkbox"/> ธนาคารเกียรตินาคิน | <input type="checkbox"/> ธนาคารยูโอบี |
| <input type="checkbox"/> ธนาคารกรุงไทย | <input type="checkbox"/> อื่นๆ โปรดระบุ..... |
| <input type="checkbox"/> ธนาคารแลนด์ แอนด์ เฮาส์ | |

ส่วนที่ 2: กระบวนการสร้างความรู้

คำชี้แจง: กรุณาตอบคำถามทุกข้อด้วยการทำเครื่องหมาย ✓ เพียงช่องใดช่องหนึ่งที่ตรงกับความคิดเห็นของท่านมากที่สุดในเรื่องของกระบวนการสร้างความรู้ในองค์กรปัจจุบันของท่าน กรุณาระบุระดับความคิดเห็นในแต่ละข้อต่อไปนี้

ข้อ	รายละเอียด	ไม่เห็นด้วย อย่างยิ่ง	ค่อนข้างไม่ เห็นด้วย	เฉยๆ	ค่อนข้าง เห็นด้วย	เห็นด้วย อย่างยิ่ง
1	ฉันมักแสดงแนวความคิดของฉันออกมาเป็นรูปจำลองแผนภาพ หรือการเปรียบเทียบอุปมาอุปไมย					
2	ฉันจดบันทึกข้อมูลที่ได้รับจากการประชุม สัมมนา ประชุมเชิงปฏิบัติการ และการฝึกอบรม					

3	ฉันใช้เวลาว่าง เช่น ช่วงพักกลางวัน หรือ ช่วงพักดื่มกาแฟ ในการพูดคุยอย่างเป็นกันเองเกี่ยวกับเรื่องงาน					
4	ความรู้ที่เกิดจากการถ่ายทอดจากผู้ที่มีประสบการณ์การทำงานมากกว่าไปสู่ผู้ที่มีประสบการณ์การทำงานน้อยกว่า					
5	องค์กรของฉันมีแผนการที่จะหมุนเวียนพนักงานไปยังแผนกอื่น					
6	องค์กรของฉันมีการริเริ่มโครงการที่ทำร่วมกันระหว่างแผนก					
7	องค์กรของฉันส่งเสริมให้พนักงานใช้ความรู้จากคลังเก็บข้อมูลขององค์กรและนำความรู้เหล่านั้นมาใช้ในการทำงานของตน					
8	องค์กรของฉันแบ่งปันประสบการณ์การทำงานกับลูกค้า หุ้นส่วน ผู้เชี่ยวชาญ และคู่แข่งขององค์กร					
9*	องค์กรของฉันส่งเสริมให้พนักงานมีการร่วมมือและช่วยเหลือซึ่งกันและกัน (เฉพาะใน pilot testing)					
10	องค์กรของฉันรวบรวมข้อมูลจากผู้เชี่ยวชาญที่มีประสบการณ์และบันทึกวิธีการทำงานที่ดีที่สุดที่ทำงานประสบความสำเร็จ					
11	องค์กรของฉันจัดทำรายงานเกี่ยวกับลูกค้า และคู่แข่งขององค์กร โดยรวบรวมจากประสบการณ์การทำงานที่ผ่านมา					
12	ฉันใช้เครื่องมือ เช่น โทรศัพท์ อีเมล และระบบเครือข่ายในองค์กร ในการติดต่อสื่อสารกับผู้ร่วมงาน					
13*	ฉันใช้ข้อมูลและความรู้จากคลังเก็บข้อมูลขององค์กรและสรุปผลในรูปแบบของสื่อนำเสนอหรือรายงาน (เฉพาะใน pilot testing)					
14	องค์กรของฉันส่งเสริมกิจกรรมทางสังคมนอกสถานที่ทำงาน เช่น การท่องเที่ยว นอกสถานที่ เป็นต้น					

15	องค์กรของฉันทันมีการจัดการ การประชุมเชิงปฏิบัติกร สัมมนา และหลักสูตรการฝึกอบรมให้แก่พนักงาน					
16 *	องค์กรของฉันทันใช้ฐานข้อมูลในการเก็บรวบรวมและจัดหมวดหมู่ข้อมูลในองค์กรให้เป็นระเบียบ (เฉพาะใน pilot testing)					
17 *	องค์กรของฉันทันจัดทำหน้าเว็บที่ใช้ภายในองค์กร เพื่อเก็บเอกสาร และให้สิทธิ์พนักงานในการเข้าถึงข้อมูลที่เป็นประโยชน์เหล่านั้น (เฉพาะใน pilot testing)					
18	องค์กรของฉันทันมีการปรับปรุงข้อมูลในฐานข้อมูลให้ทันสมัยเสมอ					
19 *	องค์กรของฉันทันจัดเตรียมรูปแบบและสถานการณ์ตัวอย่าง สำหรับการจำลองเพื่อใช้ในการทำนายผลลัพธ์ที่จะเกิดขึ้น (เฉพาะใน pilot testing)					
20	ฉันทันมีการระดมความคิดเพื่อหาข้อเสนอแนะ แนวคิด หรือแนวทางแก้ปัญหาในระหว่างการประชุม					
21	องค์กรของฉันทันจัดทำหลักสูตรการฝึกอบรมให้กับพนักงานโดยอ้างอิงจากคำแนะนำของผู้เชี่ยวชาญที่มีประสบการณ์					
22	ฉันทันนำข้อมูลที่รวบรวมมาจากแหล่งข้อมูลต่างๆ มาประมวลผลและนำไปใช้ประโยชน์ได้มากขึ้น					
23	องค์กรของฉันทันส่งเสริมให้พนักงานกล้าที่จะลงมือทำและยอมรับความคิดพลาดที่จะเกิดขึ้นได้ เช่น การนำเสนอโปรโมชันใหม่ให้กับลูกค้า การทดลองกระบวนการทำงานใหม่ เป็นต้น					
24 *	มีการเผยแพร่ข้อมูลและความรู้ในองค์กรไปยังพนักงานผ่านสื่อนำเสนอ รายงานหรือในที่ประชุม (เฉพาะใน pilot testing)					
25	องค์กรของฉันทันมีการอบรมแบบตัวต่อตัวให้กับพนักงานใหม่เพื่อให้สามารถทำงาน					

	ได้ โดยได้รับการฝึกสอนจากพนักงานที่มีประสบการณ์สูงกว่า					
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ส่วนที่ 3: ผลการดำเนินงานขององค์กร

คำชี้แจง: กรุณาตอบคำถามทุกข้อด้วยการทำเครื่องหมาย ✓ เพียงช่องใดช่องหนึ่งที่ตรงกับความคิดเห็นของท่านมากที่สุดในเรื่องของผลการดำเนินงานในองค์กรปัจจุบันของท่าน กรุณาระบุระดับความคิดเห็นในแต่ละข้อต่อไปนี้

ข้อ	รายละเอียด	ไม่เห็นด้วย อย่างยิ่ง	ค่อนข้างไม่ เห็นด้วย	เฉยๆ	ค่อนข้าง เห็นด้วย	เห็นด้วย อย่างยิ่ง
1	องค์กรของฉันมีผลการดำเนินงานที่ดี					
2	องค์กรของฉันเป็นองค์กรที่มีประสิทธิภาพในการทำงาน					
3	การเติบโตของผลกำไรขององค์กรของฉันอยู่ในระดับที่สูงเมื่อเทียบกับคู่แข่ง					
4	องค์กรของฉันมีความสัมพันธ์ที่ดีกับลูกค้า					
5	องค์กรของฉันผ่านการรับรองคุณภาพ เช่น ISO, CMMI เป็นต้น					
6	ผู้ร่วมงานของฉันมีความสามารถหลากหลาย เช่น การแก้ปัญหา การตัดสินใจ ซึ่งส่งเสริมให้องค์กรประสบความสำเร็จ					
7	ลูกค้าขององค์กรของฉันมีความพึงพอใจในผลิตภัณฑ์และบริการขององค์กร เมื่อเทียบกับคู่แข่ง					
8	องค์กรของฉันมีกลยุทธ์ที่มีประสิทธิภาพในการหาลูกค้าใหม่					
9	ฉันได้รับการฝึกอบรมอย่างเพียงพอจากพนักงานที่อยู่มาก่อนเพื่อที่จะทำงานของฉันได้อย่างต่อเนื่อง					
10	พนักงานในองค์กรมีความพยายามที่จะรักษาความรู้ ความชำนาญ เทคนิค และแนวทางการเกี่ยวกับการทำงานไว้					
11	ผู้ร่วมงานของฉันฉลาด และมีความคิดสร้างสรรค์					
12	องค์กรของฉันมีระบบการจัดการที่เก็บข้อมูลความรู้เพื่อสำหรับใช้ในอนาคต					
13	องค์กรของฉันมีความสามารถในการป้องกันและลดความสูญเสียจากความ					

	เสียงที่รับรู้ได้และความไม่แน่นอนที่จะเกิดขึ้น					
14	องค์กรของฉันมีความสามารถในการตอบสนองและลดความเสี่ยงจากเหตุการณ์ไม่คาดฝัน					
15	พนักงานในองค์กรของฉันมีการส่งเสริมการทำงานร่วมกันเป็นทีม ผ่านการแบ่งปันข้อมูลและความรู้ระหว่างหน่วยงาน					
16	องค์กรของฉันส่งเสริมวัฒนธรรมในการแบ่งปันความรู้ เช่น มีรางวัลให้กับพนักงานที่มีนำเสนอความรู้ แนวคิด หรือข้อเสนอแนะใหม่ ให้กับองค์กร					
17	พนักงานในองค์กรของฉันมีการใช้ระบบการจัดการข้อมูลในการแบ่งปันข้อมูลและความรู้ เพื่อเพิ่มประสิทธิภาพในการทำงาน					
18	ฉันได้รับข้อมูลและคำแนะนำที่เป็นประโยชน์ หลังจากการประชุมระดมความคิด					
19	องค์กรของฉันมีการจัดหาหลักสูตรการเรียนรู้และฝึกอบรมเพื่อให้พนักงานมีความสามารถที่จะทำงานใหม่ที่ได้รับ					
20	เมื่อทำงานร่วมกัน พนักงานในองค์กรของฉันมีการแบ่งปันข้อมูลและความรู้ซึ่งกันและกัน					
21	ในองค์กรของฉัน ความรู้และข้อมูลถูกปรับปรุงให้ทันสมัยและมีการดูแลอย่างเหมาะสมอย่างสม่ำเสมอ					
22	องค์กรของฉันมีข้อมูลที่มีประโยชน์มากมายเก็บอยู่ในรูปแบบของเอกสารและฐานข้อมูลขององค์กร					
23	กระบวนการปฏิบัติงานขององค์กรของฉันมีประสิทธิภาพอย่างมาก					
24	องค์กรของฉันมีกระบวนการคัดเลือกพนักงานใหม่อย่างเข้มงวด					
25	องค์กรของฉันมีการบริจาคเงินให้การกุศลอย่างสม่ำเสมอ					

26	เมื่อเทียบกับคู่แข่งอื่น องค์กรของฉันมีอัตราการลาออกของพนักงานต่ำกว่า					
27	องค์กรของฉันมีการจัดหาหลักสูตรฝึกอบรมที่มีประสิทธิภาพให้กับพนักงาน					
28	หลักสูตรฝึกอบรมของพนักงานถูกกำหนดให้สอดคล้องกับเป้าหมายระยะยาวขององค์กร					
29	เมื่อเทียบกับคู่แข่งอื่น องค์กรของฉันเป็นองค์กรที่น่าทำงานด้วย					
30	ฉันมีความเชื่อมั่นในความเป็นผู้นำของผู้บริหารขององค์กรของฉัน					
31	ฉันมีความพึงพอใจกับการเติบโตในหน้าที่การงานของฉัน					
32	ฉันมีความพึงพอใจกับเงินเดือนที่ได้รับ					
33	ฉันมีความพึงพอใจกับสิทธิประโยชน์สำหรับพนักงานในองค์กรของฉัน					
34	องค์กรของฉันมีนโยบายที่สอดคล้องกับรัฐบาลและหน่วยงานที่ควบคุมด้านกฎระเบียบ					
35	องค์กรของฉันมีการทำกิจกรรมเพื่อสังคม					
36	ผลงานการกุศลขององค์กรของฉันเป็นส่วนหนึ่งของกิจกรรมทางธุรกิจขององค์กร					

ส่วนที่ 4: ข้อมูลส่วนตัว

คำชี้แจง: กรุณาตอบคำถามทุกข้อด้วยทำเครื่องหมาย ✓ หรือกรอกข้อมูลลงในช่องว่าง

- เพศ: ชาย หญิง
- อายุ:ปี
- ระดับการศึกษาสูงสุด:

<input type="checkbox"/> อนุปริญญา	<input type="checkbox"/> ปริญญาเอก
<input type="checkbox"/> ปริญญาตรี	<input type="checkbox"/> อื่นๆ โปรดระบุ
<input type="checkbox"/> ปริญญาโท	
- แผนกหรือส่วนงาน:

<input type="checkbox"/> หน่วยงานธุรกิจรายย่อย	<input type="checkbox"/> หน่วยงานธุรกิจขนาดกลาง
--	---

- | | | | |
|--------------------------|---|--------------------------|--|
| <input type="checkbox"/> | หน่วยงานธุรกิจขนาดใหญ่ | <input type="checkbox"/> | หน่วยงานบริหารความเสี่ยง |
| <input type="checkbox"/> | หน่วยงานเทคโนโลยี | <input type="checkbox"/> | หน่วยงานกำกับและบริหารงานกฎหมาย |
| <input type="checkbox"/> | หน่วยงานบริหารการเงิน | <input type="checkbox"/> | หน่วยงานตรวจสอบภายใน |
| <input type="checkbox"/> | หน่วยงานธุรกิจตลาดเงินตลาดทุน | <input type="checkbox"/> | หน่วยงานทรัพยากรบุคคล |
| <input type="checkbox"/> | หน่วยงานปรับโครงสร้างหนี้และ
บริหารทรัพย์สิน | <input type="checkbox"/> | หน่วยงานยุทธศาสตร์ธนาการ
อื่นๆ โปรดระบุ |

5. ตำแหน่ง:

- | | | | |
|--------------------------|------------------------|--------------------------|-----------|
| <input type="checkbox"/> | พนักงานระดับปฏิบัติการ | <input type="checkbox"/> | ผู้จัดการ |
| <input type="checkbox"/> | เจ้าหน้าที่ | <input type="checkbox"/> | ผู้บริหาร |
| <input type="checkbox"/> | เจ้าหน้าที่อาวุโส | | |

6. ระยะเวลาทำงานทั้งหมดตั้งแต่เริ่มทำงานที่แรก (ระบุจำนวนปี หากมีเศษ ให้ปัดขึ้นเป็นจำนวนเต็ม):

7. ระยะเวลาทำงานเฉพาะในธุรกิจธนาการ (ระบุจำนวนปี หากมีเศษ ให้ปัดขึ้นเป็นจำนวนเต็ม):

8. เงินเดือน:

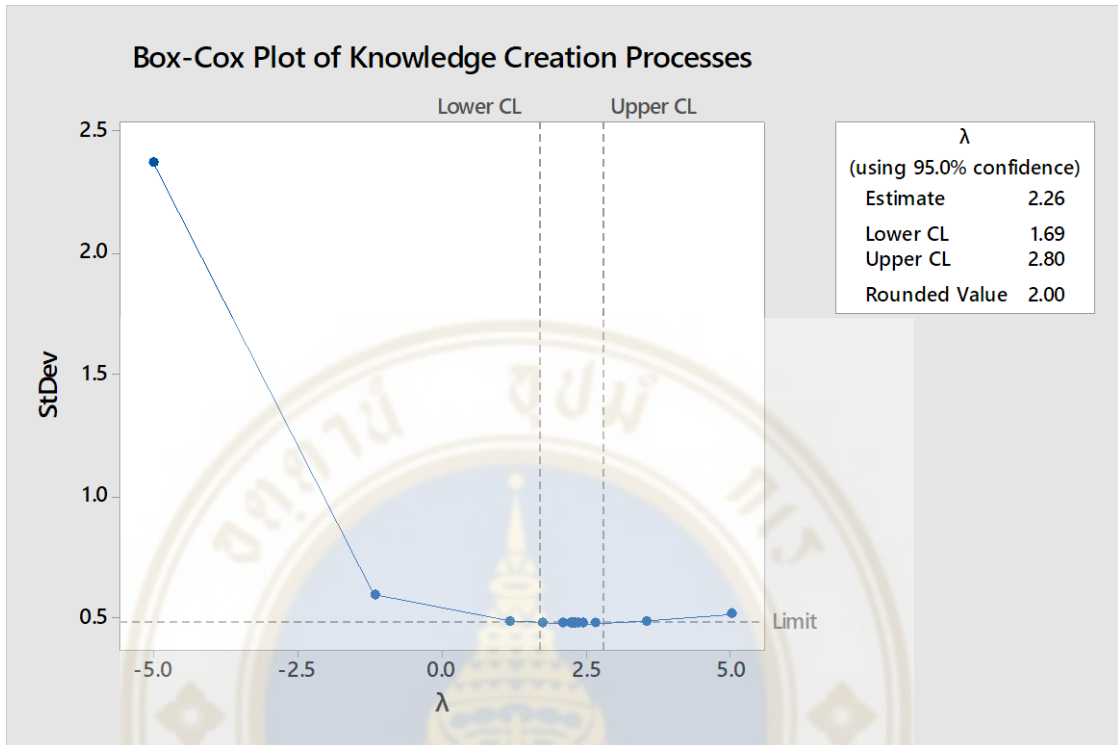
- | | | | |
|--------------------------|---------------------|--------------------------|-----------------------|
| <input type="checkbox"/> | < 15,000 บาท | <input type="checkbox"/> | 60,001 – 75,000 บาท |
| <input type="checkbox"/> | 15,000 – 30,000 บาท | <input type="checkbox"/> | 75,001 – 100,000 บาท |
| <input type="checkbox"/> | 30,001 – 45,000 บาท | <input type="checkbox"/> | 100,001 – 250,000 บาท |
| <input type="checkbox"/> | 45,001 – 60,000 บาท | <input type="checkbox"/> | > 250,000 บาท |

----- ขอขอบคุณที่ให้ความร่วมมือ -----

APPENDIX 2: Correlation coefficient (Pilot Testing N=50)

	Internal meeting	Social activities	Workshop & Training program	Face to face meeting	Mentoring and apprenticeship	Job rotation	Co-operative project	Sharing experience with external parties	Collaborative environment	Metaphors	Findings of meetings	Expert experience	Reports of external parties	Training Topic	Repository & Database	Internal Web-pages	Updating database	Editing and processing of knowledge	Documented communication	Using Communication Tools	Presentations & Reports	Learning by doing	Experimenting	On-the-job training	Simulation and forecasting
Spearman's rho																									
Internal meeting	1.000																								
Social activities	.234	1.000																							
Workshop & Training program	-.065	.438	1.000																						
Face to face meeting	.051	.467	.531	1.000																					
Mentoring and apprenticeship	.177	.231	.513	.355	1.000																				
Job rotation	.128	.211	.289	.414	.239	1.000																			
Co-operative project	.207	.249	.441	.380	.283	.370	1.000																		
Sharing experience with external parties	.186	.304	.169	.203	.059	.218	.352	1.000																	
Collaborative environment	.090	.467	.558	.629	.391	.429	.406	.413	1.000																
Metaphors	.089	.204	.286	.276	.276	.187	-.042	.332	.380	1.000															
Findings of meetings	.291	.209	.371	.522	.405	.251	.387	.305	.521	.173	1.000														
Expert experience	.051	.523	.363	.465	.283	.330	.373	.571	.633	.288	.310	1.000													
Reports of external parties	-.007	.344	.246	.211	.144	.192	.297	.606	.326	.176	.124	.563	1.000												
Training Topic	-.145	.401	.516	.560	.337	.447	.266	.292	.615	.227	.426	.516	.320	1.000											
Repository & Database	.134	.552	.481	.398	.446	.272	.354	.451	.550	.161	.299	.612	.583	.422	1.000										
Internal Web-pages	.128	.482	.410	.351	.448	.091	.256	.323	.595	.319	.357	.563	.440	.457	.686	1.000									
Updating database	.201	.366	.296	.300	.329	.247	.260	.301	.571	.107	.362	.483	.431	.490	.725	.759	1.000								
Editing and processing of knowledge	-.015	.352	.474	.376	.314	.359	.079	.438	.600	.565	.345	.508	.377	.648	.507	.579	.488	1.000							
Documented communication	.024	.436	.583	.557	.443	.436	.352	.420	.699	.261	.564	.469	.483	.562	.703	.561	.557	.654	1.000						
Using Communication Tools	.191	.025	.376	.333	.500	.183	.239	.133	.393	.303	.314	.210	.138	.264	.279	.323	.292	.381	.459	1.000					
Presentations & Reports	-.027	.342	.411	.446	.372	.152	.348	.325	.508	.223	.379	.544	.485	.404	.737	.681	.618	.526	.639	.164	1.000				
Learning by doing	.187	.467	.208	.313	.140	.153	.334	.597	.483	.188	.256	.518	.549	.254	.556	.450	.512	.344	.462	.014	.646	1.000			
Experimenting	.115	.621	.469	.594	.274	.513	.416	.473	.724	.293	.453	.596	.485	.589	.587	.407	.516	.443	.651	.223	.425	.527	1.000		
On-the-job training	-.078	.424	.513	.574	.202	.512	.432	.354	.652	.210	.292	.427	.499	.421	.407	.245	.288	.380	.679	.290	.321	.358	.618	1.000	
Simulation and forecasting	.059	.397	.234	.352	.171	.391	.226	.583	.681	.377	.312	.651	.617	.504	.636	.717	.705	.691	.617	.252	.580	.539	.568	.510	1.000

APPENDIX 3: Box-Cox plot



APPENDIX 4: Independent t-test results

Male VS. Female

Group Statistics					
KCP		N	Mean	Std. Deviation	Std. Error Mean
Gender	Male	102	15.1629	4.61404	.45686
	Female	298	15.2173	4.35600	.25234

Independent Samples Test										
Gender		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
KCP	Equal variances assumed	.256	.613	-.107	398	.915	-.05438	.50738	-1.0518	.94309
	Equal variances not assumed			-.104	166.746	.917	-.05438	.52191	-1.0847	.97602

Bachelor VS. Master degree

Group Statistics					
KCP		N	Mean	Std. Deviation	Std. Error Mean
Educational Level	Bachelor degree	285	15.5424	4.42689	.26223
	Master degree	111	14.2460	4.25873	.40422

Independent Samples Test										
Educational Level		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
KCP	Equal variances assumed	.419	.518	2.645	394	.008	1.29638	.49011	.33282	2.25995
	Equal variances not assumed			2.691	207.811	.008	1.29638	.48183	.34649	2.24628

APPENDIX 5: The post-hoc test

Multiple Comparisons						
Dependent Variable: Knowledge Creation Process						
Scheffe						
(I) Age group		Mean Difference (I-J)	Std. Error	Sig.	90% Confidence Interval	
					Lower Bound	Upper Bound
21 - 24 yrs	25 - 29 yrs	-.06141	.78223	1.000	-2.7852	2.6624
	30 - 34 yrs	1.46750	.80168	.850	-1.3240	4.2590
	35 - 39 yrs	.43524	.92250	1.000	-2.7770	3.6475
	40 - 44 yrs	1.33999	1.22215	.991	-2.9156	5.5956
	45 - 49 yrs	.44996	1.49336	1.000	-4.7500	5.6500
	50 - 54 yrs	-1.66060	1.79711	.997	-7.9183	4.5971
	55 - 60 yrs	-1.93982	2.08063	.997	-9.1848	5.3051
25 - 29 yrs	21 - 24 yrs	.06141	.78223	1.000	-2.6624	2.7852
	30 - 34 yrs	1.52891	.54090	.336	-.3545	3.4124
	35 - 39 yrs	.49665	.70773	.999	-1.9677	2.9610
	40 - 44 yrs	1.40140	1.06936	.974	-2.3222	5.1250
	45 - 49 yrs	.51137	1.37113	1.000	-4.2630	5.2858
	50 - 54 yrs	-1.59919	1.69690	.996	-7.5080	4.3096
	55 - 60 yrs	-1.87841	1.99472	.996	-8.8242	5.0674
30 - 34 yrs	21 - 24 yrs	-1.46750	.80168	.850	-4.2590	1.3240
	25 - 29 yrs	-1.52891	.54090	.336	-3.4124	.3545
	35 - 39 yrs	-1.03226	.72917	.959	-3.5713	1.5068
	40 - 44 yrs	-.12752	1.08366	1.000	-3.9009	3.6459
	45 - 49 yrs	-1.01755	1.38231	.999	-5.8309	3.7958
	50 - 54 yrs	-3.12810	1.70595	.849	-9.0684	2.8122
	55 - 60 yrs	-3.40732	2.00243	.894	-10.3800	3.5653
35 - 39 yrs	21 - 24 yrs	-.43524	.92250	1.000	-3.6475	2.7770
	25 - 29 yrs	-.49665	.70773	.999	-2.9610	1.9677
	30 - 34 yrs	1.03226	.72917	.959	-1.5068	3.5713
	40 - 44 yrs	.90475	1.17586	.999	-3.1897	4.9992
	45 - 49 yrs	.01472	1.45572	1.000	-5.0542	5.0837
	50 - 54 yrs	-2.09583	1.76596	.985	-8.2451	4.0534
	55 - 60 yrs	-2.37506	2.05379	.987	-9.5265	4.7764
40 - 44 yrs	21 - 24 yrs	-1.33999	1.22215	.991	-5.5956	2.9156

	25 - 29 yrs	-1.40140	1.06936	.974	-5.1250	2.3222
	30 - 34 yrs	.12752	1.08366	1.000	-3.6459	3.9009
	35 - 39 yrs	-.90475	1.17586	.999	-4.9992	3.1897
	45 - 49 yrs	-.89003	1.66185	1.000	-6.6767	4.8967
	50 - 54 yrs	-3.00058	1.93939	.934	-9.7537	3.7526
	55 - 60 yrs	-3.27981	2.20469	.947	-10.9568	4.3971
45 - 49 yrs	21 - 24 yrs	-.44996	1.49336	1.000	-5.6500	4.7500
	25 - 29 yrs	-.51137	1.37113	1.000	-5.2858	4.2630
	30 - 34 yrs	1.01755	1.38231	.999	-3.7958	5.8309
	35 - 39 yrs	-.01472	1.45572	1.000	-5.0837	5.0542
	40 - 44 yrs	.89003	1.66185	1.000	-4.8967	6.6767
	50 - 54 yrs	-2.11055	2.12078	.995	-9.4953	5.2742
	55 - 60 yrs	-2.38978	2.36583	.994	-10.6278	5.8483
50 - 54 yrs	21 - 24 yrs	1.66060	1.79711	.997	-4.5971	7.9183
	25 - 29 yrs	1.59919	1.69690	.996	-4.3096	7.5080
	30 - 34 yrs	3.12810	1.70595	.849	-2.8122	9.0684
	35 - 39 yrs	2.09583	1.76596	.985	-4.0534	8.2451
	40 - 44 yrs	3.00058	1.93939	.934	-3.7526	9.7537
	45 - 49 yrs	2.11055	2.12078	.995	-5.2742	9.4953
	55 - 60 yrs	-.27922	2.56839	1.000	-9.2226	8.6641
55 - 60 yrs	21 - 24 yrs	1.93982	2.08063	.997	-5.3051	9.1848
	25 - 29 yrs	1.87841	1.99472	.996	-5.0674	8.8242
	30 - 34 yrs	3.40732	2.00243	.894	-3.5653	10.3800
	35 - 39 yrs	2.37506	2.05379	.987	-4.7764	9.5265
	40 - 44 yrs	3.27981	2.20469	.947	-4.3971	10.9568
	45 - 49 yrs	2.38978	2.36583	.994	-5.8483	10.6278
	50 - 54 yrs	.27922	2.56839	1.000	-8.6641	9.2226

APPENDIX 6: Regression result of hypothesis 1

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Externalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Internalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	Combination		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Organizational Performance

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.858 ^a	.736	.735	.3237	
2	.896 ^b	.803	.802	.2800	
3	.912 ^c	.831	.830	.2595	
4	.915 ^d	.838	.836	.2544	1.729

a. Predictors: (Constant), Socialization
b. Predictors: (Constant), Socialization, Externalization
c. Predictors: (Constant), Socialization, Externalization, Internalization
d. Predictors: (Constant), Socialization, Externalization, Internalization, Combination
e. Dependent Variable: Organizational Performance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	116.045	1	116.045	1107.204	.000 ^b
	Residual	41.714	398	.105		
	Total	157.758	399			
2	Regression	126.624	2	63.312	807.299	.000 ^c
	Residual	31.134	397	.078		
	Total	157.758	399			
3	Regression	131.095	3	43.698	648.995	.000 ^d
	Residual	26.664	396	.067		
	Total	157.758	399			
4	Regression	132.194	4	33.048	510.638	.000 ^e
	Residual	25.564	395	.065		
	Total	157.758	399			

a. Dependent Variable: Organizational Performance
b. Predictors: (Constant), Socialization
c. Predictors: (Constant), Socialization, Externalization
d. Predictors: (Constant), Socialization, Externalization, Internalization
e. Predictors: (Constant), Socialization, Externalization, Internalization, Combination

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.988	.016		246.390	0.000		
	Socialization	.539	.016	.858	33.275	.000	1.000	1.000
2	(Constant)	3.988	.014		284.837	0.000		
	Socialization	.312	.024	.496	12.931	.000	.338	2.955
	Externalization	.280	.024	.445	11.615	.000	.338	2.955
3	(Constant)	3.988	.013		307.405	0.000		
	Socialization	.230	.024	.366	9.411	.000	.282	3.546
	Externalization	.222	.023	.354	9.491	.000	.308	3.251
	Internalization	.170	.021	.270	8.149	.000	.389	2.568
4	(Constant)	3.988	.013		313.547	0.000		
	Socialization	.199	.025	.317	7.924	.000	.257	3.896
	Externalization	.188	.024	.299	7.702	.000	.272	3.676
	Internalization	.155	.021	.247	7.493	.000	.378	2.644
	Combination	.091	.022	.144	4.121	.000	.335	2.986

a. Dependent Variable: Organizational Performance

Collinearity Diagnostics ^a							
Model	Eigenvalue	Condition Index	Variance Proportions				
			Socialization	Externalization	Internalization	Combination	
1	1	1.000	1.000	.50			
	2	1.000	1.000	.50			
2	1	1.813	1.000	.09	.09		
	2	1.000	1.347	.00	.00		
	3	.187	3.117	.91	.91		
3	1	2.533	1.000	.04	.04	.05	
	2	1.000	1.592	.00	.00	.00	
	3	.282	2.995	.08	.28	.91	
	4	.184	3.709	.88	.68	.04	
4	1	3.268	1.000	.02	.02	.03	.03
	2	1.000	1.808	.00	.00	.00	.00
	3	.314	3.229	.00	.04	.80	.31
	4	.234	3.739	.18	.33	.14	.66
	5	.184	4.213	.80	.61	.04	.00

a. Dependent Variable: Organizational Performance

APPENDIX 7: Regression result of hypothesis 2

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Combination		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Internalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
a. Dependent Variable: Financial Performance			

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.646 ^a	.418	.416	.5583	
2	.673 ^b	.453	.451	.5417	
3	.688 ^c	.474	.470	.5322	1.710
a. Predictors: (Constant), Socialization score					
b. Predictors: (Constant), Socialization score, Combination score					
c. Predictors: (Constant), Socialization score, Combination score, Internalization score					
d. Dependent Variable: Financial Performance					

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	89.047	1	89.047	285.694	.000 ^b
	Residual	124.052	398	.312		
	Total	213.099	399			
2	Regression	96.604	2	48.302	164.608	.000 ^c
	Residual	116.495	397	.293		
	Total	213.099	399			
3	Regression	100.936	3	33.645	118.786	.000 ^d
	Residual	112.164	396	.283		
	Total	213.099	399			
a. Dependent Variable: Financial Performance						
b. Predictors: (Constant), Socialization score						
c. Predictors: (Constant), Socialization score, Combination score						
d. Predictors: (Constant), Socialization score, Combination score, Internalization score						

Coefficients ^a								
Model		Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B		Beta			Tolerance	VIF
1	(Constant)	4.089	.028		146.474	0.000		
	Socialization	.472	.028	.646	16.902	.000	1.000	1.000
2	(Constant)	4.089	.027		150.960	0.000		
	Socialization	.307	.042	.419	7.219	.000	.408	2.452
	Combination	.216	.042	.295	5.075	.000	.408	2.452
3	(Constant)	4.089	.027		153.653	0.000		
	Socialization	.216	.048	.296	4.542	.000	.312	3.200
	Combination	.170	.043	.233	3.933	.000	.379	2.641
	Internalization	.165	.042	.226	3.910	.000	.398	2.514

a. Dependent Variable: Financial Performance

Collinearity Diagnostics ^a						
Model		Eigenvalue	Condition Index	Variance Proportions		
				Socialization	Combination	Internalization
1	1	1.000	1.000	.50		
	2	1.000	1.000	.50		
2	1	1.770	1.000	.12	.12	
	2	1.000	1.330	.00	.00	
	3	.230	2.771	.88	.88	
3	1	2.480	1.000	.04	.05	.05
	2	1.000	1.575	.00	.00	.00
	3	.307	2.842	.00	.55	.71
	4	.213	3.412	.95	.40	.24

a. Dependent Variable: Financial Performance

APPENDIX 8: Regression result of hypothesis 3

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Combination		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Internalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	Externalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Customer Performance

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.688 ^a	.473	.472	.4849	
2	.727 ^b	.528	.526	.4596	
3	.741 ^c	.549	.546	.4496	
4	.747 ^d	.558	.553	.4460	1.830

a. Predictors: (Constant), Socialization score
b. Predictors: (Constant), Socialization score, Combination score
c. Predictors: (Constant), Socialization score, Combination score, Internalization score
d. Predictors: (Constant), Socialization score, Combination score, Internalization score, Externalization score
e. Dependent Variable: Customer Performance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84.078	1	84.078	357.644	.000 ^b
	Residual	93.566	398	.235		
	Total	177.644	399			
2	Regression	93.781	2	46.890	221.974	.000 ^c
	Residual	83.863	397	.211		
	Total	177.644	399			
3	Regression	97.596	3	32.532	160.937	.000 ^d
	Residual	80.048	396	.202		
	Total	177.644	399			
4	Regression	99.072	4	24.768	124.514	.000 ^e
	Residual	78.572	395	.199		
	Total	177.644	399			

a. Dependent Variable: Customer Performance
b. Predictors: (Constant), Socialization score
c. Predictors: (Constant), Socialization score, Combination score
d. Predictors: (Constant), Socialization score, Combination score, Internalization score
e. Predictors: (Constant), Socialization score, Combination score, Internalization score, Externalization score

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.034	.024		166.405	0.000		
	Socialization	.459	.024	.688	18.911	.000	1.000	1.000
2	(Constant)	4.034	.023		175.547	0.000		
	Socialization	.271	.036	.406	7.524	.000	.408	2.452
	Combination	.244	.036	.366	6.777	.000	.408	2.452
3	(Constant)	4.034	.022		179.455	0.000		
	Socialization	.187	.040	.280	4.634	.000	.312	3.200
	Combination	.202	.037	.302	5.516	.000	.379	2.641
	Internalization	.155	.036	.232	4.344	.000	.398	2.514
4	(Constant)	4.034	.022		180.904	0.000		
	Socialization	.136	.044	.204	3.082	.002	.257	3.896
	Combination	.166	.039	.249	4.303	.000	.335	2.986
	Internalization	.133	.036	.199	3.665	.000	.378	2.644
	Externalization	.117	.043	.175	2.724	.007	.272	3.676

a. Dependent Variable: Customer Performance

Collinearity Diagnostics ^a							
Model	Eigenvalue	Condition Index	Variance Proportions				
			Socialization	Combination	Internalization	Externalization	
1	1	1.000	1.000	.50			
	2	1.000	1.000	.50			
2	1	1.770	1.000	.12	.12		
	2	1.000	1.330	.00	.00		
	3	.230	2.771	.88	.88		
3	1	2.480	1.000	.04	.05	.05	
	2	1.000	1.575	.00	.00	.00	
	3	.307	2.842	.00	.55	.71	
	4	.213	3.412	.95	.40	.24	
4	1	3.268	1.000	.02	.03	.03	.02
	2	1.000	1.808	.00	.00	.00	.00
	3	.314	3.229	.00	.31	.80	.04
	4	.234	3.739	.18	.66	.14	.33
	5	.184	4.213	.80	.00	.04	.61

a. Dependent Variable: Customer Performance

APPENDIX 9: Regression result of hypothesis 4

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Internalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Externalization		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	Combination		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Business Process Performance

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.831 ^a	.691	.690	.3886	
2	.872 ^b	.760	.759	.3429	
3	.891 ^c	.795	.793	.3176	
4	.898 ^d	.807	.805	.3082	1.796

a. Predictors: (Constant), Socialization score
b. Predictors: (Constant), Socialization score, Internalization score
c. Predictors: (Constant), Socialization score, Internalization score, Externalization score
d. Predictors: (Constant), Socialization score, Internalization score, Externalization score, Combination score
e. Dependent Variable: Business Process Performance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	134.265	1	134.265	888.944	.000 ^b
	Residual	60.113	398	.151		
	Total	194.378	399			
2	Regression	147.702	2	73.851	628.146	.000 ^c
	Residual	46.675	397	.118		
	Total	194.378	399			
3	Regression	154.436	3	51.479	510.379	.000 ^d
	Residual	39.942	396	.101		
	Total	194.378	399			
4	Regression	156.851	4	39.213	412.742	.000 ^e
	Residual	37.527	395	.095		
	Total	194.378	399			

a. Dependent Variable: Business Process Performance
b. Predictors: (Constant), Socialization score
c. Predictors: (Constant), Socialization score, Internalization score
d. Predictors: (Constant), Socialization score, Internalization score, Externalization score
e. Predictors: (Constant), Socialization score, Internalization score, Externalization score, Combination score

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.995	.019		205.591	0.000		
	Socialization	.580	.019	.831	29.815	.000	1.000	1.000
2	(Constant)	3.995	.017		233.023	0.000		
	Socialization	.368	.026	.527	14.035	.000	.428	2.334
	Internalization	.280	.026	.402	10.691	.000	.428	2.334
3	(Constant)	3.995	.016		251.582	0.000		
	Socialization	.225	.030	.322	7.518	.000	.282	3.546
	Internalization	.218	.025	.312	8.538	.000	.389	2.568
	Externalization	.234	.029	.336	8.171	.000	.308	3.251
4	(Constant)	3.995	.015		259.223	0.000		
	Socialization	.179	.030	.257	5.880	.000	.257	3.896
	Internalization	.196	.025	.281	7.817	.000	.378	2.644
	Externalization	.184	.030	.263	6.202	.000	.272	3.676
	Combination	.134	.027	.193	5.042	.000	.335	2.986

a. Dependent Variable: Business Process Performance

Collinearity Diagnostics ^a							
Model	Eigenvalue	Condition Index	Variance Proportions				
			Socialization	Internalization	Externalization	Combination	
1	1	1.000	1.000	.50			
	2	1.000	1.000	.50			
2	1	1.756	1.000	.12	.12		
	2	1.000	1.325	.00	.00		
	3	.244	2.683	.88	.88		
3	1	2.533	1.000	.04	.05	.04	
	2	1.000	1.592	.00	.00	.00	
	3	.282	2.995	.08	.91	.28	
	4	.184	3.709	.88	.04	.68	
4	1	3.268	1.000	.02	.03	.02	.03
	2	1.000	1.808	.00	.00	.00	.00
	3	.314	3.229	.00	.80	.04	.31
	4	.234	3.739	.18	.14	.33	.66
	5	.184	4.213	.80	.04	.61	.00

a. Dependent Variable: Business Process Performance

APPENDIX 10: Regression result of hypothesis 5

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).
2	Internalization score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).
3	Externalization score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).
4	Combination score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).

a. Dependent Variable: Intellectual Capital Performance

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.780 ^a	.609	.608	.4214	
2	.823 ^b	.677	.675	.3835	
3	.840 ^c	.706	.704	.3662	
4	.843 ^d	.710	.707	.3640	1.760

a. Predictors: (Constant), Socialization score
b. Predictors: (Constant), Socialization score, Internalization score
c. Predictors: (Constant), Socialization score, Internalization score, Externalization score
d. Predictors: (Constant), Socialization score, Internalization score, Externalization score, Combination score
e. Dependent Variable: Intellectual Capital Performance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	109.948	1	109.948	619.199	.000 ^b
	Residual	70.671	398	.178		
	Total	180.619	399			
2	Regression	122.228	2	61.114	415.512	.000 ^c
	Residual	58.391	397	.147		
	Total	180.619	399			
3	Regression	127.524	3	42.508	317.039	.000 ^d
	Residual	53.095	396	.134		
	Total	180.619	399			
4	Regression	128.286	4	32.071	242.071	.000 ^e
	Residual	52.333	395	.132		
	Total	180.619	399			

a. Dependent Variable: Intellectual Capital Performance
b. Predictors: (Constant), Socialization score
c. Predictors: (Constant), Socialization score, Internalization score
d. Predictors: (Constant), Socialization score, Internalization score, Externalization score
e. Predictors: (Constant), Socialization score, Internalization score, Externalization score, Combination score

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.987	.021		189.228	0.000		
	Socialization	.525	.021	.780	24.884	.000	1.000	1.000
2	(Constant)	3.987	.019		207.915	0.000		
	Socialization	.322	.029	.479	10.987	.000	.428	2.334
	Internalization	.268	.029	.398	9.137	.000	.428	2.334
3	(Constant)	3.987	.018		217.763	0.000		
	Socialization	.195	.035	.291	5.662	.000	.282	3.546
	Internalization	.212	.029	.316	7.227	.000	.389	2.568
	Externalization	.208	.033	.309	6.285	.000	.308	3.251
4	(Constant)	3.987	.018		219.066	0.000		
	Socialization	.170	.036	.252	4.716	.000	.257	3.896
	Internalization	.200	.030	.298	6.759	.000	.378	2.644
	Externalization	.179	.035	.266	5.130	.000	.272	3.676
	Combination	.076	.031	.112	2.398	.017	.335	2.986

a. Dependent Variable: Intellectual Capital Performance

Collinearity Diagnostics ^a							
Model	Eigenvalue	Condition Index	Variance Proportions				
			Socialization	Internalization	Externalization	Combination	
1	1	1.000	1.000	.50			
	2	1.000	1.000	.50			
2	1	1.756	1.000	.12	.12		
	2	1.000	1.325	.00	.00		
	3	.244	2.683	.88	.88		
3	1	2.533	1.000	.04	.05	.04	
	2	1.000	1.592	.00	.00	.00	
	3	.282	2.995	.08	.91	.28	
	4	.184	3.709	.88	.04	.68	
4	1	3.268	1.000	.02	.03	.02	.03
	2	1.000	1.808	.00	.00	.00	.00
	3	.314	3.229	.00	.80	.04	.31
	4	.234	3.739	.18	.14	.33	.66
	5	.184	4.213	.80	.04	.61	.00

a. Dependent Variable: Intellectual Capital Performance

APPENDIX 11: Regression result of hypothesis 6

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization score		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Externalization score		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Internalization score		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
a. Dependent Variable: Employee Performance			

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.779 ^a	.608	.607	.4501	
2	.817 ^b	.668	.666	.4147	
3	.829 ^c	.687	.685	.4029	1.864
a. Predictors: (Constant), Socialization score					
b. Predictors: (Constant), Socialization score, Externalization score					
c. Predictors: (Constant), Socialization score, Externalization score, Internalization score					
d. Dependent Variable: Employee Performance					

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	124.849	1	124.849	616.182	.000 ^b
	Residual	80.642	398	.203		
	Total	205.491	399			
2	Regression	137.211	2	68.605	398.889	.000 ^c
	Residual	68.280	397	.172		
	Total	205.491	399			
3	Regression	141.206	3	47.069	289.943	.000 ^d
	Residual	64.286	396	.162		
	Total	205.491	399			
a. Dependent Variable: Employee Performance						
b. Predictors: (Constant), Socialization score						
c. Predictors: (Constant), Socialization score, Externalization score						
d. Predictors: (Constant), Socialization score, Externalization score, Internalization score						

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.891	.023		172.900	0.000		
	Socialization	.559	.023	.779	24.823	.000	1.000	1.000
2	(Constant)	3.891	.021		187.664	0.000		
	Socialization	.313	.036	.437	8.778	.000	.338	2.955
	Externalization	.303	.036	.422	8.478	.000	.338	2.955
3	(Constant)	3.891	.020		193.164	0.000		
	Socialization	.236	.038	.329	6.222	.000	.282	3.546
	Externalization	.248	.036	.346	6.822	.000	.308	3.251
	Internalization	.160	.032	.223	4.961	.000	.389	2.568

a. Dependent Variable: Employee Performance

Collinearity Diagnostics ^a						
Model	Eigenvalue	Condition Index	Variance Proportions			
			Socialization	Externalization	Internalization	
1	1	1.000	1.000	.50		
	2	1.000	1.000	.50		
2	1	1.813	1.000	.09	.09	
	2	1.000	1.347	.00	.00	
	3	.187	3.117	.91	.91	
3	1	2.533	1.000	.04	.04	.05
	2	1.000	1.592	.00	.00	.00
	3	.282	2.995	.08	.28	.91
	4	.184	3.709	.88	.68	.04

a. Dependent Variable: Employee Performance

APPENDIX 12: Regression result of hypothesis 7

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	Socialization score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).
2	Externalization score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).
3	Combination score		Stepwise (Criteria: Probability-of-F-to-enter \leq .050, Probability-of-F-to-remove \geq .100).
a. Dependent Variable: Social Performance			

Model Summary ^e					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.693 ^a	.480	.479	.4789	
2	.715 ^b	.511	.509	.4649	
3	.722 ^c	.522	.518	.4605	1.767
a. Predictors: (Constant), Socialization score					
b. Predictors: (Constant), Socialization score, Externalization score					
c. Predictors: (Constant), Socialization score, Externalization score, Combination score					
d. Dependent Variable: Social Performance					

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84.221	1	84.221	367.226	.000 ^b
	Residual	91.279	398	.229		
	Total	175.500	399			
2	Regression	89.688	2	44.844	207.468	.000 ^c
	Residual	85.812	397	.216		
	Total	175.500	399			
3	Regression	91.526	3	30.509	143.873	.000 ^d
	Residual	83.974	396	.212		
	Total	175.500	399			
a. Dependent Variable: Social Performance						
b. Predictors: (Constant), Socialization score						
c. Predictors: (Constant), Socialization score, Externalization score						
d. Predictors: (Constant), Socialization score, Externalization score, Combination score						

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.100	.024		171.226	0.000		
	Socialization	.459	.024	.693	19.163	.000	1.000	1.000
2	(Constant)	4.100	.023		176.375	0.000		
	Socialization	.296	.040	.446	7.393	.000	.338	2.955
	Externalization	.201	.040	.303	5.029	.000	.338	2.955
3	(Constant)	4.100	.023		178.070	0.000		
	Socialization	.247	.043	.373	5.766	.000	.289	3.463
	Externalization	.151	.043	.228	3.512	.000	.286	3.495
	Combination	.116	.039	.174	2.944	.003	.345	2.900

a. Dependent Variable: Social Performance

Collinearity Diagnostics ^a						
Model	Eigenvalue	Condition Index	Variance Proportions			
			Socialization	Externalization	Combination	
1	1	1.000	1.000	.50		
	2	1.000	1.000	.50		
2	1	1.813	1.000	.09	.09	
	2	1.000	1.347	.00	.00	
	3	.187	3.117	.91	.91	
3	1	2.570	1.000	.04	.04	.04
	2	1.000	1.603	.00	.00	.00
	3	.243	3.250	.21	.18	.96
	4	.187	3.711	.75	.79	.00

a. Dependent Variable: Social Performance