STRATEGIC TECHNOLOGY TRANSFER CAPABILITY AND FIRM PERFORMANCE: EVIDENCE FROM INFORMATION AND COMMUNICATION TECHNOLOGY BUSINESSES IN THAILAND

BY

NATARPHA SATCHAWATEE

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Management at Mahasarakham University

January 2018

STRATEGIC TECHNOLOGY TRANSFER CAPABILITY AND FIRM PERFORMANCE: EVIDENCE FROM INFORMATION AND COMMUNICATION TECHNOLOGY BUSINESSES IN THAILAND

BY

NATARPHA SATCHAWATEE

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Management at Mahasarakham University

January 2018

The examining committee has unanimously approved this dissertation, submitted by Miss Natarpha Satchawatee, as a partial fulfillment of the requirements for the degree of Doctor of Philosophy in Management at Mahasarakham University.

Examining Committee

P. Suwannarat ..... Chairman
(Asst. Prof. Dr. Pornlapas Suwannarat) (Faculty graduate committee)

S. Boonlua ..... Committee
(Dr. Sutana Boonlua) (Advisor)

Palan J. Rapath ..... Committee
(Dr. Palan Jantarajaturapath) (Co-advisor)

Suwan Wangcharoendate ..... Committee
(Assoc. Prof. Dr. Suwan Wangcharoendate) (Faculty graduate committee)

..... Committee
(Dr. Nuttapon Punpugdee) (External expert)

Mahasarakham University has granted approval to accept this dissertation as a partial fulfillment of the requirements for the degree of Doctor of Philosophy in Management.

N. Songsrirote .....
(Asst. Prof. Dr. Nitiphong Songsrirote)
Dean of Mahasarakham Business School

.....
(Prof. Dr. Pradit Terdtoon)
Dean of Graduate School
January 31, 2018

This dissertation was funded by Mahasarakham Business School,
Mahasarakham University Scholarship.
Academic Year 2017

ACKNOWLEDGEMENTS

The accomplishment of this dissertation and achievement or exploration the depths of successful learning are helped, supported, and afforded by a lot of people. First of all, I would like to thank my advisor Dr. Sutana Boonlua for giving me good recommendations and guidance to develop and improve the completion of this dissertation. Her unfailing kindness has supported my work until finally it has been accomplished. I would also like to thank my co-advisor Dr. Palan Jantarajaturapath for his knowledge, time, advice, and availability, as well as, to thank all of my committee members for their valuable comments and perseverance with my inquisitive mind. Furthermore, I would take this opportunity to give my special thank go out to Assoc. Prof. Dr. Kornchai Phornlaphatrachakorn for his intellectual guidance, advice, and concern extended to me during both the coursework and the construction of this dissertation. His enthusiasm has been a major driving force for my Ph.D. graduation and graduate career at Mahasarakham Business School.

I would also like to express my gratitude to Mahasarakham Business School and Mahasarakham University for funding and thank you to assisting of staff throughout my Ph.D. program. Also, I would like to thank all respondents of information and communication technology firms for their time and valuable information. Moreover, I would like to thank all of my friends in the Ph.D. 10 class for their support and suggestions throughout my study in the doctoral program. My special thanks go to my classmate of Management: Mrs. Yupaporn Chaisena, Miss Siriwong Earsakul, and Mr. Aphi Khamphroh for warm friendship and being very supportive.

Most importantly, I am deeply grateful to my parents, family and friends who vital encouragement and greatly supporting me.

Natarpha Satchawatee

TITLE Strategic Technology Transfer Capability and Firm Performance: Evidence from Information and Communication Technology Businesses in Thailand
AUTHOR Miss Natarpha Satchawatee
ADVISORS Dr. Sutana Boonlua, and
Dr. Palan Jantarajaturapath
DEGREE Ph.D. **MAJOR** Management
UNIVERSITY Mahasarakham University **DATE** 2018

ABSTRACT

The purposes of this research is to investigate the relationship between strategic technology transfer capability and firm performance through the mediating influences of new product development, valuable operational improvement, outstanding business effectiveness, and sustainable organizational competitiveness. In addition, five antecedents including, proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence, are also examined the influences to the dimension of strategic technology transfer capability.

Drawing on the absorptive capacity theory, dynamic capability theory, and foreign direct investment in Thailand, the conceptual model is empirically tested via quantitative methods of gathering data from 1,880 information and communication technology businesses in Thailand. The results were derived from a survey of 286 managing directors, managing partners, or manager of each firm that have been regarded as the key informant. Approximately response rate was 20.38 percent. The nineteen hypotheses are utilized to examine and prove by descriptive statistics, correlation, and multiple regression analysis.

The results suggest that technology innovation focus that one of five dimensions of strategic technology transfer capability have significant influences with all of five outcomes consequences. Technology learning capability, technology exchange competency, and technology change awareness have partially significant positive effects on all outcomes. Interestingly, technology acceptance orientation has been found to be

only variable relating to new product development. Furthermore, both internal and external determinants have impacts, at least partially, for each dimension. Top management support and technology growth munificence seems to be the most crucial. Meanwhile, innovative culture plays a significant moderating role with the relationships between proactive business policy and technology exchange competency and top management support and technology acceptance orientation. Therefore, using strategic technology transfer capability can enable firm achieve sustainable organizational competitiveness and firm performance. The theoretical and managerial contributions, conclusion, and suggestions for future research are also discussed.

TABLE OF CONTENTS

Chapter **Page**

Chapter **Page**

LIST OF TABLES

Table **Page**

Table **Page**

LIST OF FIGURES

Figure **Page**

CHAPTER I

INTRODUCTION

Overview

At the age of the contemporary business world that has dynamic and continuous change, an enterprise is being competitive as the result of introducing new products or services and innovating business processes to have faster than competitors (Krstić & Petrović, 2012). Under the circumstances that the business firms are faced with competition characterized by product and market uncertainties, globalization and rising research and development costs, technology management is important to the business and becomes the main determinant of competitiveness (Malik, 2002). The firm with technology management that has ability to connect a firm's technology to customer need and to other firm resources (Zott, Amit, & Massa, 2011). Moreover, the firm's strategy is to increase the management of technology transfer activities (Malik, 2002) that played a key role in enhancing the competitiveness of the firm (Kohut, 2016). Therefore, technology transfer has been recognized as an approach of high utility for gaining competitive advantage over other organizations in developing countries (Kumar et al., 2015). The factor which determines the effectiveness of technology transfer is the firm's absorption capacity (Glabiszewski & Grego-Planer, 2016). In addition, the formulating a technology strategy of the firm affects to the firm's performance in technology transfer, which achieves major benefits for the firm (Lichtenthaler & Lichtenthaler, 2010). Accordingly, in managing technology transfer capability that is strategy, this enables the firm to have sustainable organizational competitiveness and firm performance.

The World Economic Forum's (WEF) Global Information Technology Report 2016 provides an assessment of the ability of businesses and the wider community to utilize technology in support of growth, competitiveness and development (Baller, Dutta, & Lanvin, 2016). Thailand's ranking for firm level technology absorption, is in order at 53 from 139 countries and has the score at 4.9 which is greater than 4.7 of average score (The range of scores: 1-7). This indicator measures business uptake of new technology into firm's operations. It highlights that Thailand businesses could do more to adopt

new technologies and embed these into their operations, which shows that there is technology transfer in organization as well.

Currently, information and communication technology (ICT) business in Thailand, which is in the digital era so called Thailand 4.0. The government of Thailand focuses on Thailand 4.0 strategy to reposition the country's economy by the National Legislative Assembly approved the establishment of the Ministry of Digital Economy and Society on 16 September 2016, which changing from Ministry of Information and Communication Technology (Thailand Board of Investment, 2016). According to Ministry of Industry (2016), the government has announced the policy to reform economy structure into value–based economy and develop Thailand into a group of countries with high income. Thailand 4.0 is the economic model that has changed from producing commodity products oriented towards innovation. Changing the traditional work into the management and use of new technologies provide entrepreneurs to have more revenue. In other words, this change is driven countries by industrial into driven by technology, creativity and innovation. The structure of information and communication technology would be a key success factor. Thailand Board of Investment's (BOI) Report in 2016 shows that foreign direct investment (FDI) by target sector in 143 digital projects which is worth 44 million US dollars. The potential FDIs produce a spillover effect that is one of the most effective channels of technology transfer (Kohut, 2016) and help in terms of economic development which will allow for the country's smooth and successful transition towards becoming a Thailand 4.0 economy (Motohashi & Yuan, 2010; Thailand Board of Investment, 2016). Moreover, there is a research that investigates the factors to affect the technology transfer process of information and communication technology industry in Libya (Hassan & Jamalludin, 2016). The results suggested that government support factor, transferee and transferor characteristics, technology transfer environment, and technology learning capability factors to be the important indicators of technology transfer performance to the host information and communication technology industry. Consequently, the support from the government will enable the information and communication technology firms with strategic technology transfer capabilities that are able to succeed in a highly competitive environment. Thus, ICT business in Thailand is appropriate to be selected as a sample in this research.

In addition, the Federation of Thai Industries (FTI) has surveyed the Thai industries sentiment index (TISI) of November 2016. The surveys covered 1,173 FTI member firms within 45 industry clubs. According to the survey, the TISI of information technology industry in January 2017 was at 93.5 percent, increasing from 91.9 percent in December 2016 (Federation of Thai Industries, 2017). From the above information shows that ICT businesses are important and affect to the development of Thailand. Therefore, the selected industry has suitability and the potential to examine five dimensions of strategic technology transfer capability simultaneously.

In prior researches and literatures, technology transfer is described similarly (Battistella, Toni, & Pillon, 2016; Kim & Hong, 2016; Kundu, Bhar, & Pandurangan, 2015; Nurdin, 2014). In the beginning, it is the process by which commercial technology is disseminated, which may or may not be covered by a legal binding contract (UNCTAD, 2001). The United Nations Conference on Trade and Development (UNCTAD) developed a code of conduct for transfer of technology in 1985. Later in 2014, Economic and social council (ECOSOC) as one of the United Nations (UN) identified technology transfer as the process of deliberate and systematic acquisition/provision/sharing/licensing of equipment and machinery, technology, skills, knowledge, intellectual property rights, business and organizational processes, designs and facilities, for the manufacture of a product, for the application of a process, or for the rendering of a service. Therefore, technology transfer helps the late entrants to reduce the technological gap quickly, that is a shortcut to development (Kundu et al., 2015).

According to previous researches of technology transfer, most focus, on two major aspects of studies. Firstly, there are many researches about an international technology transfer that considers the impact of technology diffusion (Cohen & Levinthal, 1990; Keller, 2004; Kneller, Pantea, & Upward, 2010; Reddy & Zhao, 1990). Secondly, the researches focus on the transfer of technology between universities and industry (Arvanitis & Woerter, 2009; Gopalakrishnan & Santoro, 2004; Ho et al., 2014; Lee & Win, 2004; Santoro & Bierly, 2006). Therefore, technology transfer has a few researches in a perspective that focuses on the strategic capability of the firm. This gap leads to the current topic of this research that to fulfill the technology transfer literature to investigate strategy among Thai businesses as firm performance. Additionally, there is also an integration of strategic capability concept into the strategic planning process of the

business. The strategic capability defined as the ability to change an organization and create a business environment which capacity is strategic if it results in change or potential (Johannesson & Paloma, 2010). Consequently, this research defines the term "strategic technology transfer capability" as an ability of the firm to manage the process of acquisition, adaptation, and utilization of skill, knowledge, technology, and information from the origination, which leads to competitive advantage and business success.

Based on the literature reviewed, the theories and concept that employed to explain in this research are absorptive capacity, dynamic capability theory, and concept of foreign direct investment. The absorptive capacity theory suggested that firms must acquire and assimilate external knowledge and have a function of the transformation and exploitation capabilities (Zahra & George, 2002). It is the process that firms can recognize the value of new, external information, assimilate it, and apply it to commercial ends (Cohen & Levinthal, 1990). Moreover, the dynamic capability enables to an organization rapidly and efficiently adapt to changing markets and technologies, learn from this process, evolve, and ultimately renew its competencies over time (Teece, 2007; Teece, Pisano, & Shuen, 1997; Wang & Ahmed, 2007). Furthermore, there is described the foreign direct investment in Thailand that is considered as a major channel of technology transfer. Therefore, following the concept of absorptive capacity theory is mentioned in the theoretical model of strategic technology transfer capability and its consequences. While, dynamic capability theory is viewed conceptually identified and described the antecedents of strategic technology transfer capability and the moderating effect of the relationships among strategic technology transfer capability antecedents and consequences. In this research, the successful implementation of strategic technology transfer capability is a together orientation toward five new purposed dimensions which are 1) technology learning capability, 2) technology acceptance orientation, 3) technology innovation focus, 4) technology exchange competency, and 5) technology change awareness. Thus, the relationships among strategic technology transfer capability, antecedents, consequences, and moderator in the context of Thai information and communication technology businesses, in this research, are explained by the absorptive capacity and dynamic capability theories. In addition, the new purposed dimensions of strategic technology transfer capability in this research are expected to occur directly affect sustainable organizational competitiveness and firm performance. Also, there are

found that each dimensions of strategic technology transfer capability affect consequences through new product development, valuable operational improvement, and outstanding business effectiveness. The antecedents as proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence demonstrate the positive relationships to strategic technology transfer capability. Moreover, innovative culture is viewed as a moderator between strategic technology transfer capability and its antecedents.

Purposes of the Research

The main purpose of this research is to investigate the relationship between strategic technology transfer capability and firm performance. The specific research purposes are also as follows:

1. to examine the relationships among five dimensions of strategic technology transfer capability (technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness), and new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance,
2. to investigate the influences of new product development, valuable operational improvement, and outstanding business effectiveness on sustainable organizational competitiveness,
3. to examine the impact of sustainable organizational competitiveness on firm performance,
4. to investigate the relationships among proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence and each of five dimensions of strategic technology transfer capability, and
5. to test the moderating role of innovative culture on the relationships among proactive business policy, top management support, organizational resource availability, competitive market intensity, technology growth munificence and each of five dimensions of strategic technology transfer capability.

Research Questions

The key research question is, “How does strategic technology transfer capability relate to firm performance? Moreover, specific research questions are as follows:

1. How does each of five dimensions of strategic technology transfer capability (technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness) relate to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance?
2. How do new product development, valuable operational improvement, and outstanding business effectiveness have an influence on sustainable organizational competitiveness?
3. How does sustainable organizational competitiveness relate to firm performance?
4. How do proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence have an impact on each of five dimensions of strategic technology transfer capability? and
5. How does innovative culture moderate the relationships among proactive business policy, top management support, organizational resource availability, competitive market intensity, technology growth munificence and each of five dimensions of strategic technology transfer capability?

Scope of the Research

The main purpose of this research is to investigate the relationship between strategic technology transfer capability and firm performance in the information and communication technology businesses in Thailand. From a conceptual framework, several variables are included as follows; strategic technology transfer capability plays a role as an independent variable which is defined as an ability of the firm to manage the process of acquisition, adaptation, and utilization of skill, knowledge, technology, and

information from the origination, which leads to competitive advantage and business success (Brooks, 1986; ECOSOC, 2014; Janssen, 2010; Johannesson & Palona, 2010). It comprises five dimensions: technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. Moreover, the consequences of the influence of strategic technology transfer capability are investigated, namely, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. Likewise, internal and external factors determining strategic technology transfer capability are also examined. These factors comprise proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence. The moderator; innovative culture is investigated to better conceive the phenomenon of this research.

Two theories, including absorptive capacity theory, dynamic capability, are used to draw a conceptual framework and develop a set of hypotheses. Firstly, the absorptive capacity theory (Cohen & Levinthal, 1990) describes that the ability of a firm to recognize the value of new, external information, assimilates it, and applies it to commercial ends that is critical to its innovative capabilities. According to Zahra and George's (2002) conceptualize, the key dimensions of absorptive capacity which include acquisition, assimilation, transformation, and exploitation that are applied to describe each of dimensions in strategic technology transfer capability. Therefore, the premise of the absorptive capacity theory is used to illustrate how strategic technology transfer capability relates to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The strategic technology transfer capability can be seen as an absorptive capacity that is in an organizational-level construct. These capabilities may augment competitive advantage and lead to successful business.

Secondly, dynamic capability indicates that the ability of a firm to integrate, build, and reconfigure internal and external competencies to cope with a rapidly changing environment which are synthesized in a systematic way that classifies antecedents in the forms of both internal and external factors (Eriksson, 2014; Teece, Pisano, & Shuen, 1997). This research applies the premise of dynamic capability to

describe the relationships among proactive business policy, top management support, organizational resource availability, competitive market intensity, technology growth munificence, and strategic technology transfer capability. Three internal antecedents are identified as influences that determine an effectiveness of strategic technology transfer capability formulation and implementation. Dynamic capability, in addition, is also commonly used to explain the role of the moderating variable. It implies that the influences of strategic technology transfer capability and its antecedents are contingent on innovative culture. Likewise, outcomes of firm strategy depend on an external communication capability of the firm.

Furthermore, the information and communication technology businesses in Thailand are selected as a sample group for investigation. The total amounts of 18,466 firms are the population and the list of business names is available on the database online of the Department of Business Development in Thailand (www.dbd.go.th). Of the population, the required sample size representative of the information and communication technology firm in this research is 376 firms (Krejcie & Morgan, 1970) which is assumed and based on prior research, that it is approximately equal to 20 percent (Menon et al., 1999). Thereby, it is calculated into 100 percent so that the number of questionnaires sent to firms is 1,880 questionnaires. This research uses the stratified random sampling method of dividing the population into regions. After that, use systematic random sampling from each population group before mailing the questionnaires to firms. In this research, a valid and reliable self-administered questionnaire is distributed to managing directors (MD), managing partners, or managers. For testing of non-response bias uses chi-square statistic. The Ordinary Least Squares (OLS) regression analysis is processed to test all postulated hypotheses.

In summary, the scope of this research consists of three major parts. Firstly, investigate the effect of strategic technology transfer capability on firm outcomes. Secondly, examine the influence of firm outcomes on firm performance. Last, examine the relationship between the antecedents and strategic technology transfer capability along with its moderating effects.

Organization of the Dissertation

This research is organized into five chapters. Firstly, chapter one provides a brief overview consisting of motivation in the research, role of variables, theory, expected contribution, and methodology; purposes of the research, research questions, scope of the research, and organization of the research. Chapter two presents empirical and theoretical literature on strategic technology transfer capability to provide a theoretical framework explaining a conceptual model and developing hypotheses. Then, chapter three describes a research methodology which includes sample selection, data collection procedure, a development of data-collected instruments, variable definitions, measurements, and statistical methods in hypotheses testing. Chapter four presents the results of the statistical analysis. Finally, chapter five draws a conclusion, theoretical contributions, managerial implications, limitations, and direction for further research.

CHAPTER II

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The primary purpose of this chapter is to provide an understanding of proposed relationships which mainly focuses on the impact of strategic technology transfer capability, its determinants, and consequences. Thus, theoretical foundation, relevant literature, and hypotheses development are discussed as major components. This chapter comprises three sections: the first section represents the discussion of several theoretical perspectives and concept that used to explain a research phenomenon. The second section provides theoretical arguments, based on relevant conceptual and empirical literatures, which develop hypotheses relating to the constructs in a conceptual model. Finally, the final section illustrates the summary of hypothesized relationships among strategic technology transfer capability, its antecedents, and consequences that are discussed in this chapter.

Theoretical Foundation

The apparent comprehension of the overall theory proposes the relationships among strategic technology transfer capability, its antecedents, consequences, moderators, two theoretical perspectives and the concept of foreign direct investment. Absorptive capacity theory, dynamic capability theory, and foreign direct investment in Thailand are used as follows:

Absorptive Capacity Theory

The concept of absorptive capacity is first presented in 1988 (Kedia & Bhagat, 1988). The conceptual model represents absorptive capacity of organization that is one of the moderating influences to the effectiveness of technology transfer. The first definition of absorptive capacity is defined as the firm's ability to recognize the value of new external information, assimilate it, and apply it toward achieving organizational goals (Cohen & Levinthal, 1990). In addition, the academic web crawler Google Scholar shows an article of Cohen and Levinthal (1990) which is cited in more than 30,000

research papers in term of current research on learning and innovation. The absorptive capacity is discussed on the cognitive structure at the individual level which depends on prior related knowledge and diversity of background. The model is created about firm's investment in research and development (R & D) to develop one's absorptive capacity. Moreover, the source of a firm's technical knowledge is generated from the firm's own R & D knowledge; spillover of competitors' knowledge, and outside the industry knowledge.

Later, the absorptive capacity theory is extended to develop at organizational level and focusing on it emphasizes the power of converting knowledge from external sources into usable models, products, services, goods, and ideas (Zahra & George, 2002; Zahra, van de Velde, & Larrañeta, 2007). Zahra and George's (2002) reconceptualize a part of the theory and identify four key dimensions of absorptive capacity. The discrimination of two different absorptive capacities: potential and realized capacity. The potential absorptive capacity is made up of acquisition and assimilation capabilities that the firm receptive to external knowledge. The realized absorptive capacity is a function of the transformation and exploitation capabilities that accommodates the integration of existing knowledge and acquired new knowledge and assimilated them then apply to product or services to get financial benefit. According to Zahra, Larrañeta, and Galán (2010), for the first dimension of absorptive capacity, acquisition is defined as the firm's capability to identify and acquire the knowledge generated from external that is important to the operation, which based on a deep understanding of opportunity set, strategy, and the current collection of all the products or services of the firm. The indicators to evaluate the knowledge acquisition capability are the number of years of experience of the R&D department and the amount of R&D investment. Second, the dimension is assimilation is defined as the firm's capability to use in the process, interpret, and understand information received from external sources, which the assessment is to consider the number of cross-firm patent citations and the number of citations made in a firm's published research publications developed in other firms. The third dimension, transformation that can be defined as the firm's capability to refine, integrate, and develop the routines that facilitate the integration of existing knowledge and acquired new knowledge and assimilated them, which it can be evaluated from the number of new product ideas and the number of new research projects initiated. Lastly, the fourth

dimension is exploitation, it defined as the firm's capability to apply the acquired new knowledge in products or services and transformed knowledge into its operations due to the development of strategic initiatives that it can receive financial benefit, which the indicators that can be used to evaluate include the number of new product announcements, the number of patents, and the length of the product development cycle. In addition, the model of Zahra and George (2002) is advanced conditions that firm's potential and realized capacities differentially contribute to sustainable competitive advantage through strategic flexibility, product and process innovation, and firm performance.

However, Todorova and Durisin (2007) reduce serious ambiguities and omissions in Zahra and George's reconceptualization of absorptive capacity that represents into three groups. First, the components of absorptive capacity, it recommends that first step should be recognizing the value of that knowledge in the process of absorbing new knowledge. The firms often fail to identify and absorb new knowledge in this step because they are hindered by their inflexible capabilities, existing knowledge base, and path dependencies (Gavetti & Levinthal, 2000; Helfat, 2000; Langlois & Steinmueller, 2000; Leonard-Barton, 1992a; Tripsas & Gavetti, 2000). The reformulation of the theory for stating that transformation is not consequence of assimilation of new knowledge but argues for an alternative process linked to assimilation by multiple paths. Thus, the neat new constructs of potential and realized absorptive capacity should be removed from the theory. Second, the theorizing on the contingency factor of social integration must influence all components of absorptive capacity. Another contingency factor is proposed, power relationships, which is a moderating effect of the construct on both the valuing and exploitation of new knowledge. Third, the theory able to be reconceptualized as an ongoing process that includes feedback loops in which the successful process of absorbing new knowledge has been reversed and has an impact on future absorption.

Prior researches show implementing the absorptive capacity to technology transfer. For example, Lerch, Wagner, and Mueller-Seits (2010) represent environmental factors and organizational practices do public and private sector actors need to consider in their technology transfer activities in order to manage their absorptive capacity. The findings from four case studies in the optics industry in Germany and the U.S. found the absorption processes involved, the role of information exchange practices and meeting management that are moderated by power relationships and boundary spanners, the regional

and institutional embeddedness of actors involved, as well as social factors that acting connection for absorptive capacity. The study of Omar, Takim, and Nawawi (2011) proposes a conceptual model for measuring absorptive capacity in technology transfer projects in construction organization based on the experience learned from Finland, Malaysia, Spain, Taiwan, and United State of America. The model emphasizes the two-key components: the ability and motivation of employees which are measured through employees' training, merit based promotion, performance-based compensation, and performance appraisal. The goal of technology transfer is the level of absorptive capacity in the form of knowledge, skills and tools via construction projects into organization. Moreover, Selmi (2013) explains the problematic dealing with the constraints of the success of technology transfer process to develop countries through synthesizing the different theoretical approaches. The absorptive capacity is dependent on several factors ranging from initial level of development of the receiving economy, the nature of the imported technology, the market structure and the state of competition which is the process of catching up in emerging countries and their degree of exploitation of foreign technology.

However, the absorptive capacity theory has been criticized about limitation of explanation that emphasize to research and development aspects. According to Schmidt (2010) found that, the firms with only occasionally R&D are to have the absorptive capacity less than other firms with continuous R&D. This indicates that the concept of absorptive capacity is sometimes used to not relate the organizational aspects. Moreover, it also found that some scholars did not provide the definition of absorptive capacity in research, because there are varieties in the definitions and operationalizations of the absorptive capacity construct (Murovec & Prodan, 2009).

This research employs absorptive capacity theory to explain the relationships among the five new purposed dimensions of strategic technology transfer capability and firm outcomes as well as firm performance. Therefore, strategic technology transfer capability can be considered as a firm's ability that enables the process of acquisition, adaptation, and utilization of knowledge. For firm outcomes, this research proposes new product development, valuable operational improvement, and outstanding business effectiveness; which lead to sustainable organizational competitiveness and make firm performance.

Dynamic Capability Theory

The concept of dynamic capabilities has been a popular theoretical framework in strategic management research. The introduction of dynamic capabilities originates from Teece, Pisano and Shuen (1997). The definition examines how firms integrate, build, and reconfigure their internal and external firm-specific competencies into new competencies that match their turbulent environment. In other words, the organizational and strategic procedures that enable firms to integrate, reconfigure, gain, and release resources as soon as the market changed (Eisenhardt & Martin, 2000). The dynamic capabilities view of the firm indicates that the development of critical capabilities effect to competitive advantages, as well as, the organizational ability to continuously upgrade, create, extend, protect, and keep relevant the unique asset base of the enterprise (Teece, 2007), which is different from the resource-based view of the firm that emphasis is only on creating a sustainable competitive advantage from resources characterize four attributes consist of valuable, rare, inimitable, and non-substitutable (Barney, 1991). Moreover, Wang and Ahmed (2007) are also defined dynamic capabilities as the organization behavioral orientation constantly to renew, recreate, reconfigure, and integrate its capabilities and resources, and most importantly, rebuild and upgrade its core capabilities in response to changes in the environment to achieve and sustain competitive advantage. The identification of three component factors: absorptive capability, innovative capability, and adaptive capability that reflect the common features of dynamic capabilities across firms. Besides, there is a proposed formative model of dynamic capabilities which has four components including sensing, learning, coordinating, and integrating capability (Pavlou & El Sawy, 2011). In particular, learning capability captures the acquisition, assimilation, transformation, and exploitation of knowledge which similar to the dimensions of absorptive capacity.

Organizational capabilities are called ‘zero-level’ or ‘zero-order’ capabilities, as organizational capabilities refer to how an organization earns a living by continuing to sell the same product, on the same scale, to the same customers. While, dynamic capabilities are called ‘first-order’ capabilities because dynamic capabilities refer to intentionally changing the product, the production process, the scale, or the markets served by a firm (Winter, 2003). Accordingly, an organization has dynamic capabilities when it can build, reconfigure, and integrate its internal and external firm-specific

capabilities in response to its changing environment. According to Teece (2007), the sensing capabilities of the firm used to identify opportunities to improve organizational capabilities into new capabilities that better fits environment of the firm. These new capabilities can help to create new asset bases, positions, and paths of the firm, which can achieve a sustained competitive advantage for the firm relative to other firms. Therefore, the dynamic capabilities approach suggests that developing dynamic capabilities, and hence competitive advantage, the firm must be effective than their rivals at both selecting and deploying resources (Aguirre, 2013).

Eriksson (2014) reviews the systematic synthesis with 142 articles and analyzed it into three areas include the process of dynamic capability, its antecedents and consequences. The dynamic capabilities are found to comprise four knowledge processes: accumulation/acquisition, integration, utilization and reconfiguration/ transformation which match the definition of strategic technology transfer capability in this research. The antecedents are found to be either internal or external to the firm. The internal antecedents may be social or structure on different levels of the individual, the project or the organization. Toward the external antecedents, environmental factors and inter-organizational relationships are significant. Eventually, the outcomes of dynamic capabilities are performance indicators and changes in operational capabilities. In other words, dynamic capabilities are generated by a set of processes that affect organizational capabilities and resources, thus the development of capabilities and resources is the outcome of dynamic capabilities (Tondolo, & Bitencourt, 2014). For example, there is the suggestion following the dynamic capabilities perspective that antecedents to innovation can either be found at the individual, firm, and network levels (Rothaermel & Hess, 2007). In addition, Intarapanich and Ussahawanitchakit (2011) address dynamic capabilities approach to identify the antecedences of dynamic technology capability including internal resources and external conditions. Moreover, Pavlou, and El Sawy (2011) proposed and tested a structural model where the impact of dynamic capabilities on performance in new process development is mediated by operational capabilities which have indicator items including technical, customer, and managerial capabilities, and these relationship moderated by environmental turbulence.

The dynamic capabilities approach emphasizes the development of management capabilities which include technology transfer (Gathungu & Mwangi, 2012). This

consistent with the emerging literature on dynamic capabilities which based on the institutional underpinnings of multinational enterprise (MNE) strategy that technology transfer is an important activity of the institutional perspective of MNE (Dunning & Lundan, 2010). There is a research found that the local firms ought to stimulate their own dynamic capabilities to support foreign firms that would eventually transfer technology and know-how to successfully compete in the markets (Aguirre, 2013).

Nevertheless, there are the critiques of the dynamic capability theory according to being a tautology and cannot operationalize to measure (Eisenhardt & Martin, 2000). This consistent with Arend and Bromiley (2009) identified that, tautological or circular definition are the problems in defining the dynamic capability that limit the potential contribution of this theory. On the other hand, the problems in the measurement of dynamic capability that are the lack and do not specify the exact element of the assumption (Galunic & Eisenhardt, 2001; Pavlou & El Sawy, 2011).

In conclusion, the dynamic capability theory is applied to explain the relationships among strategic technology transfer capability and its antecedents including, proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence, as well as moderating effect of innovative culture on the stated relationships.

Foreign Direct Investment in Thailand

Foreign direct investment (FDI) is an important channel of technology transfer (Damijan et al., 2003; Hamar & Stephan, 2005; Louise, 2009; Saggi, 2002). Also, there are other channels of technology transfer such as licensing, trade in products and services, and international movement of people (De La Tour, Glachant, & Ménière, 2011; Hoekman, Maskus, & Saggi, 2005). According to UNCTAD (http://unctad.org) that defined FDI as an investment made for the sustainable interest in the enterprise that implement on the external sector of the investor, which is termed the direct investor in order to effectively manage the voice of customer. In addition, in 2008, the organization for economic co-operation and development (OECD) provided the fourth edition of a benchmark definition of FDI that improve techniques in financial measures which sets the world standard for FDI statistics and includes indicators on the economic activities of MNEs (OECD, 2008a).

OECD (2008b) identified that FDI can bring the benefits to host economies because this increases the employment. Moreover, the indirect benefit from FDI is spillover effects on workers employed by the local firms which increases productivity and competitiveness to host countries in the long term (OECD, 2008b; The Policy-Research Platform Project, 2010). The type of FDI can be classified according to the impact on international trade as the horizontal and vertical (Beugelsdijk, Smeets, & Zwinkels, 2008). Horizontal FDI refers to the foreign investors come to produce the final products in host countries in order to avoid trade costs, whereas vertical FDI refers to the host country are used as a production base for export to the home country of the investor or to other countries that firms take advantage of the difference in cost (Alfaro & Charlton, 2007; Protsenko, 2004).

From the literature review, there are several research that examines the impact of FDI on technology transfer of the firm in developing countries (Damijan et al., 2003; De La Tour, Glachant, & Ménière, 2011; Kathuria, 2000; Liu & Wang, 2003; Makki & Somwaru, 2004; Marin & Bell, 2006; Osano & Koine, 2016; Poon & Sajarattanochote, 2010; Wie, 2005). Thailand is classified as a developing country (United Nations, 2017) and has been rising in 19th ranking of the global FDI confidence index (A.T. Kearney, 2017). Moreover, Bank of Thailand (BOT) reports that FDI also continued inflows in Thailand, especially the manufacturing of computer and electronic products, which will be beneficial to the exports in the next phase (Bank of Thailand, 2016). Consequently, the details of inflow of FDI in Thailand that classified by business sector of Thai investors during 2005-2016 as presented in Table 1 as follows:

Table 1: Inflow of FDI in Thailand Classified by Business Sector during 2005-2016 (Unit: Millions of US Dollars)

Sector	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Agriculture, forestry and fishing	25.59	13.61	10.21	13.74	58.50	21.85	12.50	19.61	7.24	6.69	7.75	1,617.87
Mining and quarrying	665.18	510.61	2,022.72	694.65	1,388.21	947.44	619.77	751.58	555.69	188.33	819.03	311.51
Manufacturing	8,034.83	11,096.71	14,943.79	12,736.85	21,816.41	11,587.26	11,624.32	16,965.86	15,113.85	7,715.86	9,372.71	8,419.46
Electricity, gas, steam and air conditioning supply	147.98	456.56	634.61	335.10	345.03	233.46	552.63	126.19	96.55	-9.94	146.43	31.67
Construction	587.72	400.97	449.85	332.84	748.98	251.43	361.48	87.16	166.81	123.00	-297.43	-272.24
Wholesale and retail trade	4,071.70	6,913.21	3,644.54	2,887.74	4,072.45	2,117.11	2,145.73	2,590.23	3,342.26	1,115.53	2,175.36	3,197.89
Transportation and storage	325.76	829.69	284.61	686.43	1,139.67	406.74	423.76	170.83	191.66	-38.47	144.30	151.97
Accommodation and food service activities	118.61	408.60	451.99	347.01	371.54	473.07	216.80	58.68	113.10	109.40	187.30	804.49

Table 1: Inflow of FDI in Thailand Classified by Business Sector during 2005-2016 (Unit: Millions of US Dollars) (Continued)

Sector	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Financial and insurance activities	5,857.61	5,696.30	7,631.35	5,848.82	8,233.49	8,487.96	9,695.54	5,542.08	10,367.53	3,848.44	4,900.39	3,003.66
Real estate activities	1,480.61	2,855.68	2,348.18	2,068.43	1,944.10	1,526.81	1,476.22	1,467.03	1,897.99	1,478.78	1,658.06	1,632.11
Others	2,054.29	2,100.00	3,990.80	2,131.91	4,152.72	2,135.22	26,522.32	42,543.32	59,715.60	55,321.07	36,321.42	38,536.81
Total	23,373.88	31,285.95	36,412.65	28.083.52	44,271.10	28,188.37	53,651.08	70,322.58	91,568.29	69,858.70	55,435.32	57,435.19

Source: Bank of Thailand (2016)

Relevant Literature Review and Research Hypotheses

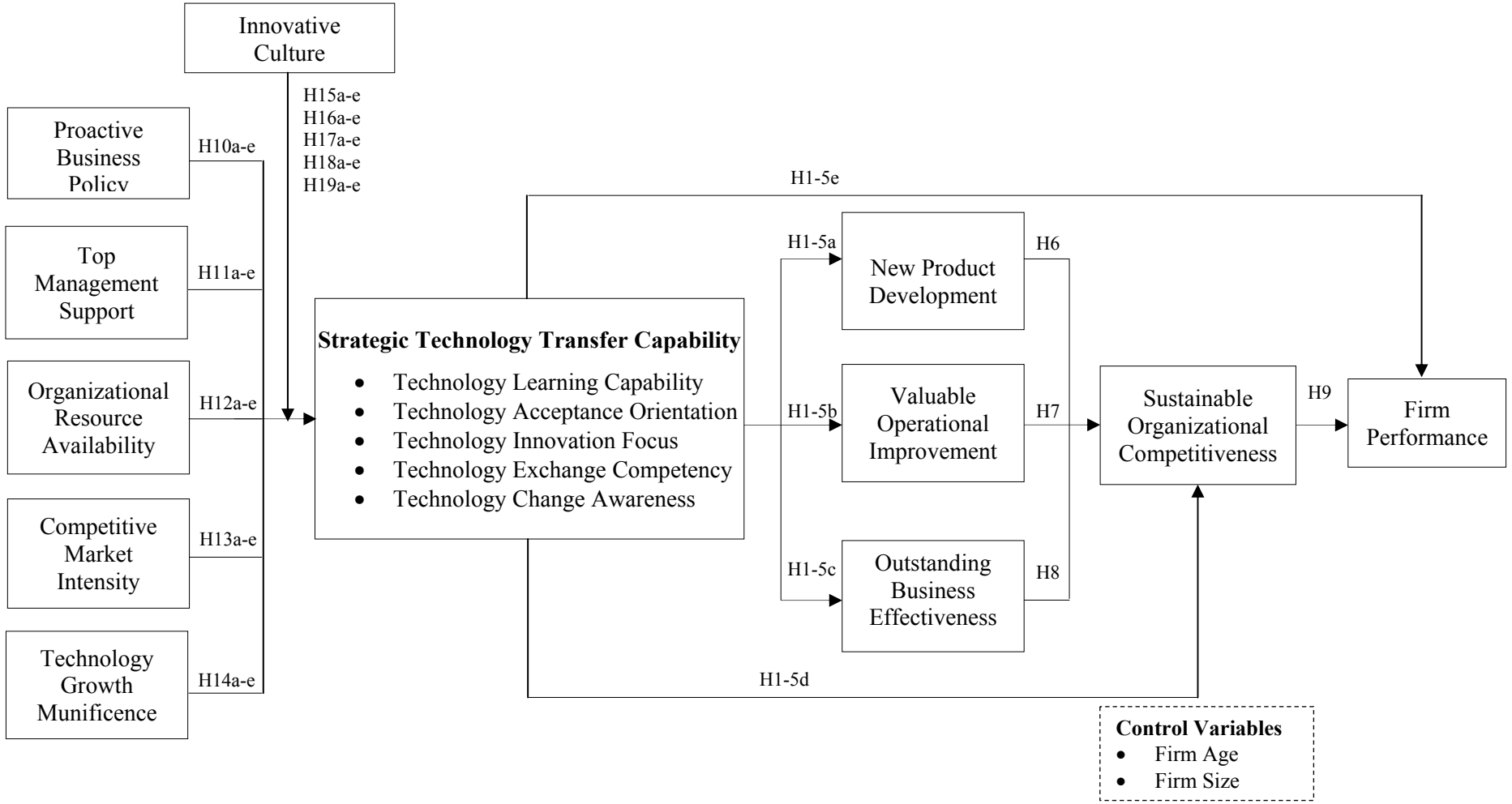
With reference to the prior literature and theoretical perspectives used to explain the overall conceptual framework, all relationships are divided into three parts;

Firstly, the relationships among each of five dimensions of strategic technology transfer capability (technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness), and its direct outcomes (new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance), are investigated and expected to yield positive relationships.

Secondly, the five determinants (proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence), of strategic technology transfer capability are examined and the positive impacts are anticipated.

Lastly, this research postulates that innovative culture has positive moderating effects which are supposed to increase the relationships among strategic technology transfer capability and its antecedents. Altogether, a developed conceptual model in this research is shown in Figure 1.

Figure 1: A Conceptual Model of the Relationships between Strategic Technology Transfer Capability and Firm Performance



Strategic Technology Transfer Capability (STTC) Background

Technology transfer, also called transfer of technology, has been researched for a long time and is defined by several articles. Due to Derakhshani (1984), technology transfer between companies involves the acquisition, utilizations, and development of technological knowledge by the firm other than that in which this knowledge originated. The definition of technology was extended as a practiced through a variety of activities and materials, including conferences, reports, training, demonstrations and other activities that allow knowledge to be transferred from a source to a user (Brooks, 1986). Technology transfer must be realized in terms of achieving three main objectives including the introduction of new techniques by improving existing techniques, investing in new plants, and generating new knowledge (Hoffman & Gibson, 1990). There is a meta research synthesizes technology transfer found that management researchers focus on the relation technology transfer to strategy and intra-sector transfer, specifically alliances pertain to develop them and transfer of technology (Zhao & Reisman, 1992).

Later, the study of Janssen (2010) has set clearly defined that the technology transfer is a movement of idle equipment and machinery from one place to another. Furthermore, it also includes the adoption and transfer of know-how, technique, and information. Regarding to the acquisition, development, and utilizations of technical knowledge by the firm other than in which this knowledge originated. At present, the definition of technology transfer is similar. Moreover, there is defined technology transfer as the process of sharing of knowledge, skills, methods, and technologies of manufacturing from a developed country to a developing one (Nurdin, 2014). According to Kundu, Bhar and Pandurangan (2015), technology transfer is defined as the process by which knowledge, information, and technology developed in one organization for one objective is utilized and applied in another area in another organization, for another objective. In addition, technology transfer is considered as an active process during which the technology and the knowledge are transferred between two distinct entities (Battistell, Toni, & Pillon, 2016). Lastly, Kim and Hong (2016) explain that the definition of technology transfer should involve the transfer of knowledge, know-how, best practice, implication process, and expert.

Moreover, international organizations have also defined the technology transfer. In 2001, The United Nations Conference on Trade and Development (UNCTAD) has used definition of Blakeney (1989) that technology transfer is "the process by which commercial technology is disseminated. This takes the form of a technology transfer transaction, which may or may not be covered by a legally binding contract, but which involves the communication, by the transferor, of the relevant knowledge to the recipient." Furthermore, UNCTAD is responsible for the management of trade, investment, and development has developed a code of conduct for transfer of technology. Later, Economic and social council (ECOSOC) as one of the United Nations (UN) that serves to study issues relating to international economic, social, humanitarian, cultural, educational and other issues involved, identified technology transfer as "the process of deliberate and systematic acquisition/provision/sharing/licensing of equipment and machinery, technology, skills, knowledge, intellectual property rights, business and organizational processes, designs and facilities, for the manufacture of a product, for the application of a process, or for the rendering of a service (ECOSOC, 2014)." Consequently, it provides a summary of definitions of strategic technology transfer capability as presented in Table 2.

Table 2: Summary of Definitions of Strategic Technology Transfer Capability

Authors	**Definitions**
Derakhshani (1984)	Transfer of technology in international business refers to the acquisition, development, and utilization of technological knowledge by a country other than in which this knowledge originated.
Brooks (1986)	Technology transfer refers to the practiced through a variety of activities and materials, including conferences, reports, training, demonstrations and other activities that allow knowledge to be transferred from a source to a user.
William and Gibson (1990)	Technology transfer refers to the process of transferring the knowledge and concepts from developed to less-technically developed countries.

Table 2: Summary of Definitions of Strategic Technology Transfer Capability (Continued)

Authors	Definitions
Levin (1993)	Technology transfer refers to a socio-technical learning and developmental process that implying the transfer of cultural skills accompanying the movement of tools, machinery, and equipment.
Gibson and Roger (1994)	Transfer of technology refers to the application of information where the process usually involves moving a technological innovation from the research and development organization to the receptor organization.
UNCTAD (2001)	Technology transfer refers to the process by which commercial technology is disseminated, which its transaction may or may not be covered by a legally binding contract but involves the communication, by the transferor, of the relevant knowledge to the recipient.
ECOSOC (2014)	Technology transfer refers to the process of deliberate and systematic acquisition/provision/sharing/licensing of equipment and machinery, technology, skills, knowledge, intellectual property rights, business and organizational processes, designs and facilities, for the manufacture of a product, for the application of a process, or for the rendering of a service.
Nurdin (2014)	Technology transfer refers to the process of sharing of knowledge, skills, methods, and technologies of manufacturing from a developed country to a developing one.
Kundu et al. (2015)	Technology transfer refers to the process by which knowledge, information, and technology developed in one organization for one objective is utilized and applied in another area in another organization, for another objective.

Table 2: Summary of Definitions of Strategic Technology Transfer Capability (Continued)

Authors	Definitions
Battistella et al. (2016)	Technology transfer refers to an active process during which the technology and the knowledge are transferred between two distinct entities.
Kim and Hong (2016)	Technology transfer refers to the transfer of knowledge, know-how, best practice, implication process, and expert.

Moreover, the literature review on multinational enterprises (MNEs) found that a spillover effect from FDI is an important driver of economic development and technological catch-up in developing countries (Motohashi & Yuan, 2010). Because FDI is a major channel of technology transfer as mentioned above in the previous section. Technology transfer is one of the most important mechanisms for countries receiving foreign investment to benefit from MNEs which have higher levels of technological development (Glass et al., 2008). According to Behera, Dua, and Goldar (2012), found that technology spillovers can be transmitted via all kinds of intermediate factors which affect on productivity and competitiveness in the long run. Therefore, technology transfer is one determinant of FDIs spillover (Kongruang, 2009).

In addition, strategic capability is integrated concept into the strategic planning process of the business. Casadesus-Masanell and Ricart (2010) defined strategy as the choice of business model through which the firm will compete in the marketplace. Strategic capability refers to the ability to change an organization and create a business environment which capacity is strategic if it results in change or potential (Johannesson & Paloma, 2010). Likewise, Aldridge (2007) defined strategic capability as the ability to develop soundly based strategies in a range of different levels and to apply strategic thinking and manage an organization strategically. Furthermore, there is examined strategic capabilities in the realms of technology, which found support for a link between the differentiation strategy and technology capabilities that improve performance in retail business in Argentina, Peru, and the United States (Parnell, 2011).

According to the discussion above, this research defines strategic technology transfer capability as an ability of the firm to manage the process of acquisition, adaptation, and utilization of skill, knowledge, technology, and information from the origination, which lead to competitive advantage and business success (Brooks, 1986; ECOSOC, 2014; Janssen, 2010; Johannesson & Palona, 2010). Particularly, the five dimensions of strategic technology transfer capability have been adapted from the key dimension of absorptive capacity including acquisition, assimilation, transformation, and exploitation that identified from Zahra and Colleagues (2010). The first dimension of strategic technology transfer capability is technology learning capability, which its definition adapted from definition of acquisition and assimilation that described as the firm's capability to acquire the knowledge and to understand information received. Technology acceptance orientation, the second dimension, its definition adapted from transformation that defined as the firm's capability to refine and integrate the routines that combining existing knowledge. Likewise, technology innovation focus as the third dimension, which definition also adapted from transformation that explained as the firm's capability to integrate and develop the newly acquired and assimilated knowledge. Technology exchange competency as the fourth dimension, its definition applied from acquisition, assimilation, transformation, and exploitation that illustrated the firm's capability to manage the knowledge. At last dimension, technology change awareness, its definition adapted from all of the dimensions of absorptive capacity together.

Based on a review of relevant literature and theories, this research present the new dimensions of strategic technology transfer capability and including the antecedents and the consequences. Moreover, there are many researches about technology transfer that as strategic capability of firm under absorptive capacity which is the determinant. Likewise, this research provides a summary of prior conceptual and empirical work on strategic technology transfer capability as presented in Table 3.

Table 3: Summary of the Key Literature Reviews on Strategic Technology Transfer Capability

Author (s)	Research Types	Title	Key Content
Cohen and Levinthen (1990)	Empirical	Absorptive Capacity: A New Perspective on Learning and Innovation	This paper identifies the absorptive capacity of the firm that it's about international technology transfer and payments. The authors argue that the success of the transfer occurs when the recipient can use, reproduce and improve the technology transfer on it. Moreover, it indicates that most of the functions are related to the firm's level of knowledge involved.
Reddy and Zhao (1990)	Conceptual	International Technology Transfer: A Review	The authors review the literature about the international technology transfer and state that researches prior to 1990 did not take into account the international political dimension, financial transactions and operations, and did not regard the horizontal and vertical dimensions of the transfer. This paper uses the organizing framework corresponding to a key component of international technology transfer consist of home country, host country, and transaction component. This argues that the interdependency between horizontal and vertical elements, making the involvement of technology transfer rarely isolated.

Table 3: Summary of the Key Literature Reviews on Strategic Technology Transfer Capability (Continued)

Author (s)	Research Types	Title	Key Content
Gopalakrishnan and Santoro (2004)	Empirical	Distinguishing between Knowledge Transfer and technology activities: The Role of Key Organizational Factors	The aim of this paper is a study about the organizations that act as intermediaries and the main determinants of technology transfer between university and industry included absorptive capacity, communication, and trust. The finding found that the category of cultures, university policies, and firm structure for licensing, intellectual property rights, and patent ownership are different. This serving knowledge transfer activity compared to activity that facilitates the transfer of technology.
Keller (2004)	Empirical	International Technology Diffusion	This article is an empirical survey and explores the extent of international technology diffusion and the spread of technology. The difference in productivity explains the difference in income in each country and technology plays an important role in determining output. Results show that technology is adopted when it is facilitated with the skills of the human capital as tacit knowledge, which the new or external technologies are accepted in a closed economy or a country that has supported.

Table 3: Summary of the Key Literature Reviews on Strategic Technology Transfer Capability (Continued)

Author (s)	Research Types	Title	Key Content
Santoro and Bierly (2006)	Empirical	Facilitators of Knowledge Transfer in University-Industry Collaborations: A Knowledge-based Perspective	According to the knowledge-based view of the firm, this paper specifies facilitators of knowledge transfer between industrial firms and university research centers that have the cooperation. This focuses on how the firm learns from the university research center is highlighted here. The empirical evidence, it is likely that the technology transfer process will be triggered if some key informants, such as social connections, trust and prior experience.
Arvanitis and Woerter (2009)	Empirical	Firms' Transfer Strategies with Universities and the Relationship with Firms' Innovation Performance	This paper proposes the new technology setting of the new linkage that occurs between industry included customers, suppliers, and competitors and the research institutions as a public organization. The result shows that there is awareness in the industry about the positive effect of the university's knowledge on innovation and economic performance. In addition, the strategy of science and business institutions is being used to improve efficiency by partnering with other organizations.

Table 3: Summary of the Key Literature Reviews on Strategic Technology Transfer Capability (Continued)

Author (s)	Research Types	Title	Key Content
Kneller, Pantea and Upward (2010)	Empirical	Does Absorptive Capacity Affect Who Benefits from International Technology Transfer?	This paper suggests the international technology transfer simplifies from human capital which often include in the absorptive capacity. Result presents it can be employed in firms and countries and in equal situations to access only determine the ability of the firm or the country to benefit from the technology. Therefore, absorptive capacity is cited by many authors as a key factor in the technology transfer.
Ho et al. (2014)	Empirical	A new Perspective to Explore the Technology Transfer Efficiencies in US Universities	The authors investigated the necessary capability in the technology transfer process of effective university. There is a two-stage perspective consist of the value creation stage and the research innovation stage. These found that efficient universities in the research innovation stage are in a more centralized location than those in the value creation stage. In the other hand, efficient universities in the value creation stage can be identified as different reference groups for specific inefficient universities.

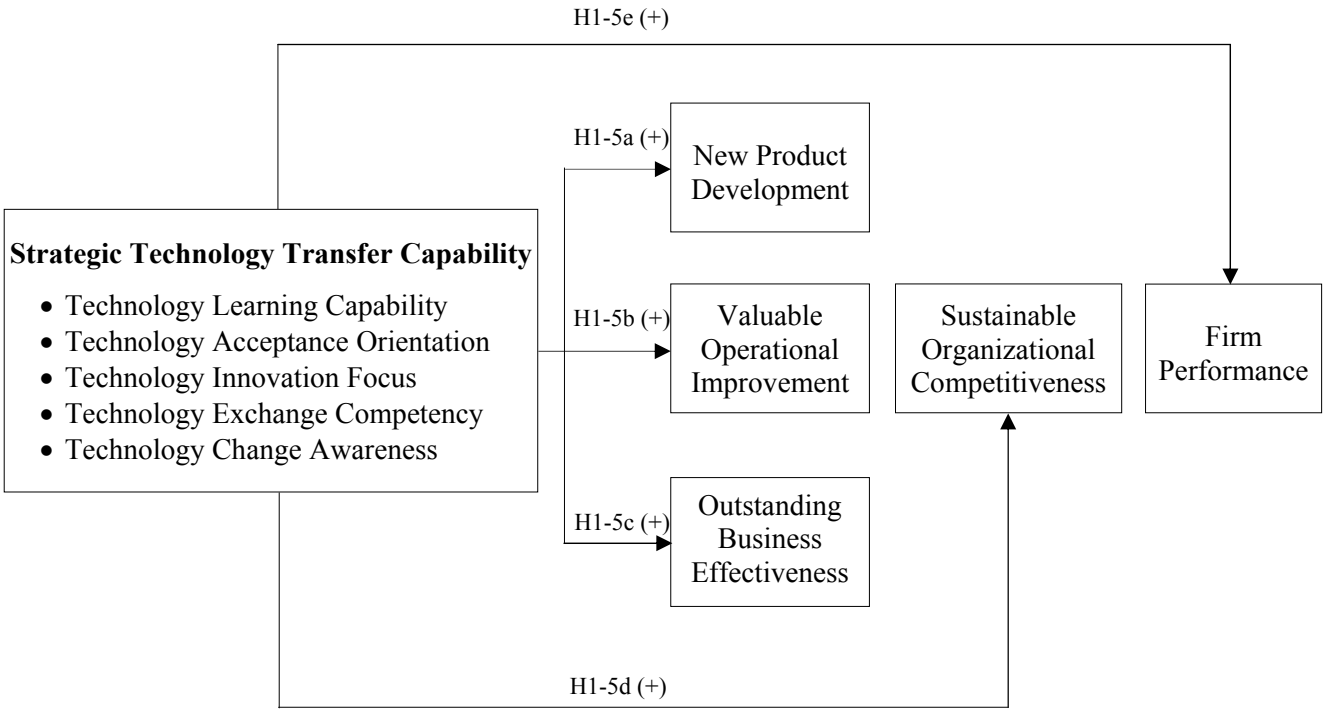
Table 3: Summary of the Key Literature Reviews on Strategic Technology Transfer Capability (Continued)

Author (s)	Research Types	Title	Key Content
Mitra, Sharma and Véganzonès - Varoudakis (2014)	Empirical	Trade Liberalization, Technology Transfer, and Firms' Productive Performance: The Case of Indian Manufacturing	To explore the economic liberalization policy change of India is an effect on efficiency and productivity of the firm. There is a variety of variables such as information and communication technology, energy, and transport. In the Indian context, the finding found that policy implication has important because several parts of the country faced with a shortage of basic infrastructure. Furthermore, the results also indicate that the Indian's firm has to rely on buying more technology from foreign country and research and development is not an activity that enhance the production.
Bozeman, Rimes and Youtie (2015)	Conceptual	The Evolving State-of-the-Art in Technology Transfer Research: Revisiting the Contingent Effectiveness Model	There are review and synthesize the literature about effective technology transfer which rapid development. The Contingent Effectiveness Model of Technology Transfer of Bozeman (2000) is updated and extended in this paper. Moreover, its focus on technology transfer that oriented public and social value in the contingent effectiveness model.

The Effects of Strategic Technology Transfer Capability on Its Consequences

This section investigates the relationships of five dimensions among strategic technology transfer capability that consist of technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency and technology change awareness emphasis on five consequences comprising new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness and firm performance. The relationships are expected to be positive as shown in Figure 2 below.

Figure 2: The Effects of Strategic Technology Transfer Capability on New Product Development, Valuable Operational Improvement, Outstanding Business Effectiveness, Sustainable Organizational Competitiveness and Firm Performance



Technology Learning Capability

The first dimension of strategic technology transfer capability is technology learning capability. Technology learning is the accumulation of technological knowledge that has the potential to enhance a firm's competitive advantage (Kim & Inkpen, 2005). This consistent with Ahmad and Schroeder (2011) proposed that the organizations need technology strategies to encourage continuous learning, which to create a competitive advantage. Moreover, technology learning take place through interactions at local, regional and global levels (Wright, 1997). Technology learning also has an important impact on the choice of global or regional models (Wiesenthal et al., 2012).

On the other hand, the study of learning capability has long been and found when managers generate ideas and also able to share ideas of them across boundaries within the organization. Moreover, these managers build learning capability when they both generate and generalize ideas with impact. Thus, learning capability is not an academic exercise. Rather, it is a focused set of management actions and accountabilities (Ulrich, Jick, & Von Glinow, 1993). According to Akgün et al., (2007), identify that learning capability is a complex and multidimensional concept, and is composed of (1) managerial commitment, (2) systems perspective, (3) openness and experimentation, and (4) knowledge transfer and integration dimensions. This implied that learning capability as a part of organizational capabilities, which is an important factor for product innovativeness (Akgün et al., 2007). In addition, organizational learning capability as a bundle of tangible and intangible resources or skills that the firm uses to achieve new forms of competitive advantage. These skills enable the process of organizational learning (Alegre & Chiva, 2008). Thus, organizational learning capability indicated as the ability of an organization to implement the appropriate management structures, procedures, and practices that accommodate and promote learning process (Goh, 1998; Leonard-Barton, 1992b).

There is a research that divides organizational learning capability into absorptive capability and transformative capability for compatibility and determines organizational learning capability as an organization’s ability to absorb and transform new knowledge and apply it to new product development with competitive advantage and high production speed (Hsu & Fang, 2009). Absorptive capability is the ability to utilize and evaluate

external knowledge that is largely a function of prior related knowledge (Cohen & Levinthal, 1990). Besides, transformative capability is the ability to choose technologies, maintain them over time, and reactivate and synthesize them with ongoing technology development efforts (Garud & Nayyar, 1994). Therefore, in this research, technology learning capability is defined as a firm's ability to systematically develop the knowledge and skills of personnel in the organization that enable the operation and administration effectively (Hsu & Fang, 2009).

The results of the empirical research showed that a firm's learning capability as a competency, and its impact on the product innovativeness and improved performance (Akgün et al., 2007). The advanced technology group of the firm which is assigned to identify new system and technology in product development that is the interpreter and deployment of technology strategy in the organization (Handfield et al., 1999). Other research indicated the greater the organizational learning capability effect of the greater the organization innovation and the execution new technology of organization function which is said to operational improvement (Sutanto, 2017). Likewise, Lin and Wu (2014) found that a firm can develop innovative technology and improve its performance through learning from cooperative alliances. Also, there is research that studies and concentrates on technological and market knowledge learning from host country networks (Bhatti, Larimo, & Coudounaris, 2016). According to Ussahawanitchakit (2008), indicated that organizational learning capability has a significant direct impact on organizational effectiveness. The research contributes to existing literature by providing an experiential learning model on subsidiary managers' experiential learning in host country networks, and that experiential learning's influences on subsidiary knowledge and subsidiary's performance (Bhatti, Larimo, & Coudounaris, 2016). Moreover, a meta-learning system is formed to achieve competitive advantage and to become more innovative and successful. Accordingly, technology learning capability is likely to influence on firm outcomes, namely, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness and firm performance. From the aforementioned arguments on technology learning capability, the first hypotheses can be proposed as:

Hypothesis 1a: Technology learning capability is positively related to new product development.

Hypothesis 1b: Technology learning capability is positively related to valuable operational improvement.

Hypothesis 1c: Technology learning capability is positively related to outstanding business effectiveness.

Hypothesis 1d: Technology learning capability is positively related to sustainable organizational competitiveness.

Hypothesis 1e: Technology learning capability is positively related to firm performance.

Technology Acceptance Orientation

The second dimension of strategic technology transfer capability is technology acceptance orientation. The previous literature has studied about technology orientation and meaning participation in the framework program for learning and knowledge (Luukkonen, 2000). Technology orientation includes product, production and innovation orientations and is the ability and the will to acquire a substantial technological background and uses it in the development of new products (Gatignon & Xuereb, 1997). Moreover, the degree of commitment to R&D, acquisition of new technologies and applications of the latest technology that are used in the classification of technology orientation (Halac, 2015). Whereas the strategic orientation is defined as creating the firm's behavior which is parallel with the firm's strategy that is expected to create sustainable competitive advantage (Zhou, Yim, & Tse, 2005). Consequently, technology orientation, and the closely related terms of innovation and product, orientation, refers to a firm's inclination to introduce or utilize new technologies, products or innovations (Hakala, 2010). It suggests that the long-term success of the firm and customer value are best created through new technological solutions, products, services, innovations, or

production processes (Hakala, 2010) that guide to activities and strategies of the organization in the technology-oriented firm (Zhou, Yim & Tse, 2005).

In addition, the technology acceptance model (TAM) is the well-known models that Davis (1985) proposed to explain the behavior of technology's user. TAM is used to consider in personal level, which user will accept technology when perceived usefulness and perceived ease of use the system that affects attitude toward using and behavioral intention to use. Technology acceptance in the organization level was determined from the successful adoption to actual use of the technology system by user (Mojtahed, Nunes, & Peng, 2011). The strategic development of the organization should be considered to technology acceptance when new technologies are adopted (Godoe & Johansen, 2012). Thus, in this research, technology acceptance orientation is defined as a firm's requirement to take advantage of existing technologies which is adopted to operating appropriately that to achieve organization's goals (Halac, 2015).

The empirical research of technology orientation has both studied its consequences and the multidimensional construct (Halac, 2015). Many studies have found that technology orientation influenced innovation, new product development, and firm performance (Al-Ansari, Altalib, & Sardoh, 2013; Jeong, Pae, & Zhou, 2006; Tsou, Chen, & Liao, 2014). Likewise, the study of SMEs business in Iran found that a firm's technology orientation can enhance firm performance (Rezazadeh, Karami, & Karami, 2016). Moreover, it also found that technology orientation firms are speed leaders which have first-to-market with new product (Leng et al., 2015). Therefore, technology acceptance orientation is likely to influence on firm outcomes, namely, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. From the aforementioned literature on technology acceptance orientation, the second hypotheses can be stated as:

Hypothesis 2a: Technology acceptance orientation is positively related to new product development.

Hypothesis 2b: Technology acceptance orientation is positively related to valuable operational improvement.

Hypothesis 2c: Technology acceptance orientation is positively related to outstanding business effectiveness.

Hypothesis 2d: Technology acceptance orientation is positively related to sustainable organizational competitiveness.

Hypothesis 2e: Technology acceptance orientation is positively related to firm performance.

Technology Innovation Focus

The third dimension of strategic technology transfer capability is technology innovation focus. There is changing business and market environments that making the firms must develop particular methods and organizational behaviors in order to manage differentiate and innovation themselves from their competitors for get more business opportunities and long-term competitive advantage (Al-Ansari et al., 2013). There are several categories in types of innovation that are divided follow the target of innovation, the degree of change, and the area of impact (Gopalakrishnan & Damanpour, 1997). The type categorized by the target of innovation is product and process innovation. Product innovation refers to developing and deliver new products, technologies and approaches, as well as improve existing products for better quality and efficiency, on the other hand, process innovation refers to applying new ideas, methods, or processes that result in overall production and operation to more effectively and efficiently (OECD/Eurostat, 2005). The type of innovation that categorized by the degree of change is radical and incremental innovation. According to Schilling (2008), radical innovation refers to innovations with new levels in a way that is completely different from the original ideas and processes, while incremental innovation refers to innovations is very frequently occur with the system has been upgraded to be more efficient as incrementally from the existing technology or something. The area of impact that used to categorized type of innovation, which is technological and administrative innovation. It explained administrative innovation refers to innovate and change to the new system, methods, and process management in the organization, as a result, the productivity, production, product design, and service delivery increase more efficiency (Gopalakrishnan

& Damanpour, 1997). Technological innovations relate to products, services, and production process technology; these are regard to basic work activities and can concern both process and product (Damanpour, 1991). Thus, technology innovation is many things, including product innovation, process innovation, radical innovation, and incremental innovation, which this occurs when innovation is based on the use of technology for change.

Besides, technological innovation is the process of reorganizing and combining knowledge to generate new ideas. When innovate radically, firms generally need to deal with high uncertainty (Li, Zhao, & Liu, 2006). Accordingly, Technology innovation will adds new functionality or improves product specifications, whereas design innovation enhances appearances and user friendliness. This indicated that both types of innovation contribute to product competitiveness. Therefore, technology innovation of course refers to the innovation of technical aspects, while design innovation affects human sensitivity (Akiike, 2014). Moreover, it found that the innovation capability of the organization which is disciplined in the strategies, systems, and structures and leads to the continuous innovation development in order to the changing market environment (Gloet & Samson, 2016; Slater, Hult, & Olson, 2010). In this research, technology innovation focus is defined as the firm's process of classifying and integrates the knowledge to generate the new technological functionality that enables to management of the organization success (Li, Zhao, & Liu, 2006; Akiike, 2014).

Recently, technology innovation has proved to be essential for most business organization as found in many researches. Several studies have found that technology innovation improves a product's technological functionality and has positive impact on corporate competitiveness through improvements of technological functionality and appearance (Rubera & Droge, 2013; Talke et al., 2009). According to Yam et al. (2011), indicated that technological innovation capabilities are able to achieved organizational performance and effectiveness. In addition, there is interaction between technology and design innovation can affect a firm's performance (Mumford, 2000; Rubera & Droge, 2013). Consequently, technology innovation focus is likely to influence on firm outcomes, namely, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness and firm performance.

From the aforementioned literature on technology innovation focus, the third hypotheses can be stated as:

Hypothesis 3a: Technology innovation focus is positively related to new product development.

Hypothesis 3b: Technology innovation focus is positively related to valuable operational improvement.

Hypothesis 3c: Technology innovation focus is positively related to outstanding business effectiveness.

Hypothesis 3d: Technology innovation focus is positively related to sustainable organizational competitiveness.

Hypothesis 3e: Technology innovation focus is positively related to firm performance.

Technology Exchange Competency

The fourth dimension of strategic technology transfer capability is technology exchange competency. The central in the business market is the nature of technological interdependence, which is most obviously occurs with matching between organizational requirements and the technical abilities to make the exchange possible. The machine has many processes and continuously rises over time. It makes the question between actors. Moreover, typical of business market depend on episodes of technological development of various kinds (McLoughlin & Horan, 2000). The paradigm in technology exchange is the basis proposal of more viable and mutually beneficial joint ventures which would also accommodate the innovative packaging and integrate management of the developing countries' megaproject (Kumaraswamy, 1998).

Focusing on technology-oriented relationships, it distinguishes between technology-related exchange activity including transfer of technological information, technological needs and requirements (Ritter & Gemünden, 2003). Kumaraswamy and

Shrestha (2002) proposed that technology exchange in construction industries that was envisioned in terms of mutually beneficial two-way technology flows that could penetrate many current barriers to technology transfer. In terms of competency, Reed and DeFillippi (1990) defined as being the particular skills and resources a firm possesses, and are used in the superior way. In other words, competency is called the core capability, defined as the knowledge set that distinguishes and provides competitive advantage (Leonard-Barton, 1992a). Moreover, the competency based approaches can identify the skills, knowledge, and capabilities that consistent with the strategy of the organization (Draganidis & Mentzas, 2006). As mentioned above, in this research, technology exchange competency is defined as the firm's ability to manage the knowledge and skills in technological information, requisition, and requirement for two-way sharing which is mutually beneficial into the organization (Kumaraswamy & Shrestha, 2002).

Moreover, Collins and Smith (2006) developed and examined a theory of how human resource practices affect the organizational social climate conditions that encourage knowledge exchange and combination and resultant firm performance the firm’s capability to exchange and combine knowledge, a relationship that predicted firm revenue from new products and services and firm sales growth. The results of investigated manufacturing firm that there is a significant and positive relationship between knowledge exchange address computer-mediated communication channels and new product development as both effective and efficient (Thomas, 2013). In addition, there is found that the exchange of knowledge in information technology affects to enhance the operational process of supply chain partner (Paulraj, Lado, & Chen, 2008). Likewise, the firm has ultimately the supply chain to remain competitive when it is information gathering and sharing of new knowledge that is the exchange competency (McCarter, Fawcett, & Magnan, 2005). Accordingly, technology exchange competency is likely to influence on firm outcomes, namely, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. From the aforementioned literature on technology exchange competency, the fourth hypotheses can be stated as:

Hypothesis 4a: Technology exchange competency is positively related to new product development.

Hypothesis 4b: Technology exchange competency is positively related to valuable operational improvement.

Hypothesis 4c: Technology exchange competency is positively related to outstanding business effectiveness.

Hypothesis 4d: Technology exchange competency is positively related to sustainable organizational competitiveness.

Hypothesis 4e: Technology exchange competency is positively related to firm performance.

Technology Change Awareness

The fifth dimension of strategic technology transfer capability is technology change awareness. The technology can be used as a strategy of the organization and the establishment of technology capabilities can be considered as an important change in the technology of the organization (Burkhardt & Brass, 1990). Thus, the firms have technology alignment that will be taken into consider technological change in the organization to which match with technology and standard as set in the strategy (Chan & Reich, 2007). Technological change is based on both better and more technology. In economics, technological change is a change in the set of feasible production possibilities. In this research, technology change awareness is defined as the firm's perception explicitly which enables to technological advance and movement in order to provide the highest usefulness of the organization (Burkhardt & Brass, 1990).

The impact of discovery for the theory and management of technologically induced organizational change (Leonardi, 2007). Technology feature allocation is a set of practices that stimulate the capability to provide information on new technologies through a network of recommendations. The informational capabilities as activating, technicians transformed the potential that the technology had to create, modify, transmit, and store information with new ways in the resources used to organize their work. Tatikonda and Stock (2003) describe how technology changes to fit interactions between organizations, resulting in productive technology transfer, which positively affects the

efficiency of new product development. Change in the organization is usually analyzed in the context of the organization (Macdonald, 1995). Although the technology change occurs at the organizational level, the effects of this change are evidenced at the individual level. Therefore, Burkhardt and Brass (1990) found that employees increased their power and network centrality following the change in technology. There is the investigation found that technology change in every activity in the organization can significantly affect an organization's competitive advantage (Kak, 2002). Moreover, according to Tracey, Vonderembse, and Lim (1999) represent the results indicate that there is a positive relationship between advanced technology and competitive capabilities achieve high level of performance in manufacturing firms from across the US. Therefore, technology change awareness is likely to influence on firm outcomes, namely, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. From the aforementioned literature on technology change awareness, the fifth hypotheses can be stated as:

Hypothesis 5a: Technology change awareness is positively related to new product development.

Hypothesis 5b: Technology change awareness is positively related to valuable operational improvement.

Hypothesis 5c: Technology change awareness is positively related to outstanding business effectiveness.

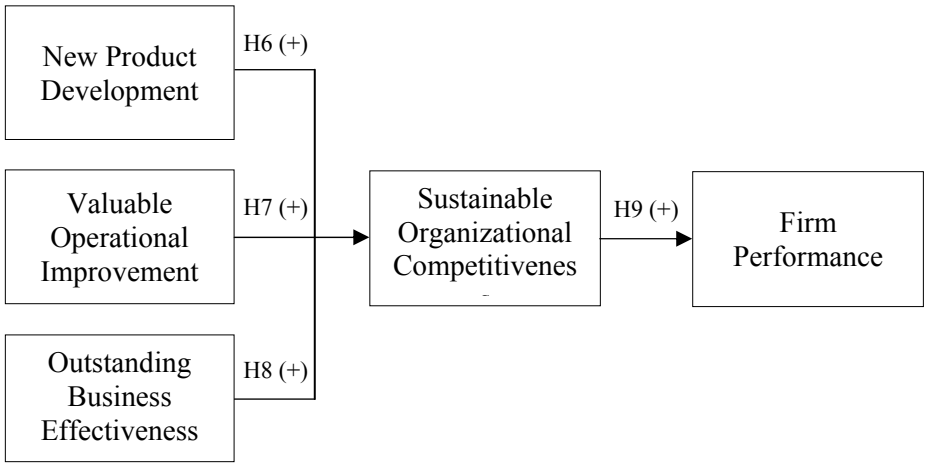
Hypothesis 5d: Technology change awareness is positively related to sustainable organizational competitiveness.

Hypothesis 5e: Technology change awareness is positively related to firm performance.

The Effects of Consequences of Strategic Technology Transfer Capability on Firm Performance

This section examines the effects of four firm outcomes of strategic technology transfer capability – namely new product development, valuable operational improvement, outstanding business effectiveness, and sustainable organizational competitiveness –on the dependent variable, firm performance. The relationships among the variables are expected to be positive as shown in Figure 3 below:

Figure 3: The Effects of New Product Development, Valuable Operational Improvement, Outstanding Business Effectiveness, and Sustainable Organizational Competitiveness on Firm Performance



New Product Development

New product development (NPD) is a process that transforms a concept into a commercial product (Hertenstein & Platt, 2000). Nakata and Sivakumar (1996) defined NPD as the process of understanding and creating a new output and the outcomes of that process which process and outcomes may be assessed subjectively, objectively, or both. Therefore, NPD is an important activity that helps firms to survive and make continuous improvements. Most firms have now placed great emphasis on shortening the time for a new product coming into the market (Liu, Chen, & Tsai, 2005). There is an explanation that new product development is a function of external contacts,

scientific capabilities, firm's location, and the educational and functional background of top managers which a new product for a firm, no matter if it is new to the market or not (Deeds, DeCarolis, & Coombs, 2000; Souder, 1988). Accordingly, in this research, new product development is defined as a process of thinking and generating a new product and service which outcome of a specific process is in order to achieve the business goals and objectives (Atuahene-Gima & Murray, 2007; Nakata & Sivakumar, 1996).

The traditional literature on technology management addressing technology transfer provides a sense of the overall transfer process, particularly at the strategic level (Tatikonda & Stock, 2003). Researchers have found that new product development can change the firm's ability to learn about the new rich environment, to create new capabilities, for developing strategic choices, market advantage, and firm performance (Howell, Shea, & Higgings, 2005; Ledwith & O'Dwyer, 2009; Vorhies & Harker, 2000). In addition, the study of Loch, Stein, and Terwiesch (1996) presents the successful new product which can offer a sustainable competitive advantage of electronic firms in the U.S., Japan, and Europe. Also, the effective development of new products continues to be a critical business activity as firms, both large and small, struggle to acquire or sustain competitive advantage (Sajid et al., 2015). As a result, new product development can be considered a factor affecting sustainable organizational competitiveness of the firm. From the aforementioned literature on new product development, the sixth hypothesis can be stated as:

Hypothesis 6: New product development is positively related to sustainable organizational competitiveness.

Valuable Operational Improvement

Previous research in the operations management literature identified that, the operation is the process that uses resources as inputs, transform energy and materials, and generates products and services as outputs (Corbett & Klassen, 2006). To increase value in operations, value-added is used as a guideline for doing business. The increasing value refers to the ability of a firm to use its resources for the benefit of external conditions that are likely to bring in organizational earnings (Coulter, 2002). Thus, adding value to operations is the ability of a firm to add value to the business, focusing on creating more

opportunities to achieve goals, including identifying improvements operations that can better serve the needs of the customer. Operational effectiveness as the ability to establish processes, which based on efficient core capabilities within the organizations (Porter, 1996). In addition, operational effectiveness also means improving the performance of the process of controlling and leading the processes within the firm, including measuring and improving the processes. The utilizing resources efficiently through these core processes enables the organization to reduce costs, eliminate waste, adapt to the suitable technological innovations, and outperform competitors (Santa et al., 2010). In this research, valuable operational improvement is defined as the using of structured processes and procedures which keeps continuous development of the activities that bring benefits to the firm (Yang, Lee, & Cheng, 2015).

Multinational corporations can access economies, including size, scope, and learning that can create a global intelligence system in R&D and manufacturing knowledge, and can stabilize sales by increasing operational flexibility in manufacturing planning and technology replacement (Pontrandolfo & Okogbaa, 1999). So looking at changes and actions, as well as performance improvements might be more important for future competitiveness than current practices and performances. The improving the sourcing side can improve the total operational performance similarly to improvements in manufacturing or sales sides (Demeter, 2014). In addition, there are found that business can improve firms' operational processes, which ultimately lead to enhanced competitive advantage (Christmann, 2000; McWilliams & Siegel, 2001). Likewise, according to Reuter et al. (2010), indicated that there are the positive operational performance implications on quality of supplying products, costs, and security of supply available from corresponding sustainable supply management capabilities gives more reasons to participate and affected to sustainable competitive advantage. From the aforementioned literature on valuable operational improvement, the seventh hypothesis can be stated as:

Hypothesis 7: Valuable operational improvement is positively related to sustainable organizational competitiveness.

Outstanding Business Effectiveness

Outstanding operational excellence means the ability of a management firm to focus on a target that is superior to its competitors. According to Mouzas (2006) that defined effectiveness as the firm's ability to generate sustained revenue growth in its surrounding network that related to the organization's own strategy. Moreover, there is identified effectiveness as a ratio of the actual output to the expected output (Rolstadås, 1998). Also responding to push for change through the implementation that has been recognized by both internal and external determinants (Rabinovich, Dresner, & Evers, 2003). There is a study that measures the contingent fit relationship between strategic priorities and its contextual variable (Jermias & Gani, 2004). Whereof, effectiveness of a business unit is measured by a multiplication of nine performance dimensions in terms of profit, return on investment, cash flow from operation, cost control, development of new products, market share, sales volume, personnel development, and market development, with their respective relative importance for the business unit. Therefore, in this research, outstanding business effectiveness is defined as a firm's capability to achieve its goals and generate business growth, favorable impressive than its competitors (Mouzas, 2006).

Ray, Barney, and Muhanna (2004) proposed examining the effectiveness of business processes as the method to assess the relationship between firm-specific resources and firm performance. Business effectiveness contains short-term and long-term performance. The short-term variables consist of time and cost reduction in systems availability, system development, and user satisfaction. The long-term variables are improved and outstanding financial performance (Born, 2002). Likewise, Choi and Wang (2007) argued that business with the effective management of stakeholder relationships can create the persistence of superior financial performance over the longer-term, which performs firms to sustainable competitive advantage. From the aforementioned literature on outstanding business effectiveness, the eighth hypothesis can be stated as:

Hypothesis 8: Outstanding business effectiveness is positively related to sustainable organizational competitiveness.

Sustainable Organizational Competitiveness

In prior literature, competitive advantage and competitiveness have been defined in diverse way. Peteraf and Barney (2003) define competitive advantage as an ability to create more economic value than the marginal competitor in the market. Thus, competitive advantage leading to above-normal returns (Peteraf, 1993). With respect to competitiveness, Feurer and Chaharbaghi (1994) have proposed a holistic definition of competitiveness, taking into account the sustainability as "Competitiveness is relative and not absolute. It depends on shareholder and customer values, financial strength which determines the ability to act and react within the competitive environment and the potential of people and technology in implementing the necessary strategic changes. Competitiveness can only be sustained if an appropriate balance is maintained between these factors which can be of a conflicting nature". Thus, it is assumed that sustained superior performance arises from superior competitiveness (Forsman, Temel, & Uotila, 2013). Competitiveness refer to the ability of an organization to compete successfully with its commercial rivals, namely the ability to produce the right goods and services of the right quality, at the right price, at the right time, which meet the needs of customer more efficiently and more effectively than other firms (Edmonds, 2000).

In this research, sustainable organizational competitiveness is defined as making the firm's ability of producing the right products and services at the right price and time to better serve the needs of our customers in the long run, more efficiently and more effectively than its competitors. There must be a balance of these factors to achieve these capabilities in the long term (Edmonds, 2000; Feurer & Chaharbaghi, 1994). Business competitiveness is the basis for superior performance (Ma, 1999). Likewise, Singh (2012) also indicated that competitiveness contributing to the increased performance of the firm or an organization's quality rivals, led to results of increased benefits for the firm. The evidence in empirical research such as that of Prempree, Ussahawanitchakit and Boonlua (2013) argues that business competitiveness is positively correlated with firm value. In addition, early study suggests that a relationship between competitiveness and firm performance (Wiklund & Shepherd, 2005). Moreover, there is investigated the impact of corporate sustainability on organizational processes and performance, which found that corporations that voluntarily adopted sustainability policies are high sustainability

companies (Eccles, Ioannou, & Serafeim, 2014). From the aforementioned literature on sustainable organizational competitiveness, the ninth hypothesis can be stated as:

Hypothesis 9: Sustainable organizational competitiveness is positively related to firm performance.

Firm Performance

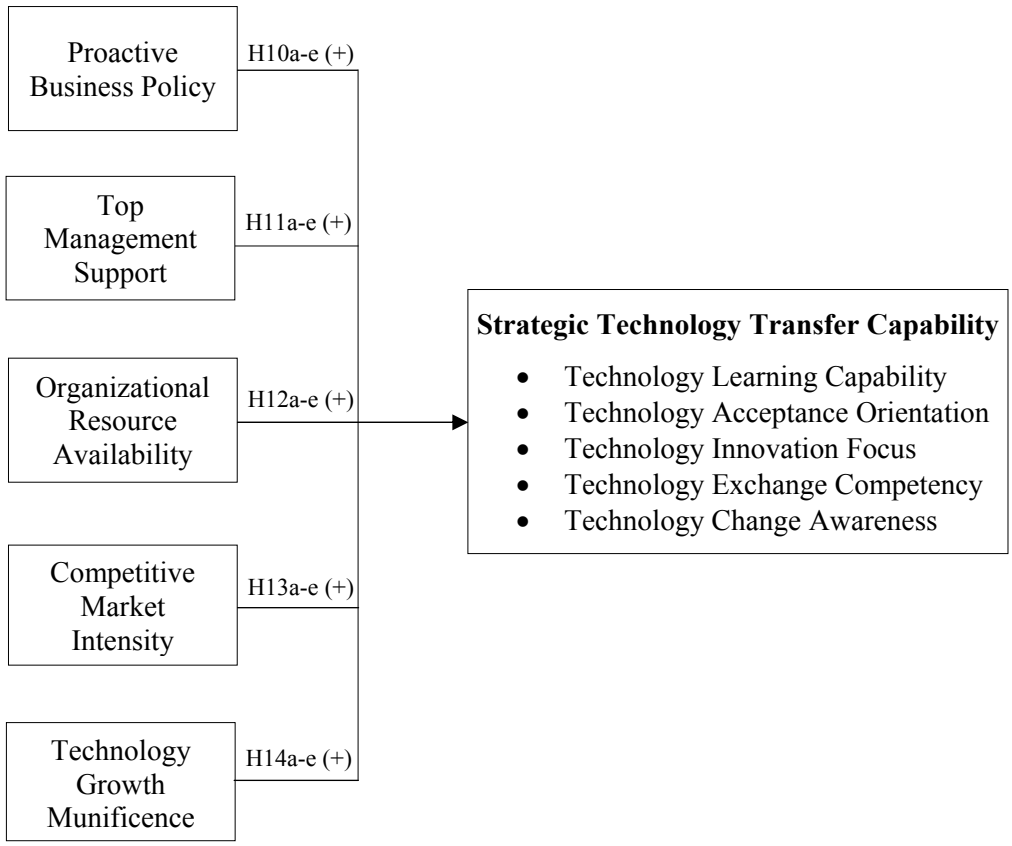
The dependent variable of this research is firm performance. Performance is recognized by the implications of a firm's strategy (Venkatraman & Ramanujam, 1986). Organizational constructs of firm performance include such variables as competitive advantage, profit, market share, sales revenue, costs, and customer satisfaction that classify these into two categories consist of objective measures such as return on assets and perceptual measures that comparison of self with competitors (Erdil, Kitapci, & Timurlenk, 2010). Regarding to Santos and Brito (2012), firm performance refers to a subset of organizational effectiveness that covers operational and financial outcomes. Output measures consider the firm's major objective and highlight profitability that has financial and non-financial assessment whereas input measures focus on duty and activities that useful in reaching the end outcomes (Li, Huang, & Tsai, 2009).

In this research, firm performance is defined as the perception of the firm to overall outcome and goal achievement in both the financial and non-financial assessment over the long term. According to Yamin, Gunasekaran, and Mavondo (1999), examine the relationships among competitive advantage, competitive strategy, and organizational performance. Likewise, Johnson (2002) has studied the relative advantages of a cost leadership strategy compare with a differentiation strategy, which looking firm performance through the profitability perspective. In addition, Ariyawardana (2003) applies the strategy-based and resource-based views of the competitive advantage paradigm for illustrate the performance of value-added tea producers in Sri Lanka. Moreover, prior research founded that technology transfer exhibits positive return and enhances firm performance (Hu, Jefferson, & Jinchang, 2005). Therefore, in this research, firm performance will be measured by subjective performance. Finally, this research expects strategic technology transfer capability to be positively related to firm performance.

The Effects of the Antecedents on Each Dimension of Strategic Technology Transfer Capability

This section explains the relationship of five antecedents (proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence) that effect on five dimensions of strategic technology transfer capability which contains technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. All the relationships among the variables are expected to be positive as presented in Figure 4 below:

Figure 4: The Effects of the Antecedents on Strategic Technology Transfer Capability



Proactive Business Policy

In the past, prior to strategic management, it was a study of business policy (White & Hamermesh, 1981). Business policy is a broad approach set out for the link between strategic planning and organizational strategy. The research mentioned that business policy explains the important concept of strategy as the proactive mediation of industry and competitive factors and organizational potential (White & Hamermesh, 1981). Regarding to proactive, a strategic orientation engenders a strong emphasis on technological leadership and radical product innovations and a preference for high-risk, high-potential-reward projects over safer projects (Droge, Calantone, & Harmancioglu, 2008). In this research, proactive business policy is defined as the firms' strategic planning characterized by an aggressive vision, multifaceted execution, and decision-making in preparing for the expected situations in the future to enhance competitiveness (Droge et al., 2008; White & Hamermesh, 1981).

For the evolutionist or structuralist perspective, there are focus on the policies to support technology and diffusion compensation for less than optimal R&D and on improving a mediated transmission of information. This indicates that the policy maker should support to the complex cognitive specific processes of learning and adaptation in the receiver firms (Laranja, 2009). Subsequent research on proactive environmental strategy that found it influences to competitive advantage and firm performance (Aragón-Correa & Sharma, 2003; Menguc, Auh, & Ozanne, 2010). Moreover, there is explained that policy should stimulate the growth of strong private investing organizations as the incentive to be more proactive that conducted to technology exchange and technological change in organization level (Cooke, 2001). From the aforementioned literature on proactive business policy, the tenth hypotheses can be stated as:

Hypothesis 10a: Proactive business policy is positively related to technology learning capability.

Hypothesis 10b: Proactive business policy is positively related to technology acceptance orientation.

Hypothesis 10c: Proactive business policy is positively related to technology innovation focus.

Hypothesis 10d: Proactive business policy is positively related to technology exchange competency.

Hypothesis 10e: Proactive business policy is positively related to technology change awareness.

Top Management Support

Previous researches have stated that top management support is a key recurrent factor critical for developing and promoting a vision to shape the implementation of firm (Kim, Lee, & Gosain, 2005; Thong, Yap, & Raman, 1996). Top management support of information systems refers to the degree to which top management understands the importance of the information system function and the extent to which it is involved in information system activities (Jitpaiboon & Kalaian, 2005; Ragu-Nathan et al., 2004). Moreover, top management support can be seen in several ways by acting as an executive sponsor, providing encouragement to a team, helping a team to surmount obstacles, streamlining decision-making processes, maintaining open channels of communication with people involved in new product development, and providing adequate capital and human resources (Carbonell & Rodríguez-Escudero, 2009). According to Garrett and Neubaum (2013), top management provision of financial and organizational resources, advocates for and acts on behalf of the venture. Incorporates rules, processes, and procedures, and resolve conflicts and creates a facilitative environment for the venture's ultimate success. Therefore, in this research, top management support is defined as the involvement, interesting, understanding, and consideration of chief executive officer who makes operation effective until successful (Jitpaiboon & Kalaian, 2005).

There is analyzing the effects of top management support for technology, which the promotion of technology skills, absorptive capacity, and technological distinctive firms influence on organizational performance through corporate entrepreneurship (García-Morales, Bolívar-Ramos, & Martín-Rojas, 2014). In addition, the results of Chinese firm’s investigation found that organization support such as top management

support has a positive influence on the technology orientation of the firm (Jeong, Pae, & Zhou, 2006). The key responsibility for the firm of the most top management has in all aspects of operation, management, and performance. Therefore, the effectiveness of strategic management implementation is contingent upon the top management support (Kearns, 2006). According to Al Shaar et al. (2015) found that the support of top management affect both product and process innovation. In addition, information exchange and technology as the key element of the organization structure that affected by the communication between boards and employees (Glickman et al., 2007). Moreover, there is indicated that firm's executive is planning and budgeting for strategy capability that provides to act quickly on detecting technological change in organization (Agbim, 2013). From the aforementioned literature on top management support, the eleventh hypotheses can be stated as:

Hypothesis 11a: Top management support is positively related to technology learning capability.

Hypothesis 11b: Top management support is positively related to technology acceptance orientation.

Hypothesis 11c: Top management support is positively related to technology innovation focus.

Hypothesis 11d: Top management support is positively related to technology exchange competency.

Hypothesis 11e: Top management support is positively related to technology change awareness.

Organizational Resource Availability

Resource of organization can be used to gain competitive advantage and higher performance, which mostly related to the attributes including valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991). According to Barney (1991), there are three categories of resources: physical capital resources, human capital resources, and organizational capital resources. Physical resources are typically tangible that consist of technology, plant, equipment, geographic location, and raw material. Human capital resources are intangible asset that consists of training, experience, judgment, intelligence, relationship, and insights of employees. Organizational capital resources are reporting structure that consists of planning, controlling, coordination, and management systems.

Resource availability is determined by time's percentage of resources that can be scheduled for work (Daley, 2013). The research of Shaw et al. (2013) define resource availability as the accessibility of financial, material or human assets. Therefore, in this research, organizational resource availability is defined as the accessibility of firm-specific assets, including both tangible and intangible, for facilitating the core business processes to be achieved goals (Barney, 1991; Pansuppawatt & Ussawanitchakit, 2011; Shaw et al., 2013). It is the fruitfulness of both tangible and intangible factors for supporting the performance of business processes to achieve firm's goals (Ray, Barney, & Muhanna, 2004). Previous research found that most of the work had the positive relationship between availability of resources and innovation adoption (Ungan, 2004). In contrast, Yoon (2009) explains the availability of slack resources which is the degree of uncommitted resources that available to an organization. It found that positively associated with the organizational adoption of an innovation, because slack resources help easier for the organization to take the risk of loss, experiment with innovations, and implementing new ideas. According to Hsu and Fang (2009), the firms have availability of resource due to the investment including human capital, structural capital, and relational capital that are significantly positively affected organizational learning capability. Moreover, firm-specific characteristics as differential access to financial and other resources which located that are significant condition the likelihood that firms is adopting a new technology which is the technological changing (Harrison, Kelley, & Gant, 1996). From the aforementioned literature on organizational resource availability, the twelfth hypotheses can be proposed as:

Hypothesis 12a: Organizational resource availability is positively related to technology learning capability.

Hypothesis 12b: Organizational resource availability is positively related to technology acceptance orientation.

Hypothesis 12c: Organizational resource availability is positively related to technology innovation focus.

Hypothesis 12d: Organizational resource availability is positively related to technology exchange competency.

Hypothesis 12e: Organizational resource availability is positively related to technology change awareness.

Competitive Market Intensity

The strength of competition a business faces is called competitive intensity (Nhuta, 2012). According to Jamshidi and Moazemi (2016), the authors identify that the number of participants in a market increases to which mean the volume and unpredictability of strategic changes may increase dramatically. The competitive intensity of the firm increases when competitors' marketing actions are both frequent and aggressive (Narver & Slater, 1990). Current as competition intensifies, the firms confront more constraints in their pricing such that operations lower firm performance or inefficiencies in business practices. Then, competitive intensity refers to the degree of competition that a firm confronts in its industry. Moreover, the increased intensity often is characterized by greater rivalry among incumbents, which can take the form of price wars, increased transactions, added services, and more advertising or product offerings (Li, Poppo, & Zhou, 2008). Therefore, the level of competitive intensity is related to the activities of competing firms, including price competition, promotion competition, and so forth (Cui, Griffith, & Cavusgil, 2005).

In this research, competitive market intensity is defined as the perception of the competitors' progression and changes in customer demand as a positive influence of

operational effectiveness as driving firms to develop and improve administration more efficiently (Myers, Daugherty, & Autry, 2000). According to Wilden et al., (2013) study that identified the organic structure and external competitive intensity of the firm as the methods to garner a firm's dynamic capabilities, tangible outcomes is that firms exploit opportunities through dynamic capabilities. Moreover, the firms perceiving their industry environment as turbulent tended to understand customers and competitor actions better, which enabled them to develop a marketing mix and firm's capability to reach their target markets with superior products and services more effectively (O'Cass & Weerawardena, 2010). From the aforementioned literature on competitive market intensity, the thirteenth hypotheses can be stated as:

Hypothesis 13a: Competitive market intensity is positively related to technology learning capability.

Hypothesis 13b: Competitive market intensity is positively related to technology acceptance orientation.

Hypothesis 13c: Competitive market intensity is positively related to technology innovation focus.

Hypothesis 13d: Competitive market intensity is positively related to technology exchange competency.

Hypothesis 13e: Competitive market intensity is positively related to technology change awareness.

Technology Growth Munificence

Economists and other observers often point to technology growth as the source of both trends. Environmental munificence has long been an important factor influencing organizational decisions (Staw & Szwajkowski, 1975). Technology advances are a key force in achieving business goals (Allred & Swan, 2004). According to Glazer and Weiss (1993), technology growth refers to the speed of forward change of technology

associated with new technology products that impact on firm operational procedures. Likewise, Carnabuci and Bruggeman (2009) understand that the growth of technology as the extent to which new inventions are generated, or it could be said that technology has changed. The rate of technological change in an industry that is the definition of technological turbulence (Jaworski & Kohli, 1993), has a more positive relationship with the process of acquiring new technological knowledge to which as technology learning capability (Lusia, 2016). Moreover, Jeong, Pae, and Zhou (2006) found that the Chinese's firms in highly competitive situations derived by rapid change of technology, influence technological orientation significantly. The growth in technology could generate positive impacts on business processes and performance (Mirbagheri & Hejazinia, 2010). Moreover, the generation of technology growth can overall enhance the efficiency of production functions (Schoute, 2011), and offer new benefits and values to customers (Prasnikar et al., 2008).

The more munificent the environment is, the greater the firm's opportunity acquires those resources (Bruno & Tyebjee, 1982). Environmental munificence refers to the extent to which critical resources exist in the environment (Brown & Kirchhoff, 1977). The degree of resource richness in the firm's environment munificence should have a significant influence on the firm's entrepreneurial orientation and subsequent growth (Castrogiovanni, 1991). Moreover, Jaiyeoba (2013) explains environmental munificence that is environmental capacity which permits organizational growth and stability. Likewise, munificence can also accommodate the generation of slack resources which can be used for organizational innovation or which the organization can use during periods of scarcity. Therefore, technology growth munificence, in this research, is defined as the perception of the progressive technological development within industry that jointly creates superior result and outcome (Brown & Kirchhoff, 1977; Glazer & Weiss, 1993). There is research indicated that firm regarding toward technology growth help a firm utilize and maximize knowledge value to improve its organizational learning capability (Hsu & Fang, 2009). In addition, firm's behavior in developing an ongoing exchange of technology that related to the technology munificence in building up firm's capabilities (Sánchez, 2012). Furthermore, technological turbulence leads to more innovations to which the proactivity of firm has been experiencing extensive changes

during transition to a market economy (Zhou, Yim, & Tse, 2005). From the aforementioned literature on technology growth munificence, the fourteen hypotheses can be stated as:

Hypothesis 14a: Technology growth munificence is positively related to technology learning capability.

Hypothesis 14b: Technology growth munificence is positively related to technology acceptance orientation.

Hypothesis 14c: Technology growth munificence is positively related to technology innovation focus.

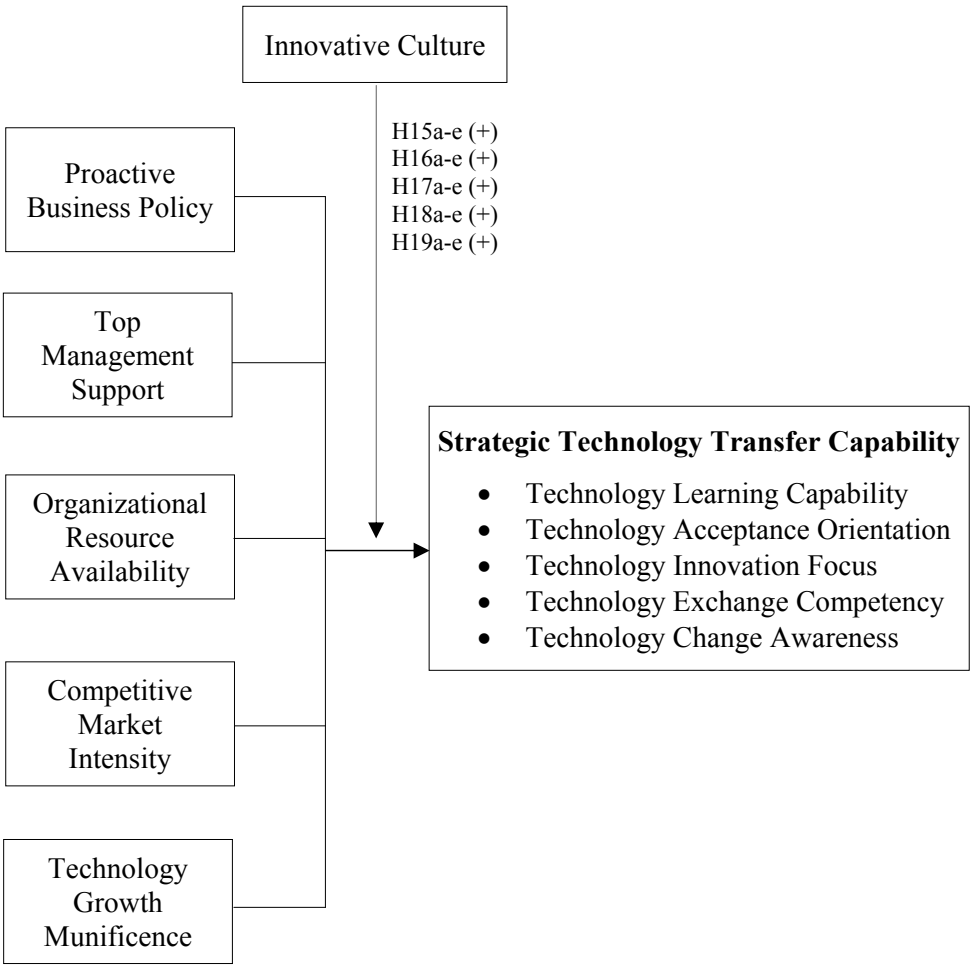
Hypothesis 14d: Technology growth munificence is positively related to technology exchange competency.

Hypothesis 14e: Technology growth munificence is positively related to technology change awareness.

The Moderating Effects of Innovative Culture on the Relationships between Strategic Technology Transfer Capability and Its Antecedents

This section explains the influences of the moderator, innovative culture, on the relationships among strategic technology transfer capability and its antecedents: proactive business policy, top management support, organizational resource availability, competitive market intensity and technology growth munificence. The moderating effect of innovative culture is expected to be positive as presented in Figure 5 below:

Figure 5: The Moderating Effects of Innovative Culture on the Relationships between Strategic Technology Transfer Capability and Its Antecedents



Innovative Culture

The moderator in this model of strategic technology transfer capability is innovative culture. Substantial organizational literature posits that an organization's culture influences the thoughts, feelings, and actions of its members (Pettigrew, 1979); helps individuals understand the organization's focus; and provides them with norms for their behavior (De Brentani & Kleinschmidt, 2004; Deshpandé & Webster, 1989). Research at the strategic business unit level defines organizational culture as the personality of the organization, which is composed of the assumptions, values, beliefs, attitudes, and behaviors of organizational members (Schein, 2004). Organizational contextual factors, such as organizational culture, help amplify the effect of

transformational leadership by increasing individuals' receptivity to an articulated vision and new values, and to the collective interest (Pawar & Eastman, 1997; Pittigrew, Ferlie, & McKee, 1992). Wallach (1983) has categorized organizational culture into three types consist of bureaucratic, supportive, and innovative. The innovative culture's main point is to push the professional development of each person and to create benefit for enterprise, thus realizing win-win result for enterprise and individuals (Hongyan & Huaizhong, 2010). According to Maher (2014) analyzes distinctive features of corporate culture that focused on innovation, particularly in the case of ICT companies, found that innovative culture gives employees freedom to develop new ideas, and assures managerial support in implementation of new projects. Moreover, fostering an innovative culture is crucial to small medium industries and how these cultures would best bring about innovation (Annamalah et al., 2016).

An innovative culture at the strategic business unit level embraces innovation, growth, and new resources, and highly values flexibility, adaptability, creativity, risk taking, and entrepreneurship (Chen et al., 2012). For example, research investigates the relationships between strategic business unit level transformational leadership and technological innovation which uses the moderating roles of innovative culture found that a stronger innovative culture is a substitute for transformational leadership behavior for facilitating technological innovation. Moreover, top managers affect innovation adoption which are responsible for the cultural values by control resources and influence strategic decision in support of innovation within the organization (Damanpour & Schneider, 2006).

In this research, innovative culture is defined as a firm's orientation toward experimenting with new alternatives or approaches by exploring new resources, breaking through existing norms, and creating new operation to improve its performance (Wei et al., 2013). Therefore, several hypotheses can be proposed as:

Hypothesis 15a: Innovative culture is positively moderate the relationships between proactive business policy and technology learning capability.

Hypothesis 15b: Innovative culture is positively moderate the relationships between proactive business policy and technology acceptance orientation.

Hypothesis 15c: Innovative culture is positively moderate the relationships between proactive business policy and technology innovation focus.

Hypothesis 15d: Innovative culture is positively moderate the relationships between proactive business policy and technology exchange competency.

Hypothesis 15e: Innovative culture is positively moderate the relationships between proactive business policy and technology change awareness.

Hypothesis 16a: Innovative culture is positively moderate the relationships between top management support and technology learning capability.

Hypothesis 16b: Innovative culture is positively moderate the relationships between top management support and technology acceptance orientation.

Hypothesis 16c: Innovative culture is positively moderate the relationships between top management support and technology innovation focus.

Hypothesis 16d: Innovative culture is positively moderate the relationships between top management support and technology exchange competency.

Hypothesis 16e: Innovative culture is positively moderate the relationships between top management support and technology change awareness.

Hypothesis 17a: Innovative culture is positively moderate the relationships between organizational resource availability and technology learning capability.

Hypothesis 17b: Innovative culture is positively moderate the relationships between organizational resource availability and technology acceptance orientation.

Hypothesis 17c: Innovative culture is positively moderate the relationships between organizational resource availability and technology innovation focus.

Hypothesis 17d: Innovative culture is positively moderate the relationships between organizational resource availability and technology exchange competency.

Hypothesis 17e: Innovative culture is positively moderate the relationships between organizational resource availability and technology change awareness.

Hypothesis 18a: Innovative culture is positively moderate the relationships between competitive uncertainly intensity and technology learning capability.

Hypothesis 18b: Innovative culture is positively moderate the relationships between competitive uncertainly intensity and technology acceptance orientation.

Hypothesis 18c: Innovative culture is positively moderate the relationships between competitive uncertainly intensity and technology innovation focus.

Hypothesis 18d: Innovative culture is positively moderate the relationships between competitive uncertainly intensity and technology exchange competency.

Hypothesis 18e: Innovative culture is positively moderate the relationships between competitive uncertainly intensity and technology change awareness.

Hypothesis 19a: Innovative culture is positively moderate the relationships between technology munificence environment and technology learning capability.

Hypothesis 19b: Innovative culture is positively moderate the relationships between technology munificence environment and technology acceptance orientation.

Hypothesis 19c: Innovative culture is positively moderate the relationships between technology munificence environment and technology innovation focus.

Hypothesis 19d: Innovative culture is positively moderate the relationships between technology munificence environment and technology exchange competency.

Hypothesis 19e: Innovative culture is positively moderate the relationships between technology munificence environment and technology change awareness.

Summary

The conceptual framework of how strategic technology transfer capability relates to firm performance is portrayed. In addition, two theoretical perspectives are employed to draw the relationships in the conceptual model including absorptive capacity theory and dynamic capability theory.

This research proposes a set of 19 testable hypotheses which explains the overall relationships among constructs in the conceptual model. Those relationships are classified into four groups which are as follows: the first group is relevant to the linkages among strategic technology transfer capability and its consequences, including new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The second group contains the relationships among four consequences and firm performance. The third group holds the associations among five antecedents: proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence, and each of five dimensions of strategic technology transfer capability. The final group relates to the moderating influences of strategic technology transfer capability and innovative culture. All proposed hypotheses are presented in Table 4.

Furthermore, the following chapter describes research methods that cover these issues: a selection of samples, data collection procedures, a test of non-response bias, the measurements and definitions of variables, instrumental verification (reliability and validity), and the statistical analysis of the data.

Table 4: Summary of Hypothesized Relationships

Hypothesis	Description of Hypothesized Relationships
H1a	Technology learning capability is positively related to new product development.
H1b	Technology learning capability is positively related to valuable operational improvement.
H1c	Technology learning capability is positively related to outstanding business effectiveness.
H1d	Technology learning capability is positively related to sustainable organizational competitiveness.
H1e	Technology learning capability is positively related to firm performance.
H2a	Technology acceptance orientation is positively related to new product development.
H2b	Technology acceptance orientation is positively related to valuable operational improvement.
H2c	Technology acceptance orientation is positively related to outstanding business effectiveness.
H2d	Technology acceptance orientation is positively related to sustainable organizational competitiveness.
H2e	Technology acceptance orientation is positively related to firm performance.
H3a	Technology innovative focus is positively related to new product development.
H3b	Technology innovative focus is positively related to valuable operational improvement.
H3c	Technology innovative focus is positively related to outstanding business effectiveness.
H3d	Technology innovative focus is positively related to sustainable organizational competitiveness.
H3e	Technology innovative focus is positively related to firm performance.

Table 4: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships
H4a	Technology exchange competency is positively related to new product development.
H4b	Technology exchange competency is positively related to valuable operational improvement.
H4c	Technology exchange competency is positively related to outstanding business effectiveness.
H4d	Technology exchange competency is positively related to sustainable organizational competitiveness.
H4e	Technology exchange competency is positively related to firm performance.
H5a	Technology change awareness is positively related to new product development.
H5b	Technology change awareness is positively related to valuable operational improvement.
H5c	Technology change awareness is positively related to outstanding business effectiveness.
H5d	Technology change awareness is positively related to sustainable organizational competitiveness.
H5e	Technology change awareness is positively related to firm performance.
H6	New product development is positively related to sustainable organizational competitiveness.
H7	Valuable operational improvement is positively related to sustainable organizational competitiveness.
H8	Outstanding business effectiveness is positively related to sustainable organizational competitiveness.
H9	Sustainable organizational competitiveness is positively related to firm performance.

Table 4: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships
H10a	Proactive business policy is positively related to technology learning capability.
H10b	Proactive business policy is positively related to technology acceptance orientation.
H10c	Proactive business policy is positively related to technology innovation focus.
H10d	Proactive business policy is positively related to technology exchange competency.
H10e	Proactive business policy is positively related to technology change awareness.
H11a	Top management support is positively related to technology learning capability.
H11b	Top management support is positively related to technology acceptance orientation.
H11c	Top management support is positively related to technology innovation focus.
H11d	Top management support is positively related to technology exchange competency.
H11e	Top management support is positively related to technology change awareness.
H12a	Organizational resource availability is positively related to technology learning capability.
H12b	Organizational resource availability is positively related to acceptance orientation.
H12c	Organizational resource availability is positively related to technology innovation focus.
H12d	Organizational resource availability is positively related to technology exchange competency.

Table 4: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships
H12e	Organizational resource availability is positively related to technology change awareness.
H13a	Competitive market intensity is positively related to technology learning capability.
H13b	Competitive market intensity is positively related to technology acceptance orientation.
H13c	Competitive market intensity is positively related to technology innovation focus.
H13d	Competitive market intensity is positively related to technology exchange competency.
H13e	Competitive market intensity is positively related to technology change awareness.
H14a	Technology growth munificence is positively related to technology learning capability.
H14b	Technology growth munificence is positively related to technology acceptance orientation.
H14c	Technology growth munificence is positively related to technology innovation focus.
H14d	Technology growth munificence is positively related to technology exchange competency.
H14e	Technology growth munificence is positively related to technology change awareness.
H15a	Innovative culture positively moderates the relationship between proactive business policy and technology learning capability.
H15b	Innovative culture positively moderates the relationship between proactive business policy and technology acceptance orientation.
H15c	Innovative culture positively moderates the relationship between proactive business policy and technology innovation focus.

Table 4: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships
H15d	Innovative culture positively moderates the relationship between proactive business policy and technology exchange competency.
H15e	Innovative culture positively moderates the relationship between proactive business policy and technology change awareness.
H16a	Innovative culture positively moderates the relationship between top management support and technology learning capability.
H16b	Innovative culture positively moderates the relationship between top management support and technology acceptance orientation.
H16c	Innovative culture positively moderates the relationship between top management support and technology innovation focus.
H16d	Innovative culture positively moderates the relationship between top management support and technology exchange competency.
H16e	Innovative culture positively moderates the relationship between top management support and technology change awareness.
H17a	Innovative culture positively moderates the relationship between organizational resource availability and technology learning capability.
H17b	Innovative culture positively moderates the relationship between organizational resource availability and technology acceptance orientation.
H17c	Innovative culture positively moderates the relationship between organizational resource availability and technology innovation focus.
H17d	Innovative culture positively moderates the relationship between organizational resource availability and technology exchange competency.
H17e	Innovative culture positively moderates the relationship between organizational resource availability and technology change awareness.

Table 4: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships
H18a	Innovative culture positively moderates the relationship between competitive market intensity and technology learning capability.
H18b	Innovative culture positively moderates the relationship between competitive market intensity and technology acceptance orientation.
H18c	Innovative culture positively moderates the relationship between competitive market intensity and technology innovation focus.
H18d	Innovative culture positively moderates the relationship between competitive market intensity and technology exchange competency.
H18e	Innovative culture positively moderates the relationship between competitive market intensity and technology change awareness.
H19a	Innovative culture positively moderates the relationship between technology growth munificence and technology learning capability.
H19b	Innovative culture positively moderates the relationship between technology growth munificence and technology acceptance orientation.
H19c	Innovative culture positively moderates the relationship between technology growth munificence and technology innovation focus.
H19d	Innovative culture positively moderates the relationship between technology growth munificence and technology exchange competency.
H19e	Innovative culture positively moderates the relationship between technology growth munificence and technology change awareness.

CHAPTER III

RESEARCH METHODS

The previous chapter illustrates a comprehensive review of relevant literature detailing strategic technology transfer capability, theoretical foundations, antecedents, consequences, moderators, and the hypothesis development. Consequently, this chapter demonstrates the research methods that help to clarify the understanding of the hypothesis testing process. Thus, this chapter is organized into five sections as follows. Firstly, the sample selection and data collection procedures, including population and samples, data collection, and test of non-response bias are detailed. Secondly, the variable measurements of each construct are developed. Thirdly, the instrumental verifications, including the test of validity and reliability are described. Fourthly, the statistical analysis utilizes the regression equations to test the hypotheses are presented. Finally, the summary of definitions and operational variables of constructs is included.

Sample Selection and Data Collection Procedure

Population and Sample

This research mainly examined antecedents and consequences of strategic technology transfer capability of information and communication technology businesses in Thailand. The population was obtained from the database of the Department of Business Development, the Ministry of Commerce Thailand (www.dbd.go.th). This database is a good source to provide all completed addresses because the Department of Business Development is responsible for the business registration and information services. Thus, the population data derived could confirm and affirm that a certain firm is still in business. The firms are classified into information and communication technology business of selected database including software development, information service, consulting computer, and related activities. It always works with transfer technology, so it is appropriate to use in this research. Information and communication technology businesses are interesting to investigate because the industry is an important contributor to economic growth in the globalized economy (Maryska, Doucek, & Kunstova, 2012).

Nowadays, Thailand is in the era so called ‘Thailand 4.0’. According to Ministry of Industry (2016), the government has announced the policy to reform economy structure into value–based economy and develop Thailand into a group of countries with high income. Thailand 4.0 is the economic model that has changed from producing commodity products oriented towards innovation. Changing the traditional work into the management and use of new technologies to provide entrepreneurs have more revenue. In other words, this change is driven countries by industrial into driven by technology, creativity and innovation. The structure of information and communication technology would be a key success factor. There is report shows that FDIs by target sector in 143 digital projects which is worth 44 million US dollars (Thailand BOI, 2016). The potential FDIs generate the spillover effect that is one of the most effective channels of technology transfer (Kohut, 2016) and will allow for the country’s smooth and successful transition toward becoming a Thailand 4.0 economy (Motohashi & Yuan, 2010; Thailand Board of Investment, 2016). In addition, there is research that investigates the factors to affect the technology transfer process of information and communication technology industry in Libya (Hassan & Jamalludin, 2016). The results suggested that government support factor, transferee and transferor characteristics, technology transfer environment, and technology learning capability factors are the important indicators of technology transfer performance to the host information and communication technology industry. Therefore, the selected industry has the potential to examine five dimensions of strategic technology transfer capability simultaneously.

In order to illustrate the research phenomenon, a list of 18,466 Thai information and communication technology firms that are provided by the database online of the Department of Business Development in Thailand (www.dbd.go.th). The required sample size to be representative of the information and communication technology firm in this research is 376 firms, which is a minimum usable sample size with 95 percent confidentiality (Krejcie & Morgan, 1970).

The calculation of an appropriate sample size by the formula from Krejcie and Morgan (1970) as: n = sample size; N = population size; e = error; p = 0.5;χ^2 = 3.841 for calculated:

$$n = \frac{\chi^2 Np(1-p)}{e^2(N-1) + \chi^2 p(1-p)}$$

$$n = \frac{3.841(18{,}466)(0.5)(1\text{-}0.5)}{(0.05)^2\,(18{,}466\text{-}1) + 3.841(0.50)(1\text{-}0.50)}$$

$$n = 376.293 \approx 376 \text{ Firms}$$

However, based on prior research, the effective response rate for a mail-out survey, without an appropriate follow-up procedure, should be more than 20 percent a range that is considered acceptable for data analysis (Aaker, Kumar, & Day, 2001). Thereby, the sample size calculated into 100 percent that the target sample for mailed questionnaires was 1,880 questionnaires which were calculated from (376×100)/20 = 1,880 questionnaires.

The stratified random sampling of 1,880 firms was selected. The population was separated into several mutually exclusive subpopulations or strata herein refer to as region as business data warehouse from the database online of the Department of Business Development in Thailand. This research applied proportionate stratification that was based on the stratum's share of the total population to come up with the sample in each stratum. The target sample was derived by using systematic random procedures to draw the population from each stratum. The region was used to stratify into seven stratums with the number of samples as following: Bangkok 1,039 firms, northern 137 firms, northeastern 195 firms, central 291 firms, eastern 86 firms, western 30 firms, and southern 102 firms. After mailed questionnaires to respondents, the total of undeliverable sample was 477 firms and the total of returned sample was 298 firms. Therefore, the sample size that used to calculate in this research was 1,403 firms. The stratification of population, samples and undeliverable samples are presented in Table 5.

Table 5: The Strata of the Stratified Random Sampling

Stratum	Region	Population (Firms)	Sample (Firms)	Undeliverable Sample (Firms)	Returned Sample (Firms)
1	Bangkok	10,206	1,039	279	141
2	Northern	1,352	137	45	38
3	Northeastern	1,915	195	36	39
4	Central	2,858	291	60	21
5	Eastern	843	86	15	12
6	Western	292	30	10	24
7	Southern	1,000	102	32	23
Total		**18,466**	**1,880**	**477**	**298**

Data Collection

The questionnaires are appropriately used to collect data in this research. These are a widely-used method for large-scale data collection in strategic management and organizational research. According to Pongpearchan and Ussahawanitchakit (2011), the mailing questionnaire is an appropriate instrument to gather data from different geographical areas at low cost. In this research, the questionnaire was directly distributed to the key informants; top executive including managing directors, managing partners, or managers of the Thai information and communication technology business industry. They are selected as the key informant because it can be stated that the top executive possesses the most comprehensive knowledge of the characteristics, strategy, and performance of the firm (Blombäck & Pasillas, 2012; Weerawardena, O'Cass, & Julian, 2006). There are some studies found that top executive provides data that is as reliable and valid as multiple informant (O'Cass & Weerawardena, 2010; Zahra & Covin, 1993). Furthermore, it found that organizational strategic decisions and actions are motivated by a managerial perception of reality rather than by an objective calibration of reality (Spyropoulou, Skarmeas, & Katsikeas, 2010). Therefore, the measurement by a perception of top executive is likely to be appropriate in this research.

According to the completed questionnaires mailed to respondents and were directly sent back to the researcher by the prepared return envelopes in order to ensure confidentiality, two weeks was allowed to receive replies. After that, there was a follow up mail-out to non-respondents. The undeliverable surveys caused by some of these firms had moved to another or unknown location and some were close down. The deduction of 477 from the original 1,880 surveys represented the valid mailing was 1,403 surveys. The responded from remained valid for research purposes had 298 firms but there were 1,105 firms that did non response questionnaire. However, 12 uncompleted surveys were also found and discarded. Therefore, there were only 286 surveys which were usable for further analysis. The effective response rate was approximately 20.38 percent. The details of questionnaire mailing are presented in Table 6.

Table 6: Details of Questionnaire Mailing

Details	**Numbers**
Mailed Questionnaires	1,880
Undelivered Questionnaires	477
Valid Questionnaire Mailing	1,403
Non Response Questionnaires	1,105
Received Questionnaires	298
Unusable Questionnaire	12
Usable Questionnaire	286
Response Rate (286/1,403) x 100	20.38%

In this research, a valid and reliable self-administered questionnaire comprises seven sections. In the first section, respondents are requested to provide their personal information such as gender, age, marital status, level of education, work experience, average monthly income, and current position. The second section questions the organizational characteristics; for example, business type, number of employees, and annual revenues. For the third to sixth section, respondents are canvassed on their perceptions toward strategic technology transfer capability, its consequences, antecedents,

and other influences. Moreover, the Likert five-point interval scale, ranging from 1 = strongly disagree to 5 = strongly agree, was employed.

To be more specific, the third section collects the key concepts of strategic technology transfer capability dimensions: technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. The forth section presents questions concerning the consequences of strategic technology transfer capability, including new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The fifth section includes questions regarding to the antecedents of strategic technology transfer capability including proactive business policy, top management support, organizational resource availability, and, innovative culture. The sixth section consists of a set of questions relating to competitive market intensity, and technology growth munificence that affect the relationship among strategic technology transfer capability antecedents and consequences. Finally, the seventh section provides an open-ended question to gather key respondent suggestions and opinions. This questionnaire is attached in the Appendix E (Thai) and F (English).

Test of Non-Response Bias

The important step before the sample is generalized to the population is to implement the test of non-response bias. The response of the mail survey from the sample cannot receive all of them. Thus, the non-response bias is required to claim that all participants can be inferred as representative all of the population (Lewis, Hardy, & Snaith, 2013). To detect possible response bias problems between respondents and non-respondents, a two-tailed test (level .05) of the differences of proportions from the sample is conducted corresponding with the test for non-response bias (Armstrong & Overton, 1977). Regarding demographics, this research uses organizational demographics including business model, location of business, business ownership, operational capital, the period of time in operating business, number of employees, and average revenue per year to test the non-response bias. A chi-square comparison of the demographics between early and late respondents is conducted corresponding with the test for non-response bias (Hwang, Yang, & Hong, 2015). If the results are derived from the chi-square have

no statistically significant difference between early and late respondents, then it implies that the returned questionnaires have no non-response bias problem.

In this research, all 286 usable questionnaires are half-split into two groups. The early respondents are the first group and the late respondents are the second group. Then, 143 responses from the first group mailing are used to compare with 143 responses received from the second group mailing in terms of their demographic information. These results are as follow: business model (Pearson chi-square = 0.879, $p > 0.05$), business location (Pearson chi-square = 0.884, $p > 0.05$), business ownership (Pearson chi-square = 0.607, $p > 0.05$), operational capital (Pearson chi-square = 0.943, $p > 0.05$), period of time in operating business (Pearson chi-square = 0.992, $p > 0.05$), number of employees (Pearson chi-square = 1.000, $p > 0.05$), and average revenue per year (Pearson chi-square = 0.761, $p > 0.05$).

For testing of non-response bias using chi-square statistic, the result indicates no statistically significant difference between early and late respondents at $\alpha = 0.05$ of any demographic information. Thus, this research has no response bias problem. The results of non-response bias test show in Appendix C.

Measurements

In measuring each construct in the conceptual model, multiple item measurement processes were developed. Since, constructs are the abstractions that cannot be directly measured or observed and should be measured by multiple items (Churchill, 1979). Moreover, using multiple items provide a wider range of the content of conceptual definition and improvement of reliability (Neuman, 2006). In this research, all constructs are transformed to the operational variables to gain more accuracy in measuring research constructs as shown in Table 9 which provides the definition of each construct, the operational variables, and scale source. All variables are derived from the definition and previous literature, by the five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) as show detail of each item in Appendix A. In summary, all operational definitions of each construct which are comprised of the dependent variable, the independent variables, the moderating variables, and the controlled variables, are described below.

Dependent Variable

Firm performance. With regard to research on firm performance, it is defined as the perception of the firm to overall outcome and goal achievement in both the financial and non-financial assessment over the long term (Yamin, Gunasekaran, & Mavondo, 1999). This performance construct is measured by the adapted scale from Lee (2010) which includes a six-item scale. It illustrates business outcomes in the form of the degree to which firm have performance that is on target, profitability, market share, sales growth, customer satisfaction and effective operation.

Independent Variables

This research consists of 14 independent variables which are separated into three categories; core construct, consequential variables, and antecedent variable. Firstly, strategic technology transfer capability is the center and core construct of this research. It can be measured through five distinctive attribute dimensions: technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. These attributes reflect the good characteristics of strategic technology transfer capability. The measure of each attribute depends on its definition which is detailed below.

Technology learning capability. Technology learning capability is measured as a new scale with four-items regarding its definition and literature reviews. The operational definition is described as the degree of the encouragement personnel to study, train, and exchange about technological knowledge and skills for use in the operation within the firm.

Technology acceptance orientation. The measurement of technology acceptance orientation is created including a four-item scale. There is explained to the level of the utilization, application, and association in useful and valuable technology to the operational process of the firm.

Technology innovation focus. Technology innovation focus is defined as the intention of the firm to allocate, create, and explore the new technology in the functional process constantly that enable to management of the organization succeed. The measurement is created with a new four-item scale.

Technology exchange competency. Technology exchange competency is measured as a new scale with four-items regarding its definition and literature reviews. Technology exchange competency, in this research, is the degree to which the firm has transferring, sharing, and combination of technology for working in the each unit together.

Technology change awareness. Technology change awareness is defined as the level of the firm to analyze historical data and then predicts the future in order to understand emerging technologies. This construct is developed as a new scale regarding to its definition and literature reviews which including a four-item scale.

Consequential Variables

The second category is the consequences of strategic technology transfer capability, namely, new product development, valuable operational improvement, outstanding business effectiveness, and, sustainable organizational competitiveness. The measure of each consequential variable conforms to its definition and relative literatures, discussed as follows.

New product development. With regard to the study of Hertenstein and Platt (2000), it demonstrates that new product development, in this research, was measured by the level of the firm's process to produce products and services which have characteristic that create a competitive advantage. Thus, the measure is created with a four-item scale developed from the definition and literature review.

Valuable operational improvement. The measurement of valuable operational improvement is developed as a new scale from definition and literature. Valuable operational improvement is defined as the degree to which the firm develops and adapts the operational processes to modernize and more efficient. Therefore, this construct is developed to a four-item scale.

Outstanding business effectiveness. This measurement is developed as a new scale with a four-item scale based on the definitions and literature. Outstanding business effectiveness is defined as the degree of the operational process excellence to achieve the business goals and objectives of the firm.

Sustainable organizational competitiveness. Sustainable organizational competitiveness is defined as the degree to which the firm has innovative products and services that are unique and different from competitors that continuous response to customer demand. This measurement is developed as a new scale with a four-item scale based on the definitions and literature.

Antecedent Variables

Lastly, the third category is the five antecedents of strategic technology transfer capability comprised of proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence. All antecedent variables align to their definitions and prior literature. The measure of each variable is discussed as follows.

Proactive business policy. Drawing on proactive strategic orientation review, proactive business policy is defined as the intention into seeking new opportunities created by the changes and developments in the operation and making radical product innovation of the firm. This measurement is adapted from Droge, Calantone, and Harmancioglu (2008) which including four-item scale.

Top management support. According to Thong, Yap, and Raman (1996), active engagement of top management with information implementation is highly desirable in business of every size. The measurement of top management support is action from chief executive officer to function in organization. This refers to the degree to which CEOs provides the direction, authority, and resources to encourage operational activities. This construct is assessed using four-item scale as adapt from Ifinedo (2008).

Organizational resource availability. Organizational resource availability is evaluated by the levels of sufficient and accessibility resources that support strategy implementation and the effective and efficient application of resources in the operation. The measurement scale of this construct is adapted from Pansuppawatt and Ussawanitchakit (2011) including a four-item scale.

Competitive market intensity. Competitive market intensity is measured using a four-item scale adapted from Myers, Daugherty, and Autry (2000). Respondents were asked to evaluate their competitors' aggressiveness and customer requirements, which impact on the respondent's decisions in the organizational development process.

Technology growth munificence. Technology growth munificence is measured through the degree of the progress and forward change of technology that applied to facilitate business operations and processes. This four-item scale is adapted from Sriboonlue (2015).

Moderating Variables

Drawing on the dynamic capability theory, there is a purposed moderator in this research. This is innovative culture on the external point of view which moderates the relationships among strategic technology transfer capability and its antecedents. This moderator is grounded on its definition and previous literature. The measure of the moderating variable is discussed as follows.

Innovative culture. Innovative culture is measured as the degree to which the firm creates an environment where innovation thrives that makes the new operation different from the original. This evaluation tool was adopted from Wei, O'Neill, Lee, and Zhou (2013). The scale consists of four-items and has been used for decades.

Control Variables

Two control variables are included in this research. Firm age and firm size are the characteristics that may influence the hypothesized relationships. Previous research suggested that larger and older firms may face organizational inertia (Huff, Huff, & Thomas, 1992), while smaller and younger firms are more likely to encounter resource constraints which affect an ability of firms to process information related to changing resources and adapting to changing resource conditions (Patel, Terjesen, & Li, 2012). The measurement of each control variable is detailed as follows.

Firm age. Firm age is normally associated with business experience, competitiveness and capability. According to Leiblein, Reuer, and Dalsace (2002), firm age may influence firm performance and sustainability. This implied that older firms may benefit from accumulated experience (Baden-Fuller & Volberda, 1997). Therefore, firm performance and sustainability are affected by their age. Firm age is the period of time that the firm has been in business (Biddle, Hilary, & Verdi, 2009; Yu et al., 2013), and can be measured by the length from the establishment year to the current year of study (Zhou et al., 2005). Therefore, in this research, firm age is a dummy variable in

which 0 means the firm has been in business less than or equal to 15 years, and 1 means the firm has been in business for more than 15 years (Delmotte & Sels, 2008).

Firm size. Firm size can be measured by the number of full-time employees currently working and registered in the firm as a proxy (Christmann 2000; Hong & Zhu, 2006). According to previous research, firm size is found to affect a firm's ability to develop more innovation (Orfila-Sintes & Mattsson, 2009) and implement strategy as well as its image and reputation (Nakata, Zhu, & Izberk-Bilgin, 2011). Accordingly, firm size affect firm's strategic technology transfer capability, so it needs to be controlled. In this research, firm size is represented by dummy variables including 0 means the firm has less than 10 employees, and 1 means the firm has equal and higher than 10 persons (Waranantakul, Ussahawanitchakit, & Jhundra-indra, 2013).

Methods

In this research, most of constructs in the conceptual model are newly developed. Consequently, a pre-test method is appropriately conducted to assert the validity and reliability of the questionnaire. Firstly, the questionnaire was double-checked by a specialist and experienced scholars. Later, the rationale of the pre-test was conducted to check for clear and accurate understanding of the questionnaire before using real data collection.

Validity and Reliability

Validity is defined as the accuracy of the measurement that evinces the concept of consideration (Hair et al., 2010). In order to verify the research instrument accuracy and validity, this research examines content and constructs validity of the questionnaire.

Content validity is based on the extent to which the items of the scales are sufficiently reflected the interrelated theoretical domains (Green, Tull, & Albaum, 1988). With regarding to relevant theory and literature review, each of the items in a questionnaire was subjectively assessed by a specialist and related academic expert. In this research, validation of content required two experts in academic research to review and suggest any necessary refinement of questions in relation to the variable content. Thus, after referral to the two experts some points regarding the format of the questionnaire, and

some specific questions were modified, adjusted or deleted to ensure clarity. The details of expertise are shown in Appendix G.

Construct validity is referred to a set of measured item that actually reflects the theoretical latent construct that those items are designed to measure (Hair et al., 2010). There is construct validity if the measure behaves the way it is supposed to with a variety of other variables (Zikmund, 2003: 303). In addition, according to Sekaran (2003: 207), construct validity tested through convergent and discriminant validity. Convergent validity exists when two different scores and instruments measure the same concept through some highly correlated means. While discriminant validity exists, two separate scores are predicted to be distinct and uncorrelated and are found to be uncorrelated and distinct (Sekaran, 2003). In short, this validity also means that individually measured items should represent only one construct. Therefore, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are used to determine the construct validity of the item in the questionnaire. Acceptable construct validity uses the size of the factor loading at greater than the 0.40 cut-off and statistically significant (Nunnally & Berstein, 1994).

Table 7: Results of Validity Testing

Variables	**Factor Loadings**
Firm Performance (FPM)	0.801 – 0.932
Technology Learning Capability (TLC)	0.627 – 0.856
Technology Acceptance Orientation (TAO)	0.709 – 0.899
Technology Innovation Focus (TIF)	0.764 – 0.838
Technology Exchange Competency (TEC)	0.751 – 0.931
Technology Change Awareness (TCA)	0.882 – 0.941
New Product Development (NPD)	0.821 – 0.908
Valuable Operational Improvement (VOI)	0.841 – 0.959
Outstanding Business Effectiveness (OBE)	0.789 – 0.886
Sustainable Organizational Competitiveness (SOC)	0.762 – 0.924
Proactive Business Policy (PBP)	0.802 – 0.869

Table 7: Results of Validity Testing (Continued)

Variables	Factor Loadings
Top Management Support (TMS)	0.814 – 0.946
Organizational Resource Availability (ORA)	0.752 – 0.876
Competitive Market Intensity (CMI)	0.714 – 0.949
Technology Growth Munificence (TGM)	0.767 – 0.886
Innovative Culture (INC)	0.653 – 0.895

As the results, Table 7 shows the results of factor loading of multi-item scales that illustrated the validity testing use the first 30 returned questionnaires. The construct validity of each item of all variable is loaded on a single factor and the range of factor loading is between 0.627 and 0.959 for EFA, and between 0.653 and 0.949 for CFA. These scales are greater than 0.4, which indicate construct validity acceptance (see Appendix B). Moreover, each of the items in a questionnaire is subjectively assessed by two related academic experts (see Appendix G) to ensure the content validity (see also Appendix A).

Reliability is the degree to which measures are free from error as a condition with repeatability or consistency (Trochim, 2006; Zikmund, 2003). The assessment of the degree of consistency is between multiple measurements of a variable (Hair et al., 2010). This research estimates the reliability indicator of each construct that confirms the degree of consistency between multiple measurements of a variable from Cronbach's alpha coefficient and item total correlation is used to test the internal consistency. The rationale for internal consistency is that all individual items should be measured from the same construction and thus be highly inter-correlated.

Cronbach's alpha coefficients is generally used as a measure to test the internal consistency of each constructs (Hair et al., 2010). The degree of internal consistency between the multiple variables shows that there are reliability (Hair et al., 2010). In internal consistency reliability which judged by estimating how well the items that reflect the same construct yield similar results (Trochim, 2006). A criterion of the agreement for acceptable Cronbach's alpha coefficient should not be lower than 0.70 (Hair et al., 2010; Nunnally & Bernstein, 1994).

Item total correlation is the correlation between particular indicator item and the sum of all other indicator items that used to consider each separate item of the construct (Hair et al., 2010). High correlations between the results of the multi-item measurements in the same construct indicate higher degrees of internal consistency (Zikmund & Babin, 2007). The acceptable value for item total correlation is set at more than 0.3 which indicates as good correlation and there is internal consistency (Nunnally & Bernstein, 1994).

In this research, the validity and reliability testing use the first 30 returned questionnaires. As shown on Table 8, the result of Cronbach's alpha coefficients and item total correlation are demonstrated. Cronbach's alpha is a range between 0.710 and 0.939, which exceeds 0.70, to indicate high reliability. Furthermore, the item total correlations are scaled from 0.396 to 0.917 in that all scales exceed 0.3. Thus, this research shows that the internal consistency is distinct the entire scale and item reliability is acceptable. More details of validity and reliability testing are showed in Appendix B.

Table 8: Results of Reliability Testing

Variables	**Item total correlation**	**Cronbach's Alpha**
Firm Performance (FPM)	0.721 – 0.894	0.939
Technology Learning Capability (TLC)	0.396 – 0.642	0.710
Technology Acceptance Orientation (TAO)	0.543 – 0.792	0.847
Technology Innovation Focus (TIF)	0.574 – 0.664	0.810
Technology Exchange Competency (TEC)	0.592 – 0.852	0.847
Technology Change Awareness (TCA)	0.790 – 0.892	0.923
New Product Development (NPD)	0.703 – 0.829	0.906
Valuable Operational Improvement (VOI)	0.722 – 0.917	0.903
Outstanding Business Effectiveness (OBE)	0.627 – 0.778	0.848
Sustainable Organizational Competitiveness (SOC)	0.611 – 0.846	0.871
Proactive Business Policy (PBP)	0.637 – 0.737	0.837

Table 8: Results of Reliability Testing (Continued)

Variables	Item total correlation	Cronbach's Alpha
Top Management Support (TMS)	0.696 – 0.889	0.907
Organizational Resource Availability (ORA)	0.548 – 0.756	0.809
Competitive Market Intensity (CMI)	0.531 – 0.896	0.849
Technology Growth Munificence (TGM)	0.616 – 0.749	0.837
Innovative Culture (INC)	0.463 – 0.756	0.794

Statistical Techniques

Before hypotheses testing, all of raw data was checked, encoded, and recorded in a data file. Afterward, the basis assumption of regression analysis and data examined is tested that involved checking linearity of phenomenon measured, constant variance of the error terms (Homoscedasticity), independence of the error term, normality of the error term distribution, and test of multicollinearity. Moreover, the results of assumption are illustrated in Appendix D. The statistical techniques composed of descriptive analysis, factor analysis, and variance inflation factors (VIF), correlation analysis, and multiple regression analysis that are mentioned as below.

Descriptive analysis. This technique is used to explore the data collected and provided basic verification data (Coakes, Steed, & Price, 2008) that is obtained from a demographic profile of the key informants in information and communication technology businesses as the sample. The descriptive statistical is analyzed by frequency and percentage of the entire research variables.

Factor analysis. Factor analysis is used to reduce a large number of variables to a smaller number of factors (Tabachnick & Fidell, 2001: 966). Therefore, factor scores are considered as independent variables to avoid higher correlation that causes multicollinearity problems, for predicting the dependent variables in multiple regressions.

Variance inflation factor (VIF). To deal with the multicollinearity problem, this research is employed a VIF and a tolerance value as indicators to indicate a high degree of multicollinearity among the multiple independent variables in the regression equation model. Regarding Hair and colleagues (2010), a tolerance value must be greater than 0.10 and the VIF should be less than 10, then multicollinearity is not a concern. In this research, an analysis of collinearity statistics indicates that range of VIF values is 1.031 – 4.793 and the tolerance value is 0.209 – 0.970, that there is no multicollinearity problem. More details of the results of multicollinearity testing is provided in Table 2D, 3D, and 4D (Appendix D).

Correlation analysis. The Pearson's correlation technique is illustrated to test the strength of linear dependence between two variables. In this research, the data is used to examine which is the interval level that can be used the Pearson correlation analysis. The correlation coefficient can vary between -1.00 to +1.00 which the direction of the relationship is indicated by the sign (Cohen et al., 2003). The values of one variable in the positive correlation will be increasing if the values of the other variable increased. On the other hand, the negative correlation, the values of one variable will be decreasing if the values of the other variable increased (Cohen et al., 2003). In this research, the relationship between each pair of variables or called the intercorrelations is represented on correlation matrix in Table 10 in the next chapter. A multicollinearity problem may be occurred when an independent variable is highly correlated with one or more of the other independent variables in a multiple regression equation (Hair et al., 2010). Accordingly, Hair and colleagues (2010) suggested that the correlation coefficient must not exceed 0.8 on the scales. Therefore, this research uses factor score of all variables to avoid the multicollinearity problem as mentioned above.

Multiple regression analysis. The Ordinary Least Squares (OLS) regression analysis is used to test all postulated hypotheses. Since both dependent and independent variables in this research are categorical data and interval data, the OLS is an appropriate method for examining the hypothesized relationships (Hair et al., 2010). As a result, all proposed hypotheses in this research are transformed into seventeen statistical equations. Each equation conforms to the hypothesis development described in the previous chapter. Moreover, the statistical equations are separated into two sections as follows.

The first section contains statistical equations examining the relationship among five dimensions of strategic technology transfer capability (technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness), new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. This research model of these relationships is represented as the equations are as below.

Equation 1: $NPD = \alpha_1 + \beta_1 TLC + \beta_2 TAO + \beta_3 TIF + \beta_4 TEC + \beta_5 TCA + \beta_6 FA + \beta_7 FS + \varepsilon_1$

Equation 2: $VOI = \alpha_2 + \beta_8 TLC + \beta_9 TAO + \beta_{10} TIF + \beta_{11} TEC + \beta_{12} TCA + \beta_{13} FA + \beta_{14} FS + \varepsilon_2$

Equation 3: $OBE = \alpha_3 + \beta_{15} TLC + \beta_{16} TAO + \beta_{17} TIF + \beta_{18} TEC + \beta_{19} TCA + \beta_{20} FA + \beta_{21} FS + \varepsilon_3$

Equation 4: $SOC = \alpha_4 + \beta_{22} TLC + \beta_{23} TAO + \beta_{24} TIF + \beta_{25} TEC + \beta_{26} TCA + \beta_{27} FA + \beta_{28} FS + \varepsilon_4$

Equation 5: $FPM = \alpha_5 + \beta_{29} TLC + \beta_{30} TAO + \beta_{31} TIF + \beta_{32} TEC + \beta_{33} TCA + \beta_{34} FA + \beta_{35} FS + \varepsilon_5$

Equation 6: $SOC = \alpha_6 + \beta_{36} NPD + \beta_{37} VOI + \beta_{38} OBE + \beta_{39} FA + \beta_{40} FS + \varepsilon_6$

Equation 7: $FPM = \alpha_7 + \beta_{41} SOC + \beta_{42} FA + \beta_{43} FS + \varepsilon_7$

The second section shows statistical equations examining the effects of the antecedent variables including proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology

growth munificence on each dimensions of strategic technology transfer capability. The influences of innovative culture, as a moderator, are also included as shown below.

Equation 8: $TLC = \alpha_8 + \beta_{44}PBP + \beta_{45}TMS + \beta_{46}ORA + \beta_{47}CMI + \beta_{48}TGM + \beta_{49}FA + \beta_{50}FS + \varepsilon_8$

Equation 9: $TAO = \alpha_9 + \beta_{51}PBP + \beta_{52}TMS + \beta_{53}ORA + \beta_{54}CMI + \beta_{55}TGM + \beta_{56}FA + \beta_{57}FS + \varepsilon_9$

Equation 10: $TIF = \alpha_{10} + \beta_{58}PBP + \beta_{59}TMS + \beta_{60}ORA + \beta_{61}CMI + \beta_{62}TGM + \beta_{63}FA + \beta_{64}FS + \varepsilon_{10}$

Equation 11: $TEC = \alpha_{11} + \beta_{65}PBP + \beta_{66}TMS + \beta_{67}ORA + \beta_{68}CMI + \beta_{69}TGM + \beta_{70}FA + \beta_{71}FS + \varepsilon_8$

Equation 12: $TCA = \alpha_{12} + \beta_{72}PBP + \beta_{73}TMS + \beta_{74}ORA + \beta_{75}CMI + \beta_{76}TGM + \beta_{77}FA + \beta_{78}FS + \varepsilon_{12}$

Equation 13: $TLC = \alpha_{13} + \beta_{79}PBP + \beta_{80}TMS + \beta_{81}ORA + \beta_{82}CMI + \beta_{83}TGM + \beta_{84}INC + \beta_{85}(INC * PBP) + \beta_{86}(INC * TMS) + \beta_{87}(INC * ORA) + \beta_{88}(INC * CMI) + \beta_{89}(INC * TGM) + \beta_{90}FA + \beta_{91}FS + \varepsilon_{13}$

Equation 14: $TAO = \alpha_{14} + \beta_{92}PBP + \beta_{93}TMS + \beta_{94}ORA + \beta_{95}CMI + \beta_{96}TGM + \beta_{97}INC + \beta_{98}(INC * PBP) + \beta_{99}(INC * TMS) + \beta_{100}(INC * ORA) + \beta_{101}(INC * CMI) + \beta_{102}(INC * TGM) + \beta_{103}FA + \beta_{104}FS + \varepsilon_{14}$

Equation 15: TIF = $\alpha_{15} + \beta_{105}PBP + \beta_{106}TMS + \beta_{107}ORA + \beta_{108}CMI + \beta_{109}TGM + \beta_{110}INC + \beta_{111}(INC * PBP) + \beta_{112}(INC * TMS) + \beta_{113}(INC * ORA) + \beta_{114}(INC * CMI) + \beta_{115}(INC * TGM) + \beta_{116}FA + \beta_{117}FS + \varepsilon_{15}$

Equation 16: TEC = $\alpha_{16} + \beta_{118}PBP + \beta_{119}TMS + \beta_{120}ORA + \beta_{121}CMI + \beta_{122}TGM + \beta_{123}INC + \beta_{124}(INC * PBP) + \beta_{125}(INC * TMS) + \beta_{126}(INC * ORA) + \beta_{127}(INC * CMI) + \beta_{128}(INC * TGM) + \beta_{129}FA + \beta_{130}FS + \varepsilon_{16}$

Equation 17: TCA = $\alpha_{17} + \beta_{131}PBP + \beta_{132}TMS + \beta_{133}ORA + \beta_{134}CMI + \beta_{135}TGM + \beta_{136}INC + \beta_{137}(INC * PBP) + \beta_{138}(INC * TMS) + \beta_{139}(INC * ORA) + \beta_{140}(INC * CMI) + \beta_{141}(INC * TGM) + \beta_{142}FA + \beta_{143}FS + \varepsilon_{17}$

Where;

TLC	=	Technology Learning Capability
TAO	=	Technology Acceptance Orientation
TIF	=	Technology Innovation Focus
TEC	=	Technology Exchange Competency
TCA	=	Technology Change Awareness
NPD	=	New Product Development
VOI	=	Valuable Operational Improvement
OBE	=	Outstanding Business Effectiveness
SOC	=	Sustainable Organizational Competitiveness
FPM	=	Firm Performance
PBP	=	Proactive Business Policy
TMS	=	Top Management Support
ORA	=	Organizational Resource Availability
CMI	=	Competitive Market Intensity
TGM	=	Technology Growth Munificence

INC	=	Innovative Culture
FA	=	Firm Age
FS	=	Firm Size
α	=	Constant
β	=	Regression Coefficient
ε	=	Error Term

Summary

This chapter summarizes the research methods used in the investigation for this research, from simple selection to data gathering, examining all constructs purposed in the conceptual model, and to answer the research questions. To be specific, there are four main parts in this chapter: (1) sample selection and data collection procedures, (2) measurement of variables, (3) verification of instrument, and (4) statistical techniques. A total list of 18,466 Thai information and communication technology firms were provided by Department of Business Development in Thailand. The key informants completing questionnaire are managing directors, managing partners or managers. Moreover, a valid and reliable questionnaire is the primary instrument of data collection. This chapter also provides the measurements of each construct in the model, which are based on the existing literature. For multiple regression analysis, testable seventeen statistical equations are formulated. Finally, a summary of the constructs' definitions and the operational explanation is given in Table 9.

Table 9: Definitions and Operational Variables of Constructs

Construct	Definition	Operational Variables	Scale Source
	Dependent variable		
Firm performance (FPM)	The perception of the firm to overall outcomes and goal achievement in both the financial and non-financial assessment over the long term	The outcomes of the firm that assess the degree to which firm have performance that is on target, profitability, market share, sales growth, customer satisfaction and effective operation	Lee (2010)
	Independent variables		
Technology learning capability (TLC)	The firm's ability to systematically develops the knowledge and skills of personnel in the organization that enables the operation and administration effectively	The degree of the encouragement personnel to study, train, and exchange about technological knowledge and skills for use in the operation within the firm	New Scale
Technology Acceptance Orientation (TAO)	The firm's requirement to take advantage of existing technologies which is adopted to operate appropriately for achieving goals of the organization	The level of the utilization, application, and association in useful and valuable technology to the operational process of the firm	New Scale
Technology innovation focus (TIF)	The firm's process of classifying and integrating the knowledge to generate the new technological functionality that enables for management of the organization success	The intention of the firm to allocate, create, and explore the new technology in the functional process constantly	New Scale

Table 9: Definitions and Operational Variables of Constructs (Continued)

Construct	Definition	Operational Variables	Scale Source
Independent variables (Con.)			
Technology exchange competency (TEC)	The firm's ability to manage the knowledge and skills in technological information, requisition, and requirement for two-way sharing which is mutually beneficial into the organization	The degree to which the firm is transferring, sharing, and combination of technology for working in the each unit together	New Scale
Technology change awareness (TCA)	The firm's perception explicitly which enables the technological advance and movement in order to provide the highest usefulness of the organization	The level of the firm to analyzes historical data and then predicts the future in order to understand emerging technologies	New Scale
Mediating variables			
New product development (NPD)	The process of thinking and creating a new product and service which outcomes of a specific process in order to achieve the business goals and objectives	The level of the firm's process to produce products and services which have characteristic that create a competitive advantage	Hertenstein and Platt (2000)
Valuable operational improvement (VOI)	The using of structured processes and procedures which make continuous development of the activities that bring benefits to the firm	The degree to which the firm develops and adapts the operational processes to modernize and more efficient	New Scale

Table 9: Definitions and Operational Variables of Constructs (Continued)

Construct	Definition	Operational Variables	Scale Source
		Mediating variables (Con.)	
Outstanding business effectiveness (OBE)	The firm's capability to achieve its goals and generates business growth, favorable and impressive than its competitors	The degree of the operational process excellence to achieve the business goals and objectives of the firm	New Scale
Sustainable organizational competitiveness (SOC)	The firm's ability of producing the right products and services at the right price and time to better serve the needs of our customers in the long run, more efficiently and more effectively than its competitors	The degree to which the firm has innovative products and services that are unique and different from competitors that continuous response to customer demand	New Scale
		Antecedent variable	
Proactive business policy (PBP)	The strategic planning characterized by an aggressive vision, multifaceted execution, and decision-making in preparing for the expected situations in the future to enhance competitiveness	The intention of the firm into seeking new opportunities created by the changes and developments in the operation and making radical product innovation	Droge, Calantone, and Harmancioglu (2008)
Top management support (TMS)	The involvement, interesting, understanding, and consideration of chief executive officer that makes operation effective until successful	The degree to which chief executive officer provides the direction, authority, and resources to encourage operational activities	Ifinedo (2008)

Table 9: Definitions and Operational Variables of Constructs (Continued)

Construct	Definition	Operational Variables	Scale Source
Antecedent variable(Con.)			
Organizational resource availability (ORA)	The accessibility of both tangible and intangible factors for supporting the performance of business processes to achieve firm's goals	The levels of sufficient and available resources that support strategy implementation and effective and efficient application of resources in the operation	Pansuppawatt and Ussahawanitchakit (2011)
Competitive market intensity (CMI)	The perception of the competitors' progression and changes in customer demand as a positive influence of operational effectiveness as driving firms to develop and improve administration more efficiently	The level of evaluation in the business competition relative to new and existing competitors and customer requirements that impact on the organizational development process	Myers, Daugherty, and Autry (2000)
Technology growth munificence (TGM)	The perception of the progressive technological development within industry that jointly creates superior result and outcome	The degree of the progress and forward change of technology that applied to facilitate business operations and processes	Sriboonlue (2015)
Moderating variables			
Innovative culture (INC)	The firm's orientation toward experimenting with new alternatives or approaches by exploring new resources, breaking through existing norms, and creating new operation to improve its performance	The degree to which the firm creates an environment where innovation thrives that makes the new operation different from the original	Wei et al. (2013)

Table 9: Definitions and Operational Variables of Constructs (Continued)

Construct	Definition	Operational Variables	Scale Source
		Control variables	
Firm age (FA)	Numbers of years that firm operates in business	Dummy variable 0 = below and equal to 15 years, 1 = higher than 15 years	Delmotte and Sels (2008)
Firm size (FS)	Numbers of full-time employees are currently working	Dummy variable 0 = less than 10 persons, 1 = equal and higher than 10 persons	Waranantakul et al. (2013)

CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents the survey data analyses and the hypothesis testing results. The content is organized as follows. Firstly, the respondent characteristics, sample characteristics, and correlation analysis along with mean and standard deviation of each construct in the conceptual model are detailed. Secondly, the hypothesis testing and the results are presented. Finally, the summary of all hypotheses testing is included.

Respondent Characteristics and Descriptive Statistics

The prior chapter explains the target population that is 1,880 information and communication technology businesses in Thailand for this study. The unit of analysis is the business organization, operating as either company or partnership. The respondents, the key informants are the managing director, managing partner, or manager of the organization who have comprehensive knowledge relevant to firm characteristics, strategy, and performance.

Respondent Characteristics

The respondent characteristics are illustrated by the demographic characteristics, including gender, age, marital status, education level, working experience, average monthly income, and current position. The demographic characteristics of respondents from 286 information and communication technology businesses are detailed in Table 10 as the following. More than half of respondents are male (52.80 percent). The range of age of respondents is more than 50 years old (38.11 percent). The marital status of respondents is generally married (67.48 percent). Approximately 61.54 percent of respondents have a bachelor's degree or lower. Moreover, the most of respondents have working experiences more than 15 years (74.12 percent). A total of 52.10 percent has the average monthly income less than 100,000 baht. Finally, 51.75 percent of the respondents hold the current position of managing directors.

Table 10: Key Participant Characteristics

Description	Categories	Frequency	Percentage
Gender	Male	151	52.80
	Female	135	47.20
	Total	286	100.00
Age	Less than 30 years old	19	6.64
	30 – 40 years old	59	20.63
	41 – 50 years old	99	34.62
	More than 50 years old	109	38.11
	Total	286	100.00
Marital Status	Single	82	28.67
	Married	193	67.48
	Divorced/Separated	11	3.85
	Total	286	100.00
Level of Education	Bachelor's degree or lower	176	61.54
	Higher than Bachelor's degree	110	38.46
	Total	286	100.00
Work Experience	Less than 5 years	11	3.85
	5 – 10 years	30	10.49
	11 – 15 years	33	11.54
	More than 15 years	212	74.12
	Total	286	100.00
Average Monthly Income	Less than 100,000 Baht	149	52.10
	100,000 – 125,000 Baht	49	17.13
	125,001 – 150,000 Baht	14	4.90
	More than 150,000 Baht	74	25.87
	Total	286	100.00
Current Position	Managing director	148	51.75
	Managing partner	36	12.59
	Manager	102	35.66
	Total	286	100.00

Firm Characteristics

This research obtains the demographic characteristic from 286 information and communication technology businesses that responded to the survey questionnaire as the following. The most of firm respondents have registered as company limited (81.47 percent) and are located in Bangkok (47.90 percent). The majority of business ownership is Thai affairs (94.41 percent). In addition, the firm respondents have less than 25,000,000 baht of the operational capital (76.92 percent) as well as the average annual revenue (60.49 percent). Approximately 79.72 percent of firm respondents have been operating in the business more than 15 years. The number of full-time employees is between 10 – 50 employees at 51.05 percent. More details on the firm characteristics of the respondents are provided in Table 11.

Table 11: Demographic Characteristics of Information and Communication Technology Firms

Description	Categories	Frequency	Percentage
Business Model	Limited Companies	233	81.47
	Partnership	53	18.53
	Total	286	100.00
Business Location	Bangkok	137	47.90
	Northern Region	36	12.59
	Central Region	35	12.24
	Northeastern Region	20	6.99
	Eastern Region	12	4.20
	Western Region	24	8.39
	Southern Region	22	7.69
	Total	286	100.00
Business Ownership	Thai Affairs	270	94.41
	Foreign Affairs	16	5.59
	Total	286	100.00

Table 11: Demographic Characteristics of Information and Communication Technology firms (Continued)

Description	Categories	Frequency	Percentage
Operational Capital	Less than 25,000,000 Baht	220	76.92
	25,000,000 – 50,000,000 Baht	41	14.34
	50,000,001 – 75,000,000 Baht	9	3.15
	More than 75,000,000 Baht	16	5.59
	Total	286	100.00
Periods of Time in Business	Less than 5 years	2	0.70
	5 – 10 years	13	4.55
	11 – 15 years	43	15.03
	More than 15 years	228	79.72
	Total	286	100.00
Number of Full-Time Employees	Less than 10 employees	112	39.16
	10 – 50 employees	146	51.05
	51 – 100 employees	12	4.20
	More than 100 employees	16	5.59
	Total	286	100.00
Firm's Average Revenues per Years	Less than 25,000,000 Baht	173	60.49
	25,000,000 – 50,000,000 Baht	68	23.78
	50,000,001 – 75,000,000 Baht	18	6.29
	More than 75,000,000 Baht	27	9.44
	Total	286	100.00

Correlation Analysis

In this research, a bivariate correlation analysis of Pearson Correlation is employed on all variables in order to explore the relationships among variables and to verify the multicollinearity problem in multiple regression assumption. According to Hair et al. (2010), when inter-correlation between independent variables exceeds 0.80, it is likely that a multicollinearity problem will occur. The bivariate correlation procedure is subject to a two-tailed test of statistical significance at 2 levels: $p < 0.05$

and $p < 0.01$. The results of the correlation analysis of all variables are presented in Table 12.

As shown in the Table 12, the correlation of the dimensions of strategic technology transfer capability including 1) technology learning capability, 2) technology acceptance orientation, 3) technology innovation focus, 4) technology exchange competency, and 5) technology change awareness that is between 0.376 and 0.611 ($p < 0.01$). All the five dimensions of strategic technology transfer capability is related positively significant to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance ($r = 0.221 – 0.642$, $p < 0.01$). Moreover, the firm outcomes comprising new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness are also strongly correlated to firm performance ($r = 0.607 – 0.637$, $p < 0.01$). Likewise, all the antecedents containing proactive business policy, top management support, organizational resource availability, competitive market intensity, technology growth munificence are positively correlated to each of the five dimensions of strategic technology transfer capability ($r = 0.292 – 0.546$, $p < 0.01$). For the moderator, innovative culture has positive correlations with all other variables ($r = 0.362 – 0.607$, $p < 0.01$). Consequently, the results of correlation between the same levels of variables indicate that all relevant bivariate correlation values do not exceed 0.8. Therefore, this research is no multicollinearity problem.

Table 12: Descriptive Statistics and Correlation Matrix of Strategic Technology Transfer Capability and All Constructs

Variables	TLC	TAO	TIF	TEC	TCA	NPD	VOI	OBE	SOC	FPM	PBP	TMS	ORA	CMI	TGM	INC	FA
Mean	4.256	4.279	4.146	4.234	4.187	4.011	4.098	4.041	4.000	3.918	4.138	4.168	4.146	4.266	4.212	4.115	N/A
S.D.	0.464	0.469	0.539	0.494	0.479	0.567	0.507	0.540	0.569	0.611	0.488	0.497	0.485	0.489	0.486	0.485	N/A
TAO	.426***																
TIF	.456***	.484***															
TEC	.376***	.486***	.579***														
TCA	.475***	.505***	.611***	.595***													
NPD	.373***	.401***	.524***	.454***	.466***												
VOI	.414***	.321***	.503***	.438***	.448***	.625***											
OBE	.303***	.260***	.430***	.370***	.307***	.526***	.663***										
SOC	.304***	.221***	.441***	.346***	.350***	.642***	.640***	.621***									
FPM	.289***	.284***	.447***	.402***	.404***	.613***	.607***	.631***	.637***								
PBP	.353***	.320***	.546***	.475***	.496***	.500***	.507***	.437***	.445***	.508***							
TMS	.397***	.401***	.517***	.455***	.511***	.510***	.528***	.422***	.494***	.535***	.677***						
ORA	.385***	.292***	.475***	.335***	.491***	.330***	.387***	.344***	.368***	.403***	.422***	.534***					
CMI	.339***	.337***	.402***	.334***	.473***	.306***	.307***	.244***	.237***	.325***	.445***	.450***	.458***				
TGM	.367***	.411***	.415***	.414***	.457***	.295***	.265***	.262***	.288***	.314***	.463***	.491***	.431***	.593***			
INC	.376***	.362***	.456***	.450***	.526***	.397***	.502***	.403***	.419***	.433***	.560***	.607***	.556***	.474***	.452***		
FA	.087	.040	.051	.097	.000	.056	-.017	.020	.084	.021	.066	.101	-.052	.025	.022	.044	
FS	.133**	.083	.133**	.176***	.115	.161***	.162***	.119**	.144**	.170***	.153***	.194***	.009	.095	.131**	.112	.112

N = 286, *** Correlation is significant at the 0.01 level (2-tailed), ** Correlation is significant at the 0.05 level (2-tailed)

Hypotheses Testing and Results

In this research, the Ordinary Least Squares (OLS) regression analysis is employed for the investigation of the hypothesized relationships. The regression equation is a linear combination of the independent variables that are considered to best explain and predict the dependent variable. Also, two control variables, firm age and firm size, are included in the equations as dummy variables. In total, there are seventeen equations to be examined in this research. The results of descriptive statistics and hypotheses testing are discussed according to regression equations as follows:

The Effects of Strategic Technology Transfer Capability on Its Consequences

As shown in Figure 6, the relationship among each dimension of strategic technology transfer capability, its outcomes, and firm performance are proposed in Hypotheses 1(a-e) – 5(a-e). The effect of each hypothesis is proposed in a positive relationship direction. For testing of these hypotheses, a set of regression equations is developed: Equations 1, 2, 3, 4, and 5.

Figure 6: The Results of the Effects of Strategic Technology Transfer Capability on Its Consequences

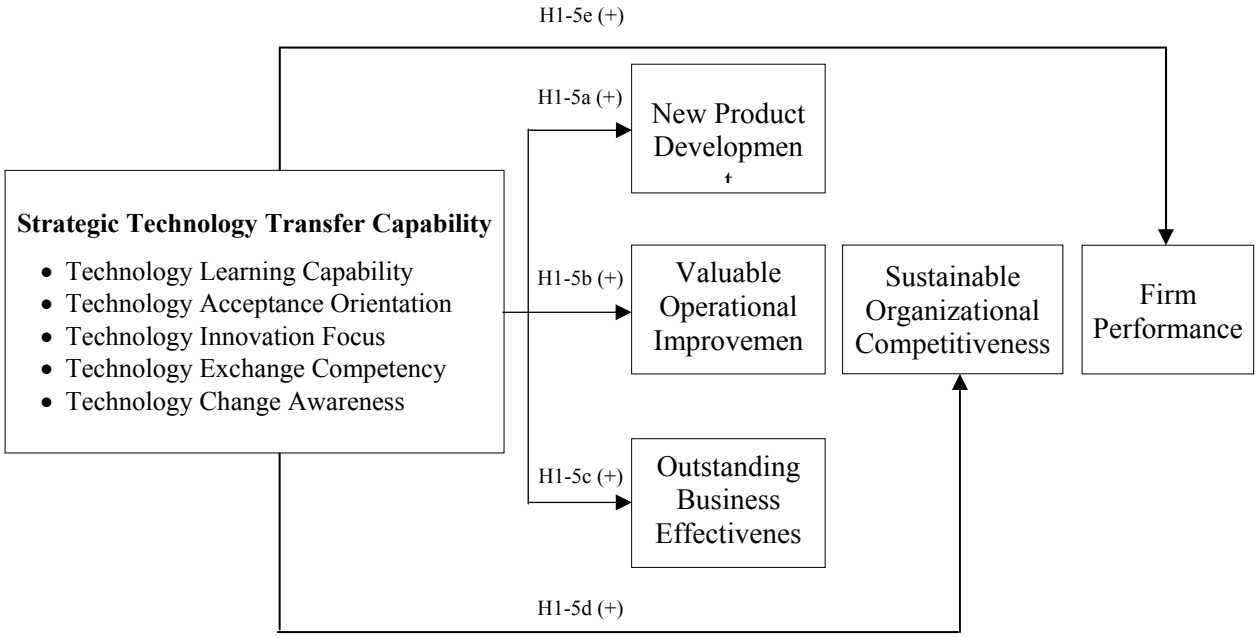


Table 13: Descriptive Statistics and Correlation Matrix of Strategic Technology Transfer Capability and Its Consequences

Variable	TLC	TAO	TIF	TEC	TCA	NPD	VOI	OBE	SOC	FPM	FA
Mean	4.256	4.279	4.146	4.234	4.187	4.011	4.098	4.041	4.000	3.918	N/A
S.D.	0.464	0.469	0.539	0.494	0.479	0.567	0.507	0.540	0.569	0.611	N/A
TAO	.426***										
TIF	.456***	.484***									
TEC	.376***	.486***	.579***								
TCA	.475***	.505***	.611***	.595***							
NPD	.373***	.401***	.524***	.454***	.466***						
VOI	.414***	.321***	.503***	.438***	.448***	.625***					
OBE	.303***	.260***	.430***	.370***	.307***	.526***	.663***				
SOC	.304***	.221***	.441***	.346***	.350***	.642***	.640***	.621***			
FPM	.289***	.284***	.447***	.402***	.404***	.613***	.607***	.631***	.637***		
FA	.087	.040	.051	.097	.000	.056	-.017	.020	.084	.021	
FS	.133**	.083	.133**	.176***	.115	.161***	.162***	.119**	.144**	.170***	.112

N = 286, *** Correlation is significant at the 0.01 level (2-tailed),

** Correlation is significant at the 0.05 level (2-tailed)

Table 13 demonstrates the correlations coefficients among each dimension of strategic technology transfer capability and its consequences, including new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. From the table, the first dimension of strategic technology transfer capability (STTC), technology learning capability is significantly and positively correlated to new product development ($r = 0.373$, $p < 0.01$), valuable operational improvement ($r = 0.414$, $p < 0.01$), outstanding business effectiveness ($r = 0.303$, $p < 0.01$), sustainable organizational competitiveness ($r = 0.304$, $p < 0.01$), and firm performance ($r = 0.289$, $p < 0.01$). For the second dimension of STTC, technology acceptance orientation has a significant and positive correlation with new product development ($r = 0.401$, $p < 0.01$), valuable operational improvement ($r = 0.321$, $p < 0.01$), outstanding business effectiveness ($r = 0.260$, $p < 0.01$), sustainable organizational competitiveness ($r = 0.221$, $p < 0.01$), and firm performance ($r = 0.284$, $p < 0.01$). For the third dimension of STTC, technology innovation focus is related positively to new product development ($r = 0.524$, $p < 0.01$), valuable operational improvement ($r = 0.503$, $p < 0.01$), outstanding business effectiveness ($r = 0.430$,

$p < 0.01$), sustainable organizational competitiveness ($r = 0.441$, $p < 0.01$), and firm performance ($r = 0.447$, $p < 0.01$). For the fourth dimension of STTC, technology exchange competency is also related positively to new product development ($r = 0.454$, $p < 0.01$), valuable operational improvement ($r = 0.438$, $p < 0.01$), outstanding business effectiveness ($r = 0.370$, $p < 0.01$), sustainable organizational competitiveness ($r = 0.346$, $p < 0.01$), and firm performance ($r = 0.402$, $p < 0.01$). Finally, the fifth dimension, technology change awareness is found significantly and positively related to new product development ($r = 0.466$, $p < 0.01$), valuable operational improvement ($r = 0.448$, $p < 0.01$), outstanding business effectiveness ($r = 0.307$, $p < 0.01$), sustainable organizational competitiveness ($r = 0.350$, $p < 0.01$), and firm performance ($r = 0.404$, $p < 0.01$). From the findings in Table 13, the correlations are less than 0.80 as recommended by Hair and colleagues (2010). In addition, Table 14 also suggests that the maximum value of variance inflation factor (VIF) is 2.046, which is lower than the cut-off score of 10 (Hair et al., 2010). Both correlations and VIF ensure the non-existence of multicollinearity problems for regression analysis of Equations 1 – 5.

The results of OLS regression analysis for the Equations 1, 2, 3, 4, and 5 are presented in Table 14. For the first equation, four out of five independent variables are found to be significantly positively affected the dependent variable, new product development: technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. For Equation 2, valuable operational improvement is found to be positively influenced by three independent variables: technology learning capability, technology innovation focus, and technology exchange competency. For Equation 3, similar to Equation 2, outstanding business effectiveness is significantly affected by exactly the same three variables: technology learning capability, technology innovation focus, and technology exchange competency. For Equation 4, there are two independent variables that have significant positive effect on sustainable organizational competitiveness: technology learning capability and technology innovation focus. For Equation 5, firm performance is positively influenced by three independent variables: technology innovation focus, technology exchange competency, and technology change awareness.

Table 14: Results of Regression Analysis for the Effects of Strategic Technology Transfer Capability on Its Consequences

Independent Variables	Dependent Variables				
	NPD	**VOI**	**OBE**	**SOC**	**FPM**
	Equation 1	**Equation 2**	**Equation 3**	**Equation 4**	**Equation 5**
Strategic Technology Transfer Capability					
Technology Learning Capability (TLC: H1a-e)	.088 (.058)	**.189***** **(.059)**	**.119*** **(.064)**	**.106*** **(.063)**	.047 (.062)
Technology Acceptance Orientation (TAO: H2a-e)	**.101*** **(.061)**	-.020 (.061)	-.001 (.066)	-.069 (.066)	-.001 (.065)
Technology Innovation Focus (TIF: H3a-e)	**.279***** **(.067)**	**.268***** **(.068)**	**.295***** **(.074)**	**.310***** **(.073)**	**.248***** **(.072)**
Technology Exchange Competency (TEC: H4a-e)	**.126*** **(.066)**	**.153**** **(.067)**	**.172**** **(.072)**	.098 (.072)	**.149**** **(.071)**
Technology Change Awareness (TCA: H5a-e)	**.121*** **(.069)**	.105 (.070)	-.036 (.076)	.079 (.075)	**.132*** **(.074)**
Firm Age (FA)	.026 (.122)	-.172 (.123)	-.065 (.134)	.112 (.133)	-.050 (.131)
Firm Size (FS)	.137 (.102)	.146 (.103)	.084 (.111)	.128 (.110)	**.188*** **(.109)**
Adjusted R^2	**.328**	**.317**	**.200**	**.209**	**.233**
F-Statistic	**20.858**	**19.858**	**11.164**	**11.726**	**13.400**
Durbin-Watson	**1.832**	**2.016**	**1.908**	**1.792**	**2.122**
Maximum VIF	**2.046**	**2.046**	**2.046**	**2.046**	**2.046**

Beta coefficients with standard in parenthesis. ***p<0.01, **p<0.05, *p<0.10

The results from these five equations are used to determine Hypotheses 1 – 5 to which the proposed hypotheses are supported. Firstly, the first hypothesis proposes that technology learning capability is positively related to new product development,

valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The results indicate that technology learning capability, the first dimension, has a positive effect on valuable operational improvement ($\beta_8 = 0.189$, $p < 0.01$), outstanding business effectiveness ($\beta_{15} = 0.119$, $p < 0.10$), and sustainable organizational competitiveness ($\beta_{22} = 0.106$, $p < 0.10$). There is research found that the greater the capability of organizational knowledge creation to which is the technology learning capability, effect of the greater the execution new technology of organization function to which namely valuable operational improvement (Sutanto, 2017). In addition, the results from empirical research of Thai accounting firms indicated that organizational learning capability to which only managerial commitment that has a significant direct impact on organizational effectiveness (Ussahawanitchakit, 2008). Moreover, they are found that organizational learning capability is a very important and complicated resource which can create competitive advantages (Hsu & Fang, 2009; Hunt & Morgan, 1995). ***Thus, Hypotheses 1b, 1c, and 1d are supported.***

However, these results do not find the significant effect of technology learning capability on new product development ($\beta_1 = 0.088$, $p > 0.10$) and firm performance ($\beta_{29} = 0.047$, $p > 0.10$). It is possible that firms emphasize the technology learning capability for training and development too much because employees may have less ability and skill. This is consistent with the research of Jabar, Soosay, and Santa (2011) who found that organization learning which includes R&D; training and formal education of employees is not significant effect skills in Malaysian firms to undertake new product development. According to Sapienza et al. (2006), suggested that the younger firms as emphasized learning is able to decrease the probability of growth and did not assess the potential threats to survival, for this reason, technology learning capability does not affect to firm performance in information and communication technology firms to which establish new business easier. ***Thus, Hypotheses 1a and 1e are not supported.***

Secondly, the second hypothesis proposes that technology acceptance orientation is positively related to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The result finds that technology acceptance

orientation, the second dimension, only positively affects new product development ($\beta_2 = 0.101$, $p < 0.10$). This result is corresponding to the finding of Leng and colleagues (2015) who found that firm's technology orientation brings about new product development which makes it be the market leader. Besides, the investigation of Chinese firms, a strong technological orientation affects new product development that the firm's innovation superior to the competition (Jeong et al., 2006). ***Thus, Hypothesis 2a is supported.***

In contrast, these results do not find the significant effects of technology acceptance orientation on valuable operational improvement ($\beta_9 = -0.020$, $p > 0.10$), outstanding business effectiveness ($\beta_{16} = -0.001$, $p > 0.10$), sustainable organizational competitiveness ($\beta_{23} = -0.069$, $p > 0.10$), and firm performance ($\beta_{30} = -0.001$, $p > 0.10$). It is possible that the firm's technology acceptance orientation is considered as technological advance which firms must allocate more resources to mediate through new product development, more than the direct effect to another performance such as operational, effectiveness, and competitiveness. This is consistent with Al-Ansari, Altalib, and Sardoh (2013) who showed the result that technology orientation of SMEs in Dubai has a weak effect on business performance and also indicates the innovation to which derived from new product development plays mediating role between technology orientation and business performance. Moreover, there is evidence of a non-monotonic effect of technology on China's firm performance, which found that technological turbulence is moderating effect (Gao, Zhou, & Yim, 2007). It implies that the relationship between technology acceptance orientation and firm performance including valuable operational improvement, outstanding business effectiveness, and sustainable organizational competitiveness that will be mediated through new product development. ***Thus, Hypotheses 2b, 2c, 2d, and 2e are not supported.***

Thirdly, the third hypothesis proposes that technology innovation focus is positively related to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The result indicates that technology innovation focus, the third dimension, positively influences all five outcomes: new product development ($\beta_3 = 0.279$, $p < 0.01$), valuable operational improvement ($\beta_{10} = 0.268$, $p < 0.01$), outstanding business effectiveness ($\beta_{17} = 0.295$, $p < 0.01$), sustainable organizational competitiveness

(β_{24} = 0.310, p < 0.01), and firm performance (β_{31} = 0.248, p < 0.01). In terms of technology innovation focus, and according to Akiike (2014), it can provide the results indicate that technology innovation enhances new product to appearances and user friendliness, as well as, adds new functionality to operational improvement. This is consistent with the result of Rubera and Droge (2013) and Talke et al. (2009) who found that technology innovation has a positive impact on organizational competitiveness through improvements of technological functionality. In addition, the empirical study of Hong Kong manufacturing industries is found that a firm with greater technology innovation capabilities is able to achieve higher levels of organizational effectiveness (Yam et al., 2011). Moreover, it gains higher firm performance when it has technology innovation focus in the firm (Mumford, 2000; Rubera & Droge, 2013, Yam et al., 2011). ***Thus, Hypotheses 3a, 3b, 3c, 3d, and 3e are strongly supported.*** Fourthly, the fourth hypothesis proposes that technology exchange competency is positively related to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The results show that technology exchange competency, the fourth dimension, has a positive effect on four outcomes: new product development (β_4 = 0.126, p < 0.10), valuable operational improvement (β_{11} = 0.153, p < 0.05), outstanding business effectiveness (β_{18} = 0.172, p < 0.05), and sustainable organizational competitiveness (β_{32} = 0.149, p < 0.05). This finding is consistent with Thomas (2013) who investigated manufacturing firm in U.S. that there is a significant and positive relationship between knowledge exchange address computer-mediated communication channels and new product development as both effective and efficient. According to Paulraj, Lado, and Chen (2008), found that the exchange of knowledge in information technology affects to enhance the operational process of supply chain partner. Likewise, the firm has ultimately the supply chain to remain competitive when it is information gathering and sharing of new knowledge that is the exchange competency (McCarter et al., 2005). Moreover, it also found that the facilitated knowledge exchange and combination has predicted firm performance from new products and services' revenue and sales growth (Collins & Smith, 2006). ***Thus, Hypotheses 4a, 4b, 4c, and 4e are supported.***

However, this research does not find a significant effect of technology exchange competency on sustainable organizational competitiveness (β_{25} = 0.098, p > 0.10). The

possible explanation of this relationship is relevant to the management of knowledge exchange to be used by the organizations to ensure whether they are making the right decision or not in competition. It is consistent with the results that indicated indirect effect of information technology on performance. It suggests that facilitating communication and information technology may engender competitive advantage by easing the flow and exchange of knowledge and other idiosyncratic, relationship-specific assets (Paulraj, Lado, and Chen, 2008). ***Thus, Hypothesis 4d is not supported.***

Finally, the fifth hypothesis proposes that technology change awareness is positively related to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The result indicates that technology change awareness, the fifth dimension, positively and significantly affects new product development ($\beta_5 = 0.121$, $p < 0.10$) and firm performance ($\beta_{33} = 0.132$, $p < 0.10$). According to the research of Tatikonda and Stock (2003), the fit in technology change with interactions between organizations positively impacts the efficient development of new products. It is consistent with the empirical research that indicated the change needed by the organization in technology effect for more innovation, which was new products or services as being developed by the organization (Sutanto, 2017). Likewise, firm performance is also found affected positively by technology change awareness. It means that the firm is able to make technological advances; it will result in better performance. Consistent with the prior research indicated that the awareness of technological changes to innovation in Dubai's SMEs were enabled to gain better firm performance (Al-Ansari et al., 2013). ***Thus, Hypotheses 5a and 5e are supported.***

However, this research does not find a significant effect of technology change awareness on valuable operational improvement ($\beta_{12} = 0.105$, $p > 0.10$), outstanding business effectiveness ($\beta_{19} = -0.036$, $p > 0.10$), and sustainable organizational competitiveness ($\beta_{26} = 0.079$, $p > 0.10$). It is possible that technological change of organization may not be believed by some employees. This is consistent with the suggestion of Ghobakhloo et al. (2012) who explained that some employees may not believe that change or improvement of business functionality through new technology systems. ***Thus, Hypotheses 5b, 5c, and 5d are not supported.***

Additionally, the results of control variables, in this research, indicate that firm age is not related to new product development (β_6 = 0.026, p > 0.10), valuable operational improvement (β_{13} = -0.172, p > 0.10), outstanding business effectiveness (β_{20} = -0.065, p > 0.10), sustainable organizational competitiveness (β_{27} = 0.112, p > 0.10), and firm performance (β_{34} = -0.050, p > 0.10). It mean that the firm as a longer period of time registered on Department of Business Development of Thailand, does not significantly affect the level of firm outcome. Although the literature review in the foreign context found that the period of time in business has an impact on firm performance and sustainability, the results in this research indicate that firm age is not significant, one possible reason is to which in Thailand context. This implied that both young and old firms must have to adapt to technological change in a highly competitive business environment in order to greater outcome of operational. Therefore, the relationship among strategic technology transfer capability's dimension, new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance are not influenced by firm age.

Moreover, this results found that firm size does not have significant relationship with new product development (β_7 = 0.137, p > 0.10), valuable operational improvement (β_{14} = 0.146, p > 0.10), outstanding business effectiveness (β_{21} = 0.084, p > 0.10), and sustainable organizational competitiveness (β_{28} = 0.128, p > 0.10). Otherwise, the result of Equation 5 which finds that firm size is significant positive effect to firm performance (β_{35} = 0.188, p < 0.10). Therefore, firm size has a direct effect on firm performance only. It can be interpreted that Thai information and communication technology firms represent a large firm which has more full-time employees is higher firm performance than other firms with fewer employees. This is consistent with the research of internationalization strategy of Chinese information technology companies in a complex network, which firm performance as financial leverage is found to have a positive effect on firm size (Da & Ken, 2015).

The Effects of New Product Development, Valuable Operational Improvement, Outstanding Business Effectiveness, and Sustainable Organizational Competitiveness, on Firm Performance

As shown in Figure 7, the relationship among the consequences of strategic technology transfer capability are proposed in Hypotheses 6 – 9. The effect of each hypothesis is proposed in a positive relationship direction. For testing of these hypotheses, a set of regression equations is developed: Equations 6 and 7.

Figure 7: The Results of the Effects of Strategic Technology Transfer Capability Consequents on Firm Performance

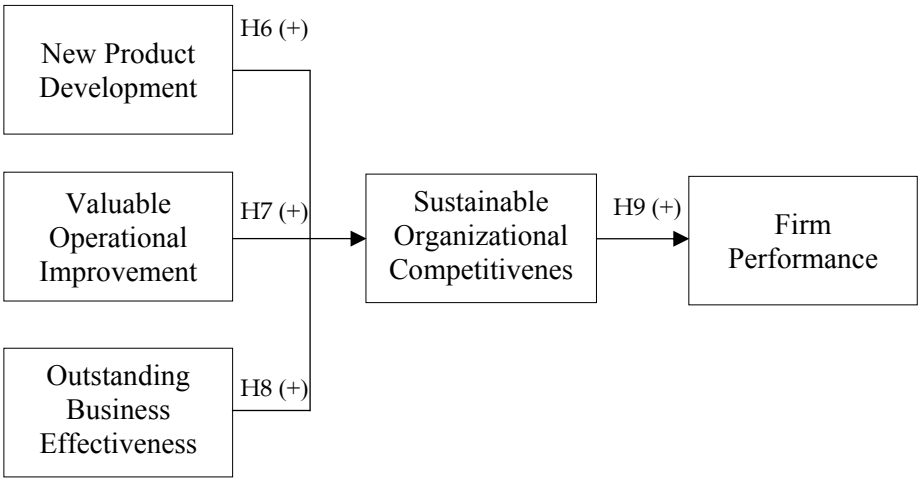


Table 15 demonstrates the correlation matrix of new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The results show the positive correlation between new product development and sustainable organizational competitiveness ($r = 0.642$, $p < 0.01$). Similarly, valuable operational improvement has a significant and positive correlation with sustainable organizational competitiveness ($r = 0.640$, $p < 0.01$). Outstanding business effectiveness is related positively to sustainable organizational competitiveness ($r = 0.621$, $p < 0.01$). Furthermore, sustainable organizational competitiveness is found significantly and positively related to firm performance ($r = 0.637$, $p < 0.01$). From the finding in Table 15, it can be realized that

none of the stated correlations is over level 0.8 as recommended by Hair and colleagues (2010).

Table 15: Descriptive Statistics and Correlation Matrix of Strategic Technology Transfer Capability Consequents and Firm Performance

Variable	NPD	VOI	OBE	SOC	FPM	FA
Mean	4.011	4.098	4.041	4.000	3.918	N/A
S.D.	0.567	0.507	0.540	0.569	0.611	N/A
VOI	.625***					
OBE	.526***	.663***				
SOC	.642***	.640***	.621***			
FPM	.613***	.607***	.631***	.637***		
FA	.056	-.017	.020	.084	.021	
FS	.161***	.162***	.119**	.144**	.170***	.112

N = 286, *** Correlation is significant at the 0.01 level (2-tailed),

** Correlation is significant at the 0.05 level (2-tailed)

In a similar manner, Table 16 indicates that the maximum value of variance inflation factor (VIF) is 2.222 in Equation 6, and 1.032 in Equation 7, which is lower than the cut-off score of 10 as recommended by Hair and Colleagues (2010). Both correlations and the VIF ensure the non-existence of multicollinearity problems for regression analysis.

The results of OLS regression analysis for Equations 6 and 7 are presented in Table 16. For Equation 6, sustainable organizational competitiveness is significantly and positively influenced by all independent variables: new product development, valuable operational improvement, and outstanding business effectiveness. For Equation 7, firm performance is positively affected by sustainable organizational competitiveness.

The results from Table 16 are used to consider Hypotheses 6 – 9 to which the proposed hypotheses are supported. The sixth hypothesis proposes that new product development is positively related to sustainable organizational competitiveness. The result indicates that new product development has a significant and positive effect on sustainable organizational competitiveness ($\beta_{36} = 0.338$, $p < 0.01$). The finding is

consistent with Loch, Stein, and Terwiesch (1996) who indicated that the successful new product related to sustainable competitive advantage of electronic businesses. It can be implied that new product development has received a great deal of importance in the strategy literature, and is a strong capability that can improve overall organizational performance (Li & Calantone, 1998). Also, the effective development of new products continues to be a critical business activity as firms, both large and small, struggle to acquire or sustain competitive advantage (Sajid et al., 2015). ***Thus, Hypothesis 6 is strongly supported.***

Table 16: Results of Regression Analysis for the Effects among Consequences of Strategic Technology Transfer Capability

Independent Variables	**Dependent Variables**	
	SOC	**FPM**
	H6-8	**H9**
	Equation 6	**Equation 7**
New Product Development (NPD: H6)	**.338***** **(.052)**	
Valuable Operational Improvement (VOI: H7)	**.243***** **(.060)**	
Outstanding Business Effectiveness (OBE: H8)	**.279***** **(.054)**	
Sustainable Organizational Competitiveness (SOC: H9)		**.629***** **(.046)**
Firm Age (FA)	.154 (.100)	-.101 (.114)
Firm Size (FS)	.020 (.084)	**.173*** **(.095)**
Adjusted R^2	**.544**	**.408**
F-Statistic	**69.067**	**66.445**
Durbin-Watson	**2.101**	**2.226**
Maximum VIF	**2.222**	**1.032**

Beta coefficients with standard in parenthesis. ***p<0.01, **p<0.05, *p<0.10

Next, the seventh hypothesis states the positive relationship between valuable operational improvement and sustainable organizational competitiveness. The results show that valuable operational improvement is positively sustainable organizational competitiveness (β_{37} = 0.243, p < 0.01). The finding is consistent with Demeter (2014) who described the important of changes and actions to which improve the total operational performance that affects to organizational competitiveness. It is implied that business can improve firms' operational processes, which ultimately lead to enhanced competitive advantage (Christmann, 2000; McWilliams & Siegel, 2001). It is found that the positive operational performance implications on costs, quality of supplied products and security of supply available from concerted sustainable supply management capabilities provide further rationale to become engaged and affected to sustainable competitive advantage (Reuter et al., 2010). ***Thus, Hypothesis 7 is strongly supported.***

For the eighth hypothesis, outstanding business effectiveness is positively related to sustainable organizational competitiveness. The finding indicates that outstanding business effectiveness has a positively affected by sustainable organizational competitiveness (β_{38} = 0.279, p < 0.01). This finding is consistent with Ray, Barney, and Muhanna (2004) who indicated that the effectiveness of business has relationship with competition of organization in long-term. It is argued that business with the effective management of stakeholder relationships can generate persistence of superior financial performance over the longer-term, which performs firms to sustainable competitive advantage (Choi & Wang, 2009). ***Thus, Hypothesis 8 is strongly supported.***

Lastly, the ninth hypothesis proposed that sustainable organizational competitiveness will have a positive effect on firm performance. The results also show that sustainable organizational competitiveness has a strong and positive effect on firm performance (β_{41} = 0.629, p < 0.01). This finding is consistent with Wiklund and Shepherd (2005) who indicated that there was a relationship between competitiveness and performance of the firm. According to Eccles, Ioannou, and Serafeim (2014) who investigated the impact of corporate sustainability on organizational processes and performance in U.S. companies found that corporations that voluntarily adopted sustainability policies are high sustainability companies. In addition, early study stated that organizational competitiveness increased firm performance (Singh, 2012). ***Thus, Hypothesis 9 is strongly supported.***

Additionally, the results of the control variables are found that firm age has no effect on sustainable organizational competitiveness (β_{39} = 0.154, p > 0.10) and firm performance (β_{42} = -0.101, p > 0.10). It concludes that the firm as a long time period registered do not significantly affect sustainable organizational competitiveness and firm performance. Because of information and communication technology businesses must be constantly adapting to be able to survive in an intense competitive environment. Thus, the consequence relationships of strategic technology transfer capability are not influenced by firm age.

Likewise, firm size also illustrates no significant relationship with sustainable organizational competitiveness (β_{40} = 0.020, p > 0.10). However, it found that firm size has a significant positive effect on firm performance (β_{43} = 0.173, p < 0.10). This implied that the larger firms can generate higher firm performance of information and communication technology businesses in Thailand.

The Effects of the Antecedents of Strategic Technology Transfer Capability, and the Moderating Role of Innovative Culture

Figure 8 illustrates the relationships among five antecedents: proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence with five dimensions of strategic technology transfer capability are proposed in Hypotheses 10(a-e) – 14(a-e). The effect of each hypothesis is proposed in a positive relationship direction. For testing of these hypotheses, a set of regression equations is developed: Equations 8 – 12. In addition, the moderating role of innovative culture is proposed to positively influence the relationship among all antecedents and each dimension of strategic technology transfer capability by being presented in Hypotheses 15(a-e) – 19(a-e). According to these hypotheses, regression equation is developed: Equations 13 – 17.

Figure 8: The Results of the Effects of Antecedents on Strategic Technology Transfer Capability

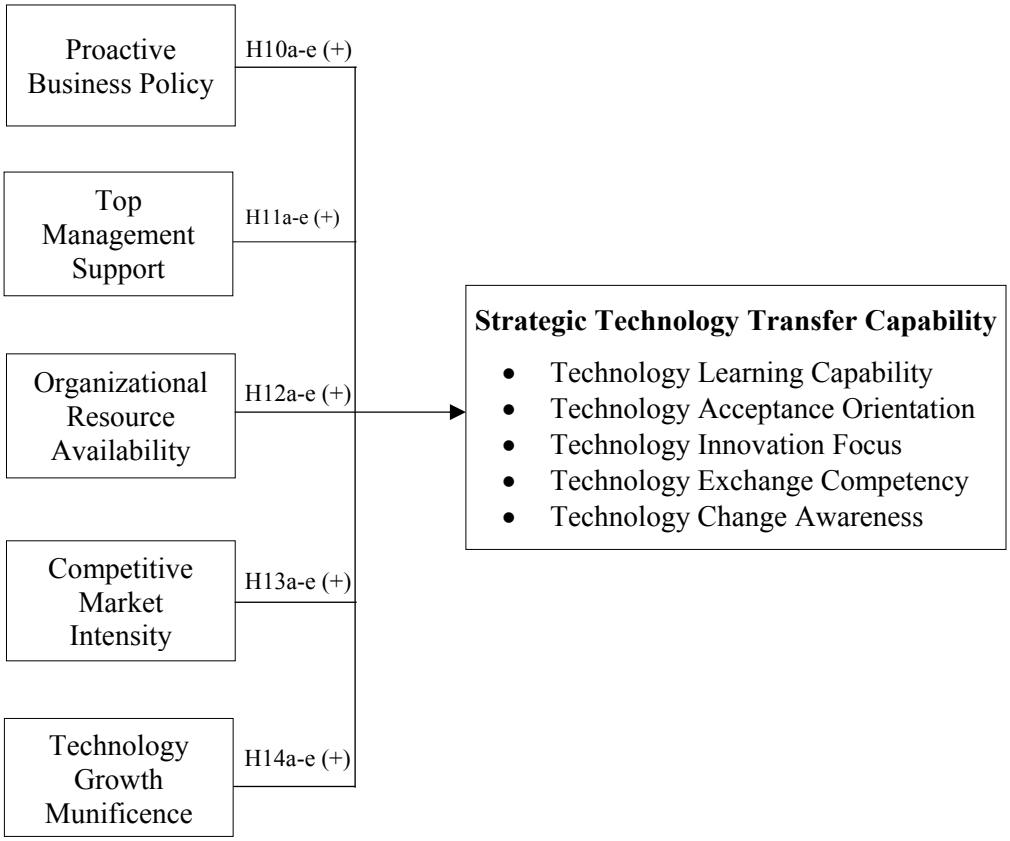


Table 17 demonstrates the correlation matrix of each dimension of strategic technology transfer capability (STTC), its five antecedents, and the moderator: innovative culture. For the first antecedent, proactive business policy is found significantly and positively correlated to all the dimension of STTC: technology learning capability ($r = 0.353$, $p < 0.01$), technology acceptance orientation ($r = 0.320$, $p < 0.01$), technology innovation focus ($r = 0.546$, $p < 0.01$), technology exchange competency ($r = 0.475$, $p < 0.01$), and technology change awareness ($r = 0.496$, $p < 0.01$). Next, top management support is also found to have positive relationship with STTC dimension: technology learning capability ($r = 0.397$, $p < 0.01$), technology acceptance orientation ($r = 0.401$, $p < 0.01$), technology innovation focus ($r = 0.517$, $p < 0.01$), technology exchange competency ($r = 0.455$, $p < 0.01$), and technology change awareness ($r = 0.511$, $p < 0.01$).

Table 17: Descriptive Statistic and Correlation Matrix of Each Dimension of Strategic Technology Transfer Capability, Its Antecedents, and Innovative Culture

Variables	PBP	TMS	ORA	CMI	TGM	INC	TLC	TAO	TIF	TEC	TCA	FA
Mean	4.138	4.168	4.146	4.266	4.212	4.115	4.256	4.279	4.146	4.234	4.187	N/A
S.D.	0.488	0.497	0.485	0.489	0.486	0.485	0.464	0.469	0.539	0.494	0.479	N/A
TMS	.677***											
ORA	.422***	.534***										
CMI	.445***	.450***	.458***									
TGM	.463***	.491***	.431***	.593***								
INC	.560***	.607***	.556***	.474***	.452***							
TLC	.353***	.397***	.385***	.339***	.367***	.376***						
TAO	.320***	.401***	.292***	.337***	.411***	.362***	.426***					
TIF	.546***	.517***	.475***	.402***	.415***	.456***	.456***	.484***				
TEC	.475***	.455***	.335***	.334***	.414***	.450***	.376***	.486***	.579***			
TCA	.496***	.511***	.491***	.473***	.457***	.526***	.475***	.505***	.611***	.595***		
FA	.066	.101	-.052	.025	.022	.044	.087	.040	.051	.097	.000	
FS	.153***	.194***	.009	.005	.131**	.112	.133**	.083	.133**	.176***	.115	.112

N = 286, *** Correlation is significant at the 0.01 level (2-tailed), ** Correlation is significant at the 0.05 level (2-tailed)

For organizational resource availability, the third antecedent, the variable is related positively to all the STTC dimensions: technology learning capability ($r = 0.385$, $p < 0.01$), technology acceptance orientation ($r = 0.292$, $p < 0.01$), technology innovation focus ($r = 0.475$, $p < 0.01$), technology exchange competency ($r = 0.335$, $p < 0.01$), and technology change awareness ($r = 0.491$, $p < 0.01$). The fourth antecedent, competitive market intensity has significant positive correlation with the five dimensions of STTC: technology learning capability ($r = 0.339$, $p < 0.01$), technology acceptance orientation ($r = 0.337$, $p < 0.01$), technology innovation focus ($r = 0.402$, $p < 0.01$), technology exchange competency ($r = 0.334$, $p < 0.01$), and technology change awareness ($r = 0.473$, $p < 0.01$). The last antecedent, technology growth munificence is related positively to technology learning capability ($r = 0.367$, $p < 0.01$), technology acceptance orientation ($r = 0.411$, $p < 0.01$), technology innovation focus ($r = 0.415$, $p < 0.01$), technology exchange competency ($r = 0.414$, $p < 0.01$), and technology change awareness ($r = 0.457$, $p < 0.01$).

For the relationship among independent variables, the correlations between each pair of proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence are ranging from 0.292 to 0.546 ($p < 0.01$), which are lower level 0.80 as recommended by Hair and colleagues (2010). It can be implied that the independent variables are appropriate to be used in measuring and predicting the dependent variables for Equations 8 – 17. In addition, the value of variance inflation factor (VIF) in Table 18 is the highest at 2.295, which is under than the cut-off score of 10 (Hair et al., 2010). Thus, both correlations and VIF confirm that multicollinearity is not a problem in regression analysis of Equations 8 – 17.

Table 18: Results of Regression Analysis for the Effects of Strategic Technology Transfer Capability and its Antecedents

Independent Variables	Dependent Variables				
	TLC	**TAO**	**TIF**	**TEC**	**TCA**
	Equation 8	**Equation 9**	**Equation 10**	**Equation 11**	**Equation 12**
Proactive Business Policy (PBP: H10a-e)	.080 (.073)	.009 (.074)	**.300***** **(.065)**	**.248***** **(.070)**	**.182***** **(.065)**
Top Management Support (TMS: H11a-e)	.119 (.079)	**.227***** **(.080)**	**.117*** **(.071)**	**.128*** **(.076)**	**.143**** **(.070)**
Organizational Resource Availability (ORA: H12a-e)	**.201***** **(.066)**	.031 (.067)	**.225***** **(.059)**	.080 (.063)	**.215***** **(.059)**
Competitive Market Intensity (CMI: H13a-e)	.071 (.069)	.075 (.069)	.060 (.061)	.012 (.066)	**.160***** **(.061)**
Technology Growth Munificence (TGM: H14a-e)	**.133*** **(.069)**	**.237***** **(.070)**	.080 (.062)	**.183***** **(.066)**	**.111*** **(.062)**
Firm Age (FA)	.169 (.132)	.029 (.133)	.056 (.118)	.146 (.126)	-.063 (.117)
Firm Size (FS)	.132 (.110)	-.006 (.111)	.090 (.098)	.164 (.106)	.063 (.098)
Adjusted R^2	**.221**	**.207**	**.380**	**.284**	**.384**
F-Statistic	**12.556**	**11.603**	**26.006**	**17.184**	**26.414**
Durbin-Watson	**2.070**	**2.148**	**2.019**	**1.929**	**2.073**
Maximum VIF	**2.295**	**2.295**	**2.295**	**2.295**	**2.295**

Beta coefficients with standard in parenthesis. ***p<0.01, **p<0.05, *p<0.10

The results of OLS regression analysis for the Equations 8 – 12 are illustrated in Table 18. For Equation 8, there are two antecedents that have significant positive effect on technology learning capability: organizational resource availability and technology growth munificence. For Equation 9, technology acceptance orientation is significantly affected by only two variables: top management support and technology

growth munificence. For Equation 10, technology innovation focus is found to be positively influenced by three antecedents: proactive business policy, top management support, and organizational resource availability. For Equation 11, technology exchange competency is positively influenced by three antecedents to be alike previous: proactive business policy, top management support, and technology growth munificence. Finally, Equation 12 found that all of antecedents have significant and positive effect to technology change awareness: proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence.

The results from these five equations are used to determine Hypotheses 10 – 14 to which the proposed hypotheses are supported. Firstly, the tenth hypothesis proposed that proactive business policy is positively related to technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. The result indicates that proactive business policy, the first antecedent, has a positive effect on technology innovation focus ($\beta_{58} = 0.300$, $p < 0.01$), technology exchange competency ($\beta_{65} = 0.248$, $p < 0.01$), and technology change awareness ($\beta_{72} = 0.182$, $p < 0.01$). It can implied that proactive business policy enables firms to execute strategic technology transfer capability. These results are consistent with Droge, Calantone, and Harmancioglu (2008) who indicated that there is relationship between proactive strategy on technological leadership and radical product innovations over safer projects. According to Cooke (2001), explained that policy should stimulate the growth of strong private investing organizations as the incentive to be more proactive that conducted to technology exchange and technological change in organization level. ***Thus, Hypotheses 10c, 10d, and 10e are supported.***

However, the proactive business policy has no effect on technology learning capability ($\beta_{44} = 0.080$, $p > 0.10$) and technology acceptance orientation ($\beta_{51} = 0.009$, $p > 0.10$). It is possible that the firms has proactive business policy, which aggressively seek out new opportunities to exploit and develop their technological capabilities that focus on new organizational changes include innovation, rather than focusing on existing technologies in terms of learning and acceptance (Cohen & Levinthal, 1990). ***Thus, Hypotheses 10a and 10b are not supported.***

Secondly, the eleventh hypothesis proposed that top management support is positively related to technology learning capability, technology acceptance orientation,

technology innovation focus, technology exchange competency, and technology change awareness. The result indicates that top management support, the second antecedent, has a positive effect on four dimensions of strategic technology transfer capability: technology acceptance orientation (β_{52} = 0.227, p < 0.01), technology innovation focus (β_{59} = 0.117, p < 0.10), technology exchange competency (β_{66} = 0.128, p < 0.10), and technology change awareness (β_{73} = 0.143, p < 0.05). It can be stated that top management support plays a major role in strategy employed. The empirical study indicates that top management support positively affects the technology acceptance orientation of the firm (Jeong et al., 2006). Furthermore, there is found that the support of top management within Jordanian industrial organizations affect both product and process innovation (Al Shaar, Altalib, & Sardoh, 2015). In addition, information exchange and technology as the key element of the organization structure that affected by the communication between boards and employees (Glickman et al., 2007). Moreover, the results of Nigerian SMEs indicated that firm's executive is planning and budgeting for strategy capability that provides to act quickly on detecting technological change in organization (Agbim, 2013). ***Thus, Hypotheses 11b, 11c, 11d, and 11e are supported.***

However, the relationships among top management support and technology learning capability are not found significant (β_{45} = 0.119, p > 0.10). It is possible that top management may support the only part of the strategic capability to which enhances firm performance and does not emphasize the employee development, but focuses only on the ability of the firm (Ifinedo, 2008). This is consistent with Rodgers and Hunter (1991) who indicated that productivity gains correlation with the extent of top management support for employees' participation in the process of setting objectives, which do not describe in specific individual development as focus on technology learning capability. ***Thus, Hypothesis 11a is not supported.***

Thirdly, the twelfth hypothesis proposed that organizational resource availability is positively related to technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. The results indicate that organizational resource availability, the third antecedent, is found to positively affect three out of five dimensions of strategic technology transfer capability: technology learning capability (β_{46} = 0.201, p < 0.01), technology innovation focus (β_{60} = 0.225, p < 0.01), and technology change awareness

(β_{74} = 0.215, p < 0.01). This result is consistent with Hsu and Fang (2009) who found that the firms in Taiwanese integrated circuit design industry, which have availability of resource due to the investment including human capital, structural capital, and relational capital that are significantly positively affected organizational learning capability. Previous literature reviews indicated that availability of organizational resource enables firms to innovation adoption and strategic innovation capability (Sriboonlue, 2015; Ungan, 2004). Furthermore, firm-specific characteristics as differential access to financial and other resources which located that are significant condition the likelihood that firms is adopting a new technology which is the technological changing (Harrison, Kelley, & Gant, 1996). ***Thus, Hypotheses 12a, 12c, and 12e are strongly supported.***

However, this research does not find a significant effect of organizational resource availability on technology acceptance orientation (β_{53} = 0.031, p > 0.10), and technology exchange competency (β_{67} = 0.080, p > 0.10). It is possible that firm has an abundance of resource which is available to always access that makes no necessary focus on the acceptance and exchange of technology in organization. The result is consistent with the study of Chau and Hu (2002) who found that the convenient technology access to which available resource is not significant in technology acceptance of physicians' decisions and related to the exchange in technology of organization. ***Thus, Hypotheses 12b and 12d are not supported.***

Fourthly, the thirteenth hypothesis proposed that competitive market intensity is positively related to technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. The results point out that only one strategic technology transfer capability dimension is affected positively by competitive market intensity as the fourth antecedent: technology change awareness (β_{75} = 0.160, p < 0.01). This is consistent with Wilden et al. (2013) who indicate that there is an external competitive intensity effect to firm's capability as employs advanced technology to which as technological change in the organization. ***Thus, Hypothesis 13e is supported.***

However, competitive market intensity has no significant relationship with technology learning capability (β_{47} = 0.071, p > 0.10), technology acceptance orientation (β_{54} = 0.075, p > 0.10), technology innovation focus (β_{61} = 0.060, p > 0.10), and technology exchange competency (β_{68} = 0.012, p > 0.10). It can imply that the firm is

related to the use of technology that does not have a meaningful association between the external environment and strategic capabilities. This is consistent with results of O'Cass and Weerawardena (2010) indicated that the external environment as market intensity to which did not make satisfactory progress in establishing a firm's internal capability especially market learning capability, as well as, capabilities are based on exchanging information through the firm's human capital to which is not related to external factor. Moreover, the result is supported by the study of Jeong, Pae, and Zhou (2006) who found that market turbulence does not significantly affect technology orientation. ***Thus, Hypotheses 13a, 13b, 13c, and 13d are not supported.***

Lastly, the fourteenth hypothesis proposed that technology growth munificence is positively related to technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. The findings indicate that technology growth munificence, the fifth antecedent, positively affects four dimensions of strategic technology transfer capability: technology learning capability ($\beta_{48} = 0.133$, $p < 0.10$), technology acceptance orientation ($\beta_{55} = 0.237$, $p < 0.01$), technology exchange competency ($\beta_{69} = 0.183$, $p < 0.01$), and technology change awareness ($\beta_{76} = 0.111$, $p < 0.10$). It can imply that technology growth munificence as external factor is the most influence ability of firm about technological capability strategy. There is research indicated that firm regarding toward technology growth to which has investments in information technology and innovation help a firm utilize and maximize knowledge value to improve its organizational learning capability (Hsu & Fang, 2009). This result is consistent with Jeong, Pae, and Zhou (2006) who found that technological turbulence, the firm in situation where is rapidly growing technology, influenced technological orientation significantly. According to Sánchez (2012) described that firm's behavior in developing an ongoing exchange of technology that related to the organization of the internal and external resources as technology munificence of a firm in building up the firm's capabilities. Moreover, technological turbulence leads to more tech-based innovations to which the proactivity of China's firm has been experiencing extensive changes during transition to a market economy (Zhou et al., 2005). ***Thus, Hypotheses 14a, 14b, 14d, and 14e are supported.***

In contrast, the relationship among technology growth munificence and technology innovation focus is not found ($\beta_{62} = 0.080$, $p > 0.10$). It is possible that firm

does not focus on technology innovation because of environment as external factor that filled with technology development. This result is consistent with Bingham (1976) who reported that slack technological resources were significantly associated with innovation in some cases, in other words, if it will be firm's innovation then it is not related to technology growth munificence. ***Thus, Hypothesis 14c is not supported.***

Additionally, the results of control variables indicate that firm age has no significant effect on all five dimensions of strategic technology transfer capability include technology learning capability (β_{49} = 0.169, p > 0.10), technology acceptance orientation (β_{56} = 0.029, p > 0.10), technology innovation focus (β_{63} = 0.056, p > 0.10), technology exchange competency (β_{70} = 0.146, p > 0.10), and technology change awareness (β_{77} = -0.063, p > 0.10). Furthermore, firm size also illustrates no significant relationships with technology learning capability (β_{50} = 0.132, p > 0.10), technology acceptance orientation (β_{57} = -0.006, p > 0.10), technology innovation focus (β_{64} = 0.090, p > 0.10), technology exchange competency (β_{71} = 0.164, p > 0.10), and technology change awareness (β_{78} = 0.063, p > 0.10). These results can be interpreted that the strategic technology transfer capability is not influenced by a firm's long period of time registered on Department of Business Development of Thailand and more employees of the firm. It may be the government policy is changed that effect to technological capability of the firm more than other factors in context of Thailand. Therefore, the relationship among strategic technology transfer capability's dimensions and its antecedents are not influenced by firm age and firm size.

The Moderating Role of Innovative Culture

Innovative culture is the moderator in this research in order to test the moderating effects that influence the relationship between five antecedence variables, and each dimension of strategic technology transfer capability. These relationships are proposed as Hypotheses 15(a-e) – 19(1-e), and in Equations 13 – 17 and are shown in Figure 9.

Figure 9: The Results of the Moderating Effects of Innovative Culture on the Relationships between Strategic Technology Transfer Capability and Its Antecedents

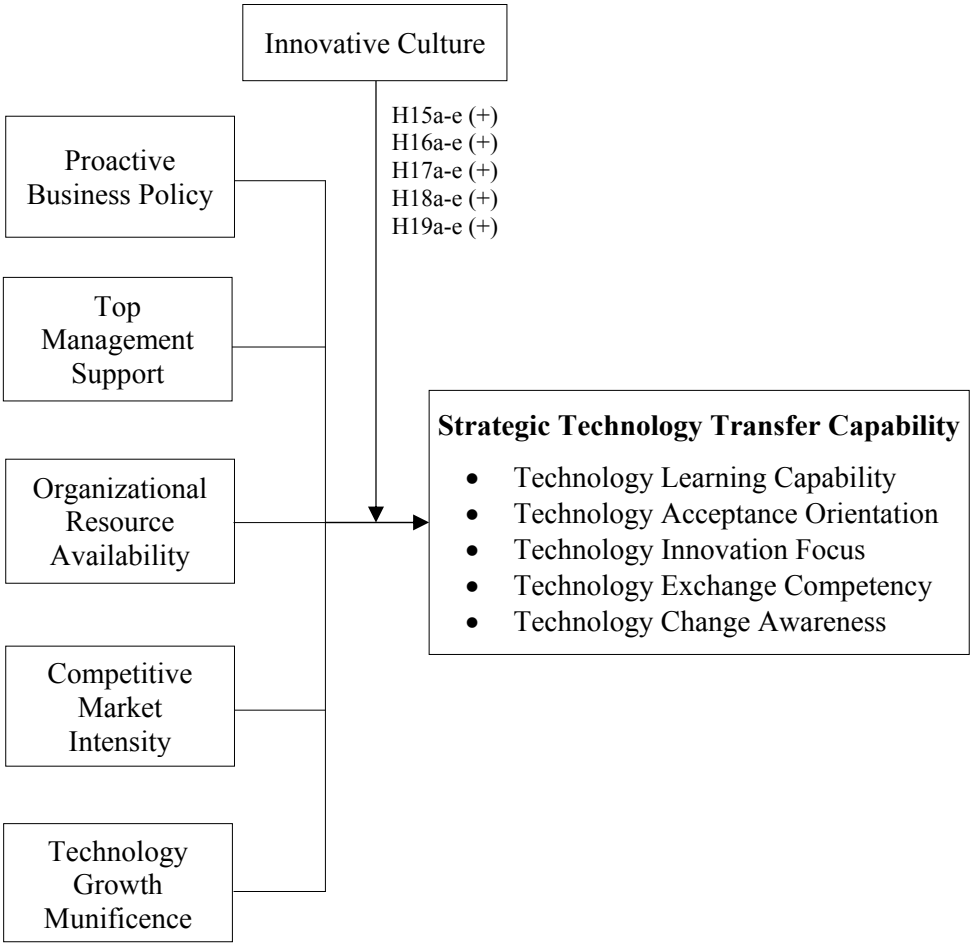


Table 19: Results of Regression Analysis for the Moderating Effects of Innovative Culture

Independent Variables	**Dependent Variables**				
	TLC	**TAO**	**TIF**	**TEC**	**TCA**
	Equation 13	**Equation 14**	**Equation 15**	**Equation 16**	**Equation 17**
Proactive Business Policy (PBP)	.075 (.078)	.039 (.077)	**.270***** **(.069)**	**.238***** **(.073)**	**.153**** **(.068)**
Top Management Support (TMS)	.117 (.084)	**.233***** **(.083)**	.101 (.075)	.089 (.079)	.088 (.074)
Organizational Resource Availability (ORA)	**.159**** **(.072)**	-.021 (.071)	**.209***** **(.064)**	-.010 (.067)	**.143**** **(.063)**
Competitive Market Intensity (CMI)	.061 (.072)	.003 (.071)	.070 (.064)	-.017 (.068)	**.161**** **(.063)**
Technology Growth Munificence (TGM)	.114 (.071)	**.196***** **(.070)**	.088 (.063)	**.166**** **(.067)**	**.110*** **(.062)**
Moderator: Innovative Culture (INC)	.103 (.077)	**.188**** **(.076)**	.020 (.069)	**.191***** **(.073)**	**.158**** **(.068)**
INC x PBP (H15a-e)	.079 (.068)	.015 (.067)	.049 (.061)	**.121*** **(.064)**	.079 (.060)
INC x TMS (H16a-e)	-.038 (.076)	**.134*** **(.076)**	-.110 (.068)	-.084 (.072)	-.095 (.067)
INC x ORA (H17a-e)	.014 (.055)	-.019 (.054)	.027 (.049)	-.051 (.051)	-.052 (.048)
INC x CMI (H18a-e)	.058 (.072)	-.106 (.071)	.026 (.064)	-.021 (.068)	.047 (.063)
INC x TGM (H19a-e)	-.077 (.072)	-.054 (.071)	-.040 (.064)	-.028 (.068)	.018 (.063)
Firm Age (FA)	.153 (.133)	.022 (.131)	.061 (.118)	.136 (.125)	-.077 (.116)
Firm Size (FS)	.153 (.114)	-.065 (.113)	.106 (.101)	.166 (.107)	.092 (.100)
Adjusted R^2	**.217**	**.232**	**.377**	**.306**	**.399**
F-Statistic	**7.069**	**7.627**	**14.281**	**10.687**	**15.549**
Durbin-Watson	**2.114**	**2.162**	**2.024**	**1.884**	**1.988**
Maximum VIF	**4.793**	**4.793**	**4.793**	**4.793**	**4.793**

Beta coefficients with standard in parenthesis. ***p<0.01, **p<0.05, *p<0.10

The correlation coefficients as shown in Table 17, innovative culture, is found to be positively correlated to all the dimensions of STTC: technology learning capability ($r = 0.376$, $p < 0.01$), technology acceptance orientation ($r = 0.362$, $p < 0.01$), technology innovation focus ($r = 0.456$, $p < 0.01$), technology exchange competency ($r = 0.450$, $p < 0.01$), and technology change awareness ($r = 0.526$, $p < 0.01$). Moreover, the correlation with five antecedence variables, innovative culture has a positive correlation with proactive business policy ($r = 0.560$, $p < 0.01$), top management support ($r = 0.607$, $p < 0.01$), organizational resource availability ($r = 0.556$, $p < 0.01$), competitive market intensity ($r = 0.474$, $p < 0.01$), and technology growth munificence ($r = 0.452$, $p < 0.01$). All pairs of correlation of innovative culture with every antecedent and dimension of STTC are significant and less than 0.80 as recommended by Hair and Colleagues (2010). Furthermore, the maximum value of VIF (Equations 13 – 17) is 4.793, as shown in Table 19, is lower than the cut-off value of 10. Thus, there is no multicollinearity problem.

The results of OLS regression analysis for the Equations 13 – 17 are shown in Table 19. For Equation 14, innovative culture is found to be moderating effect on the relationship between top management support and technology acceptance orientation. For Equation 16, innovative culture is found to be moderating effect on the relationship between proactive business policy and technology exchange competency. Otherwise, For Equations 13, 15, and 17, innovative culture is not found to be moderating effect on the relationship among the antecedents and dimensions of strategic technology transfer capability.

The results from these five equations are used to determine Hypotheses 15 – 19. The moderating effect of innovative culture on the relationship among five antecedents and each dimension of strategic technology transfer capability are as follows. Innovative culture positively moderates the relationship between proactive business policy and technology exchange competency ($\beta_{124} = 0.121$, $p < 0.10$). This is consistent with the research that study the multi-stage management of innovative corporate culture in the science and technology enterprises which taking the development process as a case in Lenovo company (Hongyan & Huaizhong, 2010). It is shown that firm's policy encourages the staff to engage in innovation for interest of organization, which to improve and exchange of new ideas between different sectors and to hold new

opportunities. ***Thus, Hypothesis 15d is supported.*** In contrast, innovation culture does not moderate the relationship between proactive business policy and technology learning capability (β_{85} = 0.079, p > 0.10), technology acceptance orientation (β_{98} = 0.015, p > 0.10), technology innovation focus (β_{111} = 0.049, p > 0.10), and technology change awareness (β_{137} = 0.079, p > 0.10). Due to more turbulent environment is pressure to more aggressive firm must to manage technology in various fields in order to success in term of competitive strategies, which it does not mention the innovative culture within the organization (Papulova & Papulova, 2006). ***Thus, Hypotheses 15a, 15b, 15c, and 15e are not supported.***

Furthermore, Innovative culture positively moderates the relationship between top management support and technology acceptance orientation (β_{99} = 0.134, p < 0.10). This is consistent with the research of Damanpour and Schneider (2006) who describe that strategic leaders or top managers heavily influence organizational capabilities by establishing organizational culture, motivating and enabling managers and employees, and building capacity for change and adoption of technology. ***Thus, Hypothesis 16b is supported.*** These findings show that innovative culture does not moderate the relationship between top management support and technology learning capability (β_{86} = -0.038, p > 0.10), technology innovation focus (β_{112} = -0.110, p > 0.10), technology exchange competency (β_{125} = -0.084, p > 0.10), and technology change awareness (β_{138} = -0.095, p > 0.10). It implies that innovative culture in an organization is vital to promote the activities internally from top management support, which to respond to the external environment, thus it does not involve strategic capabilities within the organization (Akman & Yilmaz, 2008). ***Thus, Hypotheses 16a, 16c, 16d, and 16e are not supported.***

Moreover, this research does not find the significant intervening effect of innovative culture on the relationship among organizational resource availability and five dimensions of strategic technology transfer capability comprise of technology learning capability (β_{87} = 0.014, p > 0.10), technology acceptance orientation (β_{100} = -0.019, p > 0.10), technology innovation focus (β_{113} = 0.027, p > 0.10), technology exchange competency (β_{126} = -0.051, p > 0.10), and technology change awareness (β_{139} = -0.052, p > 0.10). It implies that the scarcity of resources of organization which will lead to encourages firm to foster innovative culture in order to

accelerate aspects of technological capability. This is consistent with Oumlil and Juiz (2016) who indicated that innovation is often driven from scarcity of resources and Chien (2013) also found that do not indicate a significant relationship between innovative culture and technological capability. ***Thus, Hypotheses 17a, 17b, 17c, 17d, and 17e are not supported.***

Next, the results also present the non-significant of the moderating effects of innovative culture on the relationship among competitive market intensity and five dimensions of strategic technology transfer capability including technology learning capability (β_{88} = 0.058, p > 0.10), technology acceptance orientation (β_{101} = -0.106, p > 0.10), technology innovation focus (β_{114} = 0.026, p > 0.10), technology exchange competency (β_{127} = -0.021, p > 0.10), and technology change awareness (β_{140} = 0.047, p > 0.10). These findings show that innovative culture does not enhance better knowledge and understanding of strategic technology transfer capability because ability in technology of firm is often not related to external market factor, thus the internal factors are stimulated to firm that has each technological capability. According to O'Cass and Weerawardena (2010) who argue that the competitive environment as market intensity to which cause firm to pursue innovative ways of creating superior value that did not make satisfactory progress in the development of distinctive internal capability as exchanging information through the firm's human capital to which is not related to external factor. ***Thus, Hypotheses 18a, 18b, 18c, 18d, and 18e are not supported.***

Similarly, innovative culture does not moderate the relationship between technology growth munificence and all dimensions of strategic technology transfer capability consist of technology learning capability (β_{89} = -0.077, p > 0.10), technology acceptance orientation (β_{102} = -0.054, p > 0.10), technology innovation focus (β_{115} = -0.040, p > 0.10), technology exchange competency (β_{128} = -0.028, p > 0.10), and technology change awareness (β_{141} = 0.018, p > 0.10). The result indicates that innovative culture does not increase the external factor in technology encouragement that affects to various technological capability of firm and takes result in negative as well. This is consistent with the results of report that technology growth munificence is not relate to innovation of firm (Bingham, 1976). ***Thus, Hypotheses 19a, 19b, 19c, 19d, and 19e are not supported.***

On the other hand, the result in Table 19 finds that innovative culture has a direct effect on three dimensions of strategic technology transfer capability: technology acceptance orientation (β_{97} = 0.188, p < 0.05), technology exchange competency (β_{123} = 0.191, p < 0.01), and technology change awareness (β_{136} = 0.158, p < 0.10). It means that environment which makes new operation and resource are applied to direct support the strategic capability. This is consistent with Kalyani (2011) who examines that the organization can use innovative culture as a strategic intervention for managing change for survival and growth.

Additionally, the results of control variables indicate that firm age has no significant effect on the moderating effect of innovative culture on the relationship among all five dimensions of strategic technology transfer capability include technology learning capability (β_{90} = 0.153, p > 0.10), technology acceptance orientation (β_{103} = 0.022, p > 0.10), technology innovation focus (β_{116} = 0.061, p > 0.10), technology exchange competency (β_{129} = 0.136, p > 0.10), and technology change awareness (β_{142} = -0.077, p > 0.10). Moreover, firm size also illustrates no significant influences on the moderating effect of innovative culture on the relationships with technology learning capability (β_{91} = 0.153, p > 0.10), technology acceptance orientation (β_{104} = -0.065, p > 0.10), technology innovation focus (β_{117} = 0.106, p > 0.10), technology exchange competency (β_{130} = 0.166, p > 0.10), and technology change awareness (β_{143} = 0.092, p > 0.10). These possible that in Thailand context, innovative culture, which is the moderating role, does not have any effect to the strategic technology transfer capability. Because of the strategic capability of the firm in Thailand is set by the top executive which places the main policy of the organization. Therefore, the moderating effect of innovative culture on the relationship among strategic technology transfer capability's dimensions and its antecedents are not influenced by firm age and firm size.

Summary

This chapter describes the results of data analysis in this research. There are two main parts. The first part indicates the respondent and sample characteristics. These characteristics are explained by a percentage. Also, correlations among all variables are analyzed and presented as a correlation matrix and are explained by using descriptive statistics such as mean and standard deviation. Another part points out the results and discussions of hypotheses testing in combination with specific correlation analysis and multiple regression analysis. The results reveal that technology innovation focus and technology exchange competency, treated as dimensions 3 and 4, respectively, are important determinants to yield higher new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. Interestingly, it can be stated that technology acceptance orientation is the additional influence of new product development. In addition, technology learning capability has a strong positive impact valuable operational improvement. Although technology change awareness is a little positively affected new product development and firm performance. Moreover, the antecedents of STTC seem to be the most influential determinants of STTC. For moderating role of innovative culture, it does not play a moderating role very well in order to impact the relationship among all antecedents and each dimension of STTC. To summarize, Hypotheses 3, 6, 7, 8, and 9 are significantly supported, Hypotheses 1, 2, 4, 5, 10 – 16 are partially supported, and Hypotheses 17 – 19 are not significantly supported. This research provides the summary of the results of hypotheses testing as presented in Table 20.

The next chapter illustrates the conclusion of the research which provides a summary of the entire research. Additionally, the contributions, limitations, and research directions for further research are also discussed.

Table 20: Summary of the Hypotheses Testing Results

Hypothesis	Description of Hypothesized Relationships	Results
H1a	Technology learning capability is positively related to new product development.	Not Supported
H1b	Technology learning capability is positively related to valuable operational improvement.	Supported
H1c	Technology learning capability is positively related to outstanding business effectiveness.	Supported
H1d	Technology learning capability is positively related to sustainable organizational competitiveness.	Supported
H1e	Technology learning capability is positively related to firm performance.	Not Supported
H2a	Technology acceptance orientation is positively related to new product development.	Supported
H2b	Technology acceptance orientation is positively related to valuable operational improvement.	Not Supported
H2c	Technology acceptance orientation is positively related to outstanding business effectiveness.	Not Supported
H2d	Technology acceptance orientation is positively related to sustainable organizational competitiveness.	Not Supported
H2e	Technology acceptance orientation is positively related to firm performance.	Not Supported
H3a	Technology innovative focus is positively related to new product development.	Supported
H3b	Technology innovative focus is positively related to valuable operational improvement.	Supported
H3c	Technology innovative focus is positively related to outstanding business effectiveness.	Supported
H3d	Technology innovative focus is positively related to sustainable organizational competitiveness.	Supported

Table 20: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships	Results
H3e	Technology innovative focus is positively related to firm performance.	Supported
H4a	Technology exchange competency is positively related to new product development.	Supported
H4b	Technology exchange competency is positively related to valuable operational improvement.	Supported
H4c	Technology exchange competency is positively related to outstanding business effectiveness.	Supported
H4d	Technology exchange competency is positively related to sustainable organizational competitiveness.	Not Supported
H4e	Technology exchange competency is positively related to firm performance.	Supported
H5a	Technology change awareness is positively related to new product development.	Supported
H5b	Technology change awareness is positively related to valuable operational improvement.	Not Supported
H5c	Technology change awareness is positively related to outstanding business effectiveness.	Not Supported
H5d	Technology change awareness is positively related to sustainable organizational competitiveness.	Not Supported
H5e	Technology change awareness is positively related to firm performance.	Supported
H6	New product development is positively related to sustainable organizational competitiveness.	Supported
H7	Valuable operational improvement is positively related to sustainable organizational competitiveness.	Supported
H8	Outstanding business effectiveness is positively related to sustainable organizational competitiveness.	Supported

Table 20: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships	Results
H9	Sustainable organizational competitiveness is positively related to firm performance.	Supported
H10a	Proactive business policy is positively related to technology learning capability.	Not Supported
H10b	Proactive business policy is positively related to technology acceptance orientation.	Not Supported
H10c	Proactive business policy is positively related to technology innovation focus.	Supported
H10d	Proactive business policy is positively related to technology exchange competency.	Supported
H10e	Proactive business policy is positively related to technology change awareness.	Supported
H11a	Top management support is positively related to technology learning capability.	Not Supported
H11b	Top management support is positively related to technology acceptance orientation.	Supported
H11c	Top management support is positively related to technology innovation focus.	Supported
H11d	Top management support is positively related to technology exchange competency.	Supported
H11e	Top management support is positively related to technology change awareness.	Supported
H12a	Organizational resource availability is positively related to technology learning capability.	Supported
H12b	Organizational resource availability is positively related to acceptance orientation.	Not Supported
H12c	Organizational resource availability is positively related to technology innovation focus.	Supported

Table 20: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships	Results
H12d	Organizational resource availability is positively related to technology exchange competency.	Not Supported
H12e	Organizational resource availability is positively related to technology change awareness.	Supported
H13a	Competitive market intensity is positively related to technology learning capability.	Not Supported
H13b	Competitive market intensity is positively related to technology acceptance orientation.	Not Supported
H13c	Competitive market intensity is positively related to technology innovation focus.	Not Supported
H13d	Competitive market intensity is positively related to technology exchange competency.	Not Supported
H13e	Competitive market intensity is positively related to technology change awareness.	Supported
H14a	Technology growth munificence is positively related to technology learning capability.	Supported
H14b	Technology growth munificence is positively related to technology acceptance orientation.	Supported
H14c	Technology growth munificence is positively related to technology innovation focus.	Not Supported
H14d	Technology growth munificence is positively related to technology exchange competency.	Supported
H14e	Technology growth munificence is positively related to technology change awareness.	Supported
H15a	Innovative culture positively moderates the relationship between proactive business policy and technology learning capability.	Not Supported
H15b	Innovative culture positively moderates the relationship between proactive business policy and technology acceptance orientation.	Not Supported

Table 20: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships	Results
H15c	Innovative culture positively moderates the relationship between proactive business policy and technology innovation focus.	Not Supported
H15d	Innovative culture positively moderates the relationship between proactive business policy and technology exchange competency.	Supported
H15e	Innovative culture positively moderates the relationship between proactive business policy and technology change awareness.	Not Supported
H16a	Innovative culture positively moderates the relationship between top management support and technology learning capability.	Not Supported
H16b	Innovative culture positively moderates the relationship between top management support and technology acceptance orientation.	Supported
H16c	Innovative culture positively moderates the relationship between top management support and technology innovation focus.	Not Supported
H16d	Innovative culture positively moderates the relationship between top management support and technology exchange competency.	Not Supported
H16e	Innovative culture positively moderates the relationship between top management support and technology change awareness.	Not Supported
H17a	Innovative culture positively moderates the relationship between organizational resource availability and technology learning capability.	Not Supported
H17b	Innovative culture positively moderates the relationship between organizational resource availability and technology acceptance orientation.	Not Supported

Table 20: Summary of Hypothesized Relationships (Continued)

Hypothesis	Description of Hypothesized Relationships	Results
H17c	Innovative culture positively moderates the relationship between organizational resource availability and technology innovation focus.	Not Supported
H17d	Innovative culture positively moderates the relationship between organizational resource availability and technology exchange competency.	Not Supported
H17e	Innovative culture positively moderates the relationship between organizational resource availability and technology change awareness.	Not Supported
H18a	Innovative culture positively moderates the relationship between competitive market intensity and technology learning capability.	Not Supported
H18b	Innovative culture positively moderates the relationship between competitive market intensity and technology acceptance orientation.	Not Supported
H19a	Innovative culture positively moderates the relationship between technology growth munificence and technology learning capability.	Not Supported
H19b	Innovative culture positively moderates the relationship between technology growth munificence and technology acceptance orientation.	Not Supported
H19c	Innovative culture positively moderates the relationship between technology growth munificence and technology innovation focus.	Not Supported
H19d	Innovative culture positively moderates the relationship between technology growth munificence and technology exchange competency.	Not Supported
H19e	Innovative culture positively moderates the relationship between technology growth munificence and technology change awareness.	Not Supported

CHAPTER V

CONCLUSION

The previous chapter represents results from analyzing of the collected data including respondent characteristics, descriptive statistics, a correlation matrix, and the results of hypotheses testing. Therefore, this chapter aims to explain the conclusion, the theoretical and managerial contributions, limitations, and directions for future research.

This research investigates the effect of strategic technology transfer capability on its consequences, and its antecedents in information and communication technology firms. The main variable, strategic technology transfer capability is examined in this research with five dimensions: technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness. For the effect of strategic technology transfer capability; new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance are considered the consequences of the main variable with firm performance as the final outcome. In addition, proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence are assigned as the antecedents of strategic technology transfer capability. Innovative culture is also included in the conceptual model in order to test the moderating effect on the relationships between each of five dimensions of strategic technology transfer capability and its antecedents. All the variables are linked to form a conceptual model under two main theories: absorptive capacity and dynamic capabilities.

Especially, the key research question is how strategic technology transfer capability has an influence on business outcomes in direct way. In detail, there are five specific research questions as follow: 1) How does each of five dimensions of strategic technology transfer capability relate to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance? 2) How do new product development, valuable operational improvement, and outstanding business effectiveness have an influence on sustainable organizational competitiveness? 3) How does sustainable organizational

competitiveness affect firm performance? 4) How do proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence have an impact on each of five dimensions of strategic technology transfer capability? 5) How does innovative culture moderate the relationship among proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence on each of five dimensions of strategic technology transfer capability?

Likewise, the main purpose of this research is to investigate the relationship between strategic technology transfer capability and firm performance. The specific research purposes are also as follows: 1) to examine the relationships among five dimensions of strategic technology transfer capability (technology learning capability, technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness), on new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance; 2) to investigate the influences of new product development, valuable operational improvement, and outstanding business effectiveness on sustainable organizational competitiveness; 3) to examine the impact of sustainable organizational competitiveness on firm performance; 4) to investigate the relationships among proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence and each of five dimensions of strategic technology transfer capability; and 5) to test the moderating role of innovative culture on the relationships among proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence on each of five dimensions of strategic technology transfer capability.

In this research, the empirically investigation of the relationship, information and communication technology businesses in Thailand are selected as the target population due to the concern of strategic technology transfer capability. The sample of this investigation is obtained by using the stratified random sampling from the database of the Department of Business Development in Thailand on its website, For data collection, a questionnaire is developed and mailed to managing directors, managing partners, or managers from 1,880 information and communication technology businesses. For statistical

analysis, the OLS multiple regression is employed to analyze the data gathered from 286 respondents and approximately response rate is 20.38 percent. The results from the analyses show that the majority of the hypotheses tested is partially supported. After all, the results of each hypothesis according to each specific research questions are explained as follows:

According to the first specific research question, each of the five dimensions of strategic technology transfer capability are expected to have an effect on all the proposed consequences: new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. The results indicate that technology learning capability, the first dimension, positively affects valuable operational improvement, outstanding business effectiveness, and sustainable organizational competitiveness. Technology acceptance orientation, the second dimension, has a positive effect on only new product development. Next, technology innovation focus, the third dimension, positively influences all five outcomes: new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. In addition, technology exchange competency, the fourth dimension, is found positively affected four out of five consequences: new product development, valuable operational improvement, outstanding business effectiveness, and firm performance. The last dimension, technology change awareness, is positively influenced on new product development and firm performance.

For the second specific research question, the results indicate that sustainable organizational competitiveness is strong positively affected by new product development, valuable operational improvement, and outstanding business effectiveness. Likewise, for the third specific research question, the finding shows that sustainable organizational competitiveness has a strong positive effect on firm performance.

For the fourth specific research question, none of the antecedents are found to significantly and positively affect all the dimensions of strategic technology transfer capability. First, proactive business policy has a positive impact on technology innovation focus, technology exchange competency, and technology change awareness. Secondly, top management support is positively related to four dimensions of strategic technology transfer capability, namely, technology acceptance orientation, technology innovation

focus, technology exchange competency, and technology change awareness. Next, organizational resource availability is found to positively affect on technology learning capability, technology innovation focus, and technology change awareness. Interestingly, competitive market intensity has only influences on technology change awareness. Finally, technology growth munificence positively affects four dimension of strategic technology transfer capability: technology learning capability, technology acceptance orientation, technology exchange competency, and technology change awareness.

In according to the fifth specific research question, innovative culture is tested for its moderating effect on the relationship between the strategic technology transfer capability dimensions and its antecedents. The results indicate that there are two significantly affected. Innovative culture has positive effect in the relationship between proactive business policy and technology exchange competency and the relationship between top management support and technology acceptance orientation.

Summary of Results

In conclusion, strategic technology transfer capability is important for firm's outcomes. Especially, technology innovation focus is essential components of strategic technology transfer capability that enhances new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance. Additionally, technology acceptance orientation, technology exchange competency, and technology change awareness positively affect new product development. Furthermore, the consequences of strategic technology transfer capability have strongly impact on each other. The antecedent variables, top management support and technology growth munificence seem to be the most significant determinants encouraging strategic technology transfer capability. The summary of results in all research questions are shown in Table 21 and Figure 10 below.

Table 21: Summary of Results in All Research Questions

Research Questions	Hypotheses	Results	Conclusion
Specific Research Question			
(1) How does each of five dimensions of strategic technology transfer capability relate to new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance?	H1a-e	-Technology learning capability has a positive effect on valuable operational improvement, outstanding business effectiveness, and sustainable organizational competitiveness.	Partially supported
	H2a-e	-Technology acceptance orientation has a positive effect on only new product development.	
	H3a-e	-Technology innovation focus has a positive effect on all the consequences: new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance	
	H4a-e	- Technology exchange competency has a positive effect on new product development, valuable operational improvement, outstanding business effectiveness, and firm performance.	
	H5a-e	- Technology change awareness has a positive effect on new product development and firm performance.	

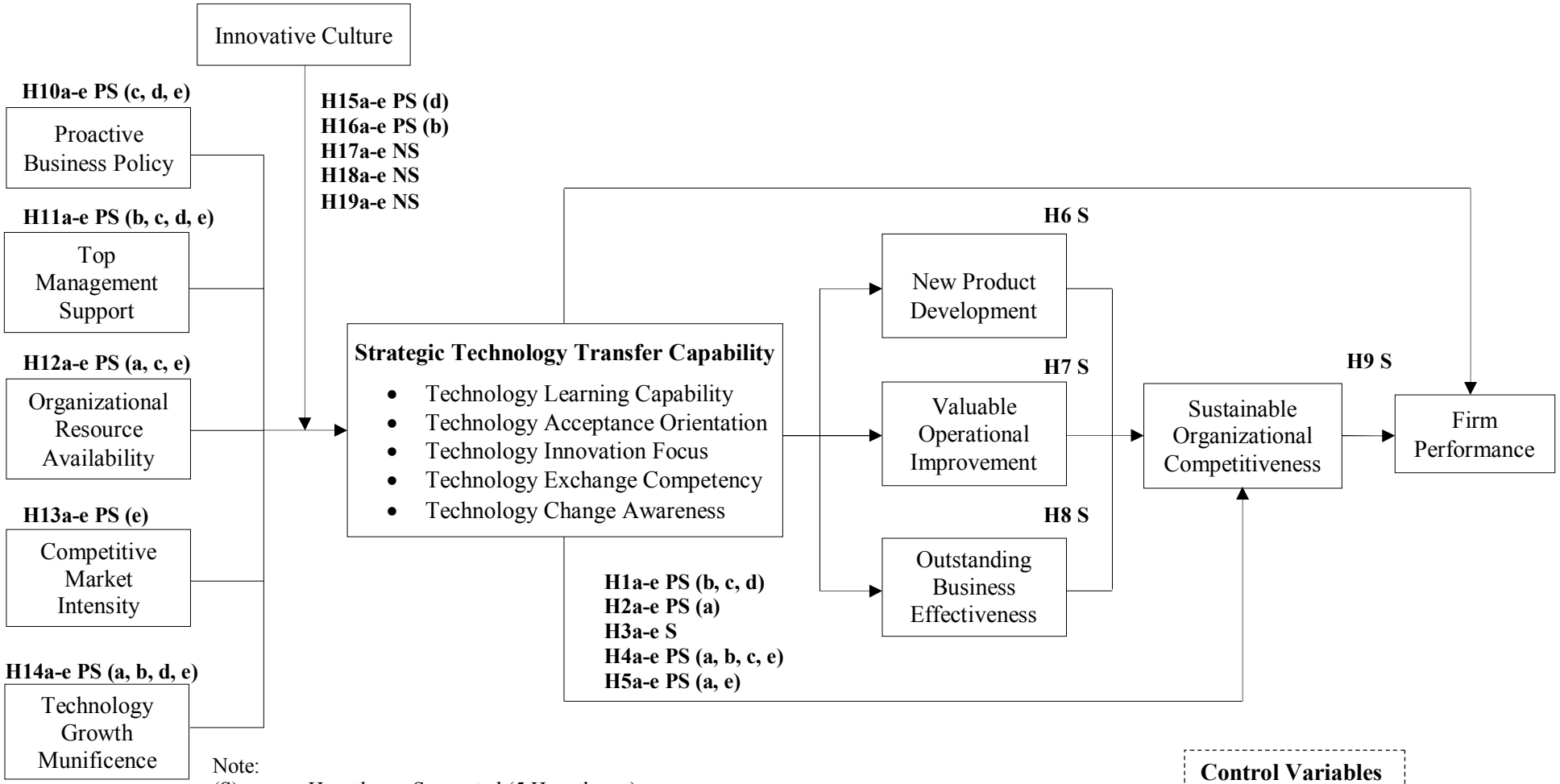
Table 21: Summary of Results in All Research Questions (Continued)

Research Questions	Hypotheses	Results	Conclusion
(2) How do new product development, valuable operational improvement, and outstanding business effectiveness have an influence on sustainable organizational competitiveness?	H6 H7 H8	Sustainable organizational competitiveness is affected significantly and positively by all three variables: new product development, valuable operational improvement, and outstanding business effectiveness.	Fully Supported
(3) How does sustainable organizational competitiveness affect firm performance?	H9	Sustainable organizational competitiveness positively affects firm performance	Fully Supported
(4) How do proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence have an impact on each of five dimensions of strategic technology transfer capability?	H10a-e H11a-e	- Proactive business policy has a positive impact on technology innovation focus, technology exchange competency, and technology change awareness. - Top management support has a positive impact on technology acceptance orientation, technology innovation focus, technology exchange competency, and technology change awareness.	Partially Supported

Table 21: Summary of Results in All Research Questions (Continued)

Research Questions	Hypotheses	Results	Conclusion
(4) How do proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence have an impact on each of five dimensions of strategic technology transfer capability?	H12a-e H13a-e H14a-e	- Organizational resource availability has a positive impact on technology learning capability, technology innovation focus, and technology change awareness. - Competitive market intensity has a positive impact on only technology change awareness. - Technology growth munificence has a positive impact on technology learning capability, technology acceptance orientation, technology exchange competency, and technology change awareness.	Partially Supported
(5) How does innovative culture moderate the relationship among proactive business policy, top management support, organizational resource availability, competitive market intensity, and technology growth munificence on each of five dimensions of strategic technology transfer capability?	H15a-e H16a-e H17a-e H18a-e H19a-e	- Innovative culture has two significant, moderating effects in the relationship between proactive business policy and technology exchange competency and the relationship between top management support and technology acceptance orientation.	Partially Supported

Figure 10: Summary of the Results of the Hypotheses Testing



Theoretical and Managerial Contributions

Currently, the abundance of technology transfer research generated this research and conceptual model that contribute essentially toward awareness of Thai information and communication technology businesses. The main contribution of this research satisfies to link the logical concept of absorptive capacity theory and dynamic capability theory that proposed a conceptual model and newly multidimensional construct of strategic technology transfer capability, which has the importance of managerial practices into enable the firm to gain the goal achievement. Thus, this research provides the theoretical and managerial contributions to the literature on strategic technology transfer capability in the following.

Theoretical Contribution

This research attempts to explore the causal relationship among the dimension of strategic technology transfer capability (STTC), firm outcomes, its antecedents, and moderator as shown in Figures 1 and 10.The main theoretical contribution related to conceptualizing the comprehensive view of strategic technology transfer capability as a multidimensional construct, which is presented as a newly developed construct and dimension. The research framework was described based on the absorptive capacity and dynamic capability theory. As the results, this research suggests four major theoretical contributions to the strategic technology transfer capability literature as follows:

Firstly, absorptive capacity theory is employed to consider strategic technology transfer capability as a firm's ability to manage the process of acquisition, adaptation, and utilization of knowledge. Moreover, the strategic technology transfer capability concept is useful in dimension development for testing, which the previous research used the study of any dimensions in the technology transfer and strategic capability perspective. The five dimensions of strategic technology transfer capability, including 1) technology learning capability, 2) technology acceptance orientation, 3) technology innovation focus, 4) technology exchange competency, and 5) technology change awareness, which are newly developed and firstly examined in order to clarify into its concept that will be useful for further research. In addition, this research has emphasized the importance of these five dimensions and especially, technology innovation focus which

illustrates positive relationship in increasing new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance.

Secondly, this research integrates absorptive capacity and dynamic capability to generate and utilize to establish hypotheses linking each construct in the conceptual model and expand the boundaries of these theories. Relying on these theories that allows researchers being able to better explain the proposed relationships among constructs and to predict the results of the relationships. The model of absorptive capacity theory according to Zahra and George (2002) that contribute to strategic flexibility, product and process innovation, firm performance, and sustainable competitive advantage, which corresponds to the relationships between each dimension of strategic technology transfer capability and its consequence consist of new product development, valuable operational improvement, outstanding business effectiveness, sustainable organizational competitiveness, and firm performance in the conceptual model. On the other hand, dynamic capability theory is employed to explain the relationships among strategic technology transfer capability and its antecedents. According to Teece, Pisano, & Shuen (1997) and Eriksson (2014), the antecedents of dynamic capability contain internal and external factors, which make the firm come into new competency. In this research, internal factors include proactive business policy, top management support, and organizational resource availability. Whereas, the firm needs for competitive market intensity and technology growth munificence are included the external factors. As the results, it is found that there are positive associations between internal and external factors of firm and five dimensions of strategic technology transfer capability.

Thirdly, innovative culture is included in the tests of the moderating effects of the relationships among the antecedents and five dimensions of strategic technology transfer capability. The results in this research found that innovative culture moderates two relationships include proactive business policy related to technology exchange competency and top management support that is related to technology acceptance orientation. However, innovative culture has no impact on other relationships. Thus, innovative culture does not the role of the moderating effect on the dimensions of strategic technology transfer capability and its antecedents.

Lastly, this research is an attempt to empirically investigate the effects of strategic technology transfer capability on firm performance and the other consequences. In particular, it is examined in terms of quantitative methods of gathering data from information and communication technology businesses in Thailand that are chosen because these have the potential to test the technology transfer performance. Therefore, the results of this research should be interesting and contributing to the technology transfer literature.

Managerial Contribution

In this research, the finding from the results can help practitioners, including managing director, managing partners, or managers, who are responsible for strategic planning in capability development of the organization. In particular, information and communication technology businesses, the practitioners should understand how their firms can achieve operational effectiveness, enhance firm performance, and improve sustainable competitiveness over their competitors in the industry through strategic technology transfer capability development. As the results, this research has five managerial implications as follows:

Firstly, the results provide guidelines for firms that the strategic technology transfer capability is utilized to competitive advantage and superior performance. Especially, technology innovation focus is a major determinant, which manages the knowledge classification and integration to generate the new technological functionality that enables the management of the organization to be more successful. The firm should encourage the creation of new technologies which are relevant to working that helps to increase more operational efficiency. The firm's awareness to allocation of technological budgets, which sufficiently used in the operation that enables to more effectively administer. Moreover, the firm should strive to continuous research and development in the field of technology that is enabling sustainable competitiveness.

Secondly, the firm should provide importance in technology exchange competency, which enables to manage the knowledge and skills in technological information, requisition, and requirement for two-way sharing. A systematic exchange of technology can increase the potential of new product development, operational improvement, business effectiveness, and performance to achieve goal into the

organization. Thus, the firm should encourage employees to use technology in the same way that enables to help them to coordinate their faster and more accurate operation. In addition, the firm's supporting into the integration of the technology capabilities of each unit together, which leads to the development of internal processes in the organization consistent in the same direction. Furthermore, the firm should focus on the concrete transfer of technology between the units that helps to achieve a more efficient operational process.

Thirdly, the results can provide guidelines for the maintenance of sustainable organizational competitiveness and improvement firm performance as a result of the implementation of strategic technology transfer capability into new product development, valuable operational improvement, and outstanding business effectiveness. Thus, the firm should be aware of the creating new products and services, including the development and expand new production lines to which are different and distinctive in order to more market share from the competitors. The utilization of structured processes and procedures which to be consistent with the situation as well and keeps the continuous development of the activities that enable to more efficiency in the operation. Likewise, the firm should manage cost, available resources, and processes to which achieve its goals effectively and excellently over the competitors.

Fourthly, the results indicate both the key internal and external factors are found to be impacted the implementation of strategic technology transfer capability that used within the firm. For internal factor, firm executive's support is the most influential determinants, which make operation effective until successful. Executive should encourage the human resource development for the best performance and the continuous investment in research and development that helps create opportunities for business growth. Besides, for external factor, the perception of the growth technological development in the present is also a major support for the firm in executing strategic technology transfer capability. Due to technology has diversity, continuous development, and is consistent with the operation of the firm that enables to more beneficial to the organization. Moreover, technology is also easier to find and cheaper than in the past, which creates superior result and outcome of the firm.

Fifthly, the result also guideline for governments to focus on policy that enhance strategic technology transfer capability to support investment from FDI or joint venture with multinational enterprises.

In conclusion, the Thai's firm in information and communication technology businesses should pay more attention on increasing the determinants of strategic technology transfer capability especially technology innovation focus and technology exchange competency. These factors have the highest effect in enhancing firm performance and lead to business success through new product development, valuable operational improvement, outstanding business effectiveness, and sustainable organizational competitiveness. Furthermore, top management support and technology growth munificence are also important for applying strategic technology transfer capability of the firm.

Limitations and Future Research Directions

As the results, there are some limitations that affect to the theoretical perspective in this research. The awareness of some limitations occurs when interpreting the results of this research. However, the limitations lead to the opportunities used as criterion for future research as discussed below.

Limitations

This research has few limitations that received from using the cross-sectional study in the quantitative approach by questionnaire survey as mentioned in the previous chapters. Firstly, limitation of Thai information and communication technology firms are registered in the Department of Business Development. On this account, the firms are not registered which make it not include into the sampling frame. Therefore, the generalizability of the findings must be cautious.

Secondly, there is the limitation of data, obtaining only a single industry in Thailand context. As a result, almost all firms as respondents are the Thai affairs ownership and trading business, which they may not be able to use technology transfer capabilities. This may affect the analytical power of the statistical tests so that the results are possibly weakened. Thus, the finding cannot generalize to other sectors or countries.

Lastly, limitation from a large amount of undelivered questionnaires due to the database is not always up-to-date. Although the response rate of approximately 20 percent, the amount is still below the appropriate minimum sample size of 376 as mentioned earlier. Thus, the findings found in this research may not be able to fully explain the whole population.

Future Research Directions

According to limitations, some suggestions for future research are provided base on the conceptual model in this research. First of all, the limitation from the cross-sectional study in quantitative approach is selected, so in future research that should consider using a longitudinal study in qualitative approach such as in-depth interview may be conducted in order to develop a more accurate result in the proposed conceptual model.

The second direction, for generalizability limitation, the future research should consider applying another sector industry in order to ensure the reliability and validity of the conceptual framework. The newly proposed dimensions of strategic technology transfer capability can be also to fit another industry whether manufacturing or service that is FDI or joint venture. This may have been the result in better statistical test.

The third direction, future research may collect data from many different key informants to get comprehensive information in a variety of perspectives. Specifically, the operational employee will be able to provide information on how to implement the strategy into working. In addition, mixed methods approach should be further conducted to extend explaining the results to each other and makes more clarify understanding of strategic technology transfer capability.

The fourth direction, the future research as context is Thai information and communication technology businesses that should be a large sample size in order to increase the quality of the results and choosing other database which is always up-to-date set of scale. Moreover, other control variables in addition to firm age and firm size may be used to achieve better results.

Finally, future research may shed light on another dimension, antecedent, and moderating variables of strategic technology transfer capability framework. For instance, the government policies in each country as external antecedent that may be greater

affected to each proposed dimension. Furthermore, innovative culture should be determined as the antecedent variable, on the other hand, it may use other variable such as corporative environment that may be a moderating role in the relationship between strategic technology transfer capability and its antecedents.

BIBLIOGRAPHY

BIBLIOGRAPHY

Aaker, D. A., Kumar, V., & Day, G. (2001). *Marketing Research*. New York: John Wiley and Sons Inc.

Agbim, K.C. (2013). The relative contribution of management skills to entrepreneurial success: A survey of small and medium enterprises (SMEs) in the trade sector. *International Organization of Scientific Research Journal of Business and Management, 7*(1), 8-16.

Aguirre, M. G. (2013). Dynamic capabilities and competitive advantage into Mexican firms: Testing Gibrat's law. *Revista Nicolaita de Estudios Económicos, 6*(2), 35-56.

Ahmad, S., & Schroeder, R. G. (2011). Knowledge management through technology strategy: Implications for competitiveness. *Journal of Manufacturing Technology Management, 22*(1), 6-24.

Akgün, A. E., Keskin, H., Byrne, J. C., & Aren, S. (2007). Emotional and learning capability and their impact on product innovativeness and firm performance. *Technovation, 27*(9), 501-513.

Akiike, A. (2014). Can firms simultaneously purse technology innovation and design innovation?. *Annals of Business Administrative Science, 13*(3), 169-181.

Akman, G., & Yilmaz, C. (2008). Innovative capability, innovation strategy and market orientation: An empirical analysis in Turkish software industry. *International Journal of Innovation Management, 12*(1), 69-111.

Al-Ansari, Y., Altalib, M., & Sardoh, M. (2013). Technology orientation, innovation and business performance: A study of Dubai SMEs. *The International Technology Management Review, 3*(1), 1-11.

Aldridge, S. (2007). *Strategy, Strategic Thinking and Strategic Capability*. [Online]. Available from: http://www.olev.de/s/strat/UK-SU-Strategy_Leadership-Forum0407.pdf [accessed 5 February 2016].

Alegre, J., & Chiva, R. (2008). Assessing the impact of organizational learning capability on product innovation performance: An empirical test. *Technovation, 28*(6), 315-326.

Alfaro, L., & Charlton, A. (2007). *Intra-industry Foreign Direct Investment (CEP Discussion Paper No. 825)*. London: Centre for Economic Performance.

Allred, B. B., & Swan, K. S. (2004). Contextual influences on international subsidiaries product technology strategy. *Journal of International Management, 10*(2), 259-286.

Al Shaar, E. M., Khattab, S. A., Alkaied, R. N., & Manna, A. Q. (2015). The effect of top management support on innovation: The mediating role of synergy between organizational structure and information technology. *International Review of Management and Business Research, 4*(2), 499-513.

Annamalah, S., Raman, M., Marthandan, G., & Logeswaran, A. K. (2016). Perceptions of open innovation among SMIs in Malaysia. *International Invention Journal of Arts and Social Science, 3*(3), 28-39.

Aragón-Correa, J. A., & Sharma, S. (2003). A contingent resource-based view of proactive corporate environmental strategy. *Academy of Management Review, 28*(1), 71-88.

Arend, R. J., & Bromiley, P. (2009). Assessing the dynamic capabilities view: spare change, everyone?. *Strategic Organization, 7*(1), 75-90.

Ariyawardana, A. (2003). Sources of competitive advantage and firm performance: The case of Sri Lankan value-added tea producers. *Asia Pacific Journal of Management, 20*(1), 73-90.

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*(3), 396-402.

Arvanitis, S., & Woerter, M. (2009). Firms' transfer strategies with universities and the relationship with firms' innovation performance. *Industrial and Corporate Change, 18*(6), 1067–1106.

A.T. Kearney. (2017). *The 2017 A.T. Kearney Foreign Direct Investment Confidence Index*. [Online]. Available from: http://www.atkearney.com/foreign-direct-investment-confidence-index [accessed 27 March, 2016].

Atuahene-Gima, K., & Murray, J. Y. (2007). Exploratory and exploitative learning in new product development: A social capital perspective on new technology ventures in China. *Journal of International Marketing, 15*(2), 1-29.

Baden-Fuller, C., & Volberda, H. W. (1997). Strategic renewal: How large complex organizations prepare for the future. *International Studies of Management and Organization, 27*(2), 95-120.

Baller, S., Dutta, S., & Lanvin, B. (2016). *The Global Information Technology Report 2016*. Geneva, Switzerland: World Economic Forum.

Bank of Thailand. (2016). *Thailand's Economic Conditions in 2016*. [Online]. Available from: https://www.bot.or.th/Thai/MonetaryPolicy/Economic Conditions/AnnualReport/AnnualReport/Annual_Y59_T.pdf [accessed 7 May, 2016].

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99-121.

Battistella, C., Toni, A. F. D., & Pillon, R. (2016). Inter-organisational technology/ knowledge transfer: A framework from critical literature review. *The Journal of Technology Transfer, 41*(5), 1195-1234.

Behera, S. R., Dua, P., & Goldar, B. (2012). Foreign direct investment and technology spillover: Evidence across Indian manufacturing industries. *The Singapore Economic Review, 57*(2), 1-35.

Beugelsdijk, S., Smeets, R., & Zwinkels, R. (2008). The impact of horizontal and vertical FDI on host's country economic growth. *International Business Review, 17*(4), 452-472.

Bhatti, W. A., Larimo, J., & Coudounaris, D. N. (2016). The effect of experiential learning on subsidiary knowledge and performance. *Journal of Business Research, 69*(5), 1567-1571.

Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics, 48*(2), 112-131.

Bingham, R. (1976). *The Adoption of Innovation by Local Governments*. Lexington, MA: Lexington Books.

Blakeney, M. (1989*). Legal Aspects of Technology Transfer to Developing Countries*. Oxford: ESC Publishing.

Blombäck, A., & Pasillas, M. R. (2012). Exploring the logics of corporate brand identity formation. *International Journal of Corporate Communications, 17*(1), 7-28.

Born, A. (2002). A framework for assessing the impact of information systems infrastructure on business effectiveness. In Miralles, F., & Valor, J. (Eds.), *ICIS 2002 Proceedings, 15-18 December 2002,* Barcelona, Spain: 23rd International Conference on Information Systems. pp. 37-47.

Bozeman, B., Rimes, H., & Youtie, J. (2015). The evolving state-of-the-art in technology transfer research: Revisiting the contingent effectiveness model. *Research Policy, 44*(1), 34-49.

Brooks, R. L. (1986). *Technology Transfer: A Strategy for Innovation Adoption at the Washington State Department of Transportation*. [Online]. Available from: https://www.wsdot.wa.gov/ [accessed 27 March, 2016].

Brown, T. E., & Kirchhoff, B. A. (1997). The effect of resource availability and entrepreneurial orientation on firm growth. In Reynolds, P. D., Bygrave, W. D., Carter, N. M., Davidsson, P., Gartner, W. B., Mason, C. M., & McDougall, P. P. (Eds.), *Frontiers of Entrepreneurial Research*. (pp. 375-389).Wellesley, MA: Babson College.

Bruno, A. V., & Tyebjee, T. T. (1982). The environment for entrepreneurship. In Kent, C. A., Sexton, D. L., & Vesper, K. H. (Eds.), *Encyclopedia of Entrepreneurship* (pp. 288-307). Englewood Cliffs, NJ: Prentice-Hall.

Burkhardt, M. E., & Brass, D. J. (1990). Changing patterns or patterns of change: The effects of a change in technology on social network structure and power. *Administrative Science Quarterly, 35*(1), 104-127.

Carbonell, P., & Rodríguez-Escudero, A. I. (2009). Relationships among team's organizational context, innovation speed, and technological uncertainty: An empirical analysis. *Journal of Engineering and Technology Management, 26*(1), 28-45.

Carnabuci, G., & Bruggeman, J. (2009). Knowledge specialization, knowledge brokerage and the uneven growth of technology domains. *Social Forces, 88*(2), 607-641.

Casadesus-Masanell, R., & Ricart, J. E. (2010). From strategy to business models and onto tactics. *Long Range Planning, 43*(2), 195-215.

Castrogiovanni, G. J. (1991). Environmental Munificence; A theoretical Assessment. *Academy of Management Review, 16*(3), 542-565.

Chan, Y. E., & Reich, B. H. (2007). IT alignment: What have we learned?. *Journal of Information Technology, 22*(4), 297-315.

Chau, P. Y., & Hu, P. J. H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information & Management, 39*(4), 297-311.

Chen, M. Y. C., Lin, C. Y. Y., Lin, H. E., & McDonough, E. F. (2012). Does transformational leadership facilitate technological innovation? The moderating roles of innovative culture and incentive compensation. *Asia Pacific Journal of Management, 29*(2), 239-264.

Chien, S. C. (2013). Innovation strategy as a mediator among social networks, innovative culture, and technological capability – An empirical study of the ICT industry in Taiwan. *African Journal of Business Management, 7*(11), 862-881.

Choi, J., & Wang, H. (2009). Stakeholder relations and the persistence of corporate financial performance. *Strategic Management Journal, 30*(8), 895-907.

Christmann, P. (2000). Effects of 'Best Practices' of environmental management on cost advantage: The role of complementary assets. *Academy of Management Journal, 43*(4), 663–680.

Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research, 16*(February), 64-73.

Coakes, S. J., Steed, L., & Price, J. (2008). *SPSS Version 15.0 for Windows: Analysis without Anguish.* Australia, Brisbane: John Wiley and Sons Inc.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/ Correlation Analysis for the Behavioral Sciences.* 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128-152.

Collins, C. J., & Smith, K. G. (2006). Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms. *Academy of Management Journal, 49*(3), 544-560.

Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change, 10*(4), 945-974.

Corbett, C. J., & Klassen, R. D. (2006). Extending the horizons: environmental excellence as key to improving operations. *Manufacturing & Service Operations Management, 8*(1), 5-22.

Coulter, M. K. (2002). *Strategic Management in Action*. New Jersey: Prentice-Hall.

Cui, A. S., Griffith, D. A., & Cavusgil, S. T. (2005). The influence of competitive intensity and market dynamism on knowledge management capabilities of multinational corporation subsidiaries. *Journal of International Marketing, 13*(3), 32-53.

Da, H. U. O., & Ken, H. U. N. G. (2015). Internationalization strategy and firm performance: Estimation of corporate strategy effect based on big data of Chinese IT companies in a complex network. *Journal for Economic Forecasting, 18*(2), 148-163.

Daley, S. (2013). *Project 2013 in Depth*. Indiana: Que.

Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal, 34*(3), 555-590.

Damanpour, F., & Schneider, M. (2006). Phases of the adoption of innovation in organizations: Effects of environment, organization and top managers. *British Journal of Management, 17*(3), 215-236.

Damijan, J. P., Knell, M., Majcen, B., & Rojec, M. (2003). The role of FDI, R&D accumulation and trade in transferring technology to transition countries: Evidence from firm panel data for eight transition countries. *Economic Systems, 27*(2), 189-204.

Davis, F. D. (1985). *A Technology Acceptance Model for Empirically Testing New End-user Information Systems: Theory and Results*. Ph.D. Thesis in Sloan School of Management, Massachusetts Institute of Technology, U.S.A.

De Brentani, U., & Kleinschmidt, E. J. (2004). Corporate culture and commitment: Impact on performance of international new product development programs. *Journal of Product Innovation Management, 21*(5), 309–333.

De La Tour, A., Glachant, M., & Ménière, Y. (2011). Innovation and international technology transfer: The case of the Chinese photovoltaic industry. *Energy Policy, 39*(2), 761-770.

Delmotte, J., & Sels, L. (2008). HR outsourcing: threat or opportunity?. *Personnel Review, 37*(5), 543-563.

Deeds, D. L., DeCarolis, D., & Coombs, J. (2000). Dynamic capabilities and new product development in high technology ventures: An empirical analysis of new biotechnology firms. *Journal of Business Venturing, 15*(3), 211-229.

Demeter, K. (2014). Operating internationally The impact on operational performance improvement. *International Journal of Production Economics, 149*(March), 172-182.

Deshpandé, R., & Webster, F. E. (1989). Organizational culture and marketing: Defining the research agenda. *Journal of Marketing, 53*(1), 3–15.

Derakhshani, S. (1984). Factors affecting success in international transfers of technology. *The Developing Economies, 22*(1), 27-47.

Draganidis, F., & Mentzas, G. (2006). Competency based management: A review of systems and approaches. *Information Management & Computer Security, 14*(1), 51-64.

Droge, C., Calantone, R., & Harmancioglu, N. (2008). New product success: Is it really controllable by managers in highly turbulent environments? *Journal of Product Innovation Management, 25*(3), 272-286.

Dunning, J. H., & Lundan, S. M. (2010). The institutional origins of dynamic capabilities in multinational enterprises. *Industrial and Corporate Change, 19*(4), 1225–1246.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science, 60*(11), 2835-2857.

ECOSOC. (2014). *Innovation and Technology Transfer for Enhanced Productivity and Competitiveness*. [Online]. Available from: https://www.uneca.org/sites/default/files/uploaded-documents/CoM/com2014/ com2014innovation_and_technlogy_ transfer_for_enhanced_productivity_ and_connectiveness_in_africa-english.pdf [accessed 27 March, 2016].

Edmonds, T. (2000). *Regional Competitiveness & the Role of the Knowledge Economy*. London: Research Publications Office.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal, 21*(10/11), 1105-1121.

Erdil, O., Kitapci, H., & Timurlenk, B. (2010). Effects of core employees on organizational capabilities and firm performance. *Journal of Global Strategic Management, 7*(1), 30-38.

Eriksson, T. (2014). Processes, antecedents and outcomes of dynamic capabilities. *Scandinavian Journal of Management, 30*(1), 65-82.

Federation of Thai Industries. (2017). *Thai Industries Sentiment Index (TISI) As at January 2017*. [Online]. Available from: http://www.fti.or.th/2016/download/technical/ดัชนีฯ_เดือนมกราคม_2560_997.pdf [accessed 27 March, 2016].

Feurer, R., & Chaharbaghi, K. (1994). Defining competitiveness: A holistic approach. *Management Decision, 32*(2), 49-58.

Forsman, H., Temel, S., & Uotila, M. (2013). Towards sustainable competitiveness: Comparison of the successful and unsuccessful eco-innovators. International *Journal of Innovation Management, 17*(03), 1-26.

Galunic, D. C., & Eisenhardt, K. M. (2001). Architectural innovation and modular corporate forms. *Academy of Management Journal, 44*(6), 1229-1249.

Gao, G. Y., Zhou, K. Z., & Yim, C. K. B. (2007). On what should firms focus in transitional economies? A study of the contingent value of strategic orientations in China. *International Journal of Research in Marketing, 24*(1), 3-15.

García-Morales, V. J., Bolívar-Ramos, M. T., & Martín-Rojas, R. (2014). Technological variables and absorptive capacity's influence on performance through corporate entrepreneurship. *Journal of Business Research, 67*(7), 1468-1477.

Garrett, R. P., & Neubaum, D. O. (2013). Top management support and Initial strategic assets: A dependency model for internal corporate venture performance. *Journal of Product Innovation Management, 30*(5), 896-915.

Garud, R., & Nayyar, P. R. (1994). Transformative capacity: Continual structuring by intertemporal technology transfer. *Strategic Management Journal, 15*(5), 365-385.

Gatignon, H., & Xuereb, J.M. (1997). Strategic orientation of the firm and new product performance. *Joumal of Marketing Research, 34*(1), 77–90.

Gathungu, J. M., & Mwangi, K. (2012). Dynamic capabilities, talent development and firm performance. *DBA Africa Management Review, 2*(3), 83-100.

Gavetti, G., & Levinthal, D. (2000). Looking forward and looking backward: Cognitive and experiential search. *Administrative Science Quarterly, 45*(1), 113–137.

Ghobakhloo, M., Hong, T. S., Sabouri, M. S., & Zulkifli, N. (2012). Strategies for successful information technology adoption in small and medium-sized enterprises. *Information, 3*(1), 36-67.

Gibson, D. V., & Rogers, E. M. (1994). *R&D Collaboration on Trial: The Microelectronics and Computer Technology Corporation*. USA: Harvard Business School Press.

Glabiszewski, W., & Grego-Planer, D, (2016). Abilities to exploit newly-acquired technologies as a source of competitive advantage of finance companies in Poland. *Management, 20*(2), 35-48.

Glass, A. J., Saggi, K., Dutt, A., & Ros, J. (2008). The role of foreign direct investment in international technology transfer. *International Handbook of Development Economics, 2*, 137-149.

Glazer, R., & Weiss, A. M. (1993). Marketing in turbulent environments: Decision processes and the time-sensitivity of information. *Journal of Marketing Research, 30*(4), 509-521.

Glickman, S. W., Baggett, K. A., Krubert, C. G., Peterson, E. D., & Schulman, K. A. (2007). Promoting quality: The health-care organization from a management perspective. *International Journal for Quality in Health Care, 19*(6), 341-348.

Gloet, M., & Samson, D. (2016). Knowledge management and systematic innovation capability. *International Journal of Knowledge Management, 12*(2), 54-72.

Godoe, P., & Johansen, T. (2012). Understanding adoption of new technologies: Technology readiness and technology acceptance as an integrated concept. *Journal of European Psychology Students, 3*(1), 38-52.

Goh, S. C. (1998). Toward a learning organization: The strategic building blocks. *SAM Advanced Management Journal, 63*(2), 15-22.

Gopalakrishnan, S., & Damanpour, F. (1997). A review of innovation research in economics, sociology and technology management. *Omega, 25*(1), 15-28.

Gopalakrishnan, S., & Santoro, M. D. (2004). Distinguishing between knowledge transfer and technology activities: The role of key organizational factors. *IEEE Transactions on Engineering Management, 51*(1), 57-69.

Green, P. E., Tull, D. S., & Albaum, G. (1988). *Research for Marketing Decisions*. New Jersey: Prentice-Hall.

Hair, J. F. I., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate Data Analysis*. USA: Pearson Education International.

Hakala, H. (2010). Configuring out strategic orientation. *Business Administration 95 Management and Organization*. [Online]. Available from: http://www.uva.fi/ materiaali/pdf/isbn_978-952-476-325-7.pdf [accessed February 2015].

Halac, D. S. (2015). Multidimensional construct of technology orientation. *Procedia-Social and Behavioral Sciences, 195*(July), 1057-1065.

Hamar, J., & Stephan, J. (2005). The potentials for technology transfer via foreign direct investment in Central East Europe-Results of a field study. *East-West Journal of Economics and Business, 8*(1&2), 19-41.

Handfield, R. B., Ragatz, G. L., Petersen, K. J., & Monczka, R. M. (1999). Involving suppliers in new product development. *California Management Review, 42*(1), 59-82.

Harrison, B., Kelley, M. R., & Gant, J. (1996). Innovative firm behavior and local milieu: Exploring the intersection of agglomeration, firm effects, and technological change. *Economic Geography, 72*(3), 233-258.

Hassan, A., & Jamalludin, Y. (2016). Analysis of success factors of technology transfer process of the information and communication technology. *International Conference on Advances in Electrical, Electronic and Systems Engineering (ICAEES), 14-16 November 2016, Malaysia,* Putrajaya, ICAEES. pp. 382-387.

Helfat, C. E. (2000). Guest editor's introduction to the special issue: The evolution of firm's capabilities. *Strategic Management Journal, 21*(10/11), 955–961.

Hertenstein, J. H., & Platt, M. B. (2000). Performance measures and management control in new product development. *Accounting Horizons, 14*(3), 303-323.

Ho, M. H. C., Liu, J. S., Lu, W. M., & Huang, C. C. (2014). A new perspective to explore the technology transfer efficiencies in US universities. *The Journal of Technology Transfer, 39*(2), 247-275.

Hoekman, B. M., Maskus, K. E., & Saggi, K. (2005). Transfer of technology to developing countries: Unilateral and multilateral policy options. *World Development, 33*(10), 1587-1602.

Hoffman, K., & Girvan, N. (1990). *Managing International Technology Transfer: A Strategic Approach for Developing Countries*. [Online]. Available from: https://idl-bnc-idrc.dspacedirect.org/handle/10625/5934 [accessed 12 May, 2016].

Hong, W., & Zhu, K. (2006). Migrating to internet-based E-commerce: Factors affecting E-commerce adoption and migration at the firm level. *Information & Management, 43*(2), 204–221.

Hongyan, C., & Huaizhong, Y. (2010). Research on multi-stage management of corporate culture in the science and technology enterprises: A case study of Lenovo. In Mingran, D. & Jianmu, Y. (Eds.), *Proceedings of the 7th International Conference on Innovation and Management, 4-5 December 2010*, Wuhan, China, The 7th International Conference on Innovation and Management (ICIM2010). pp. 940-946.

Howell, J. M., Shea, C. M., & Higgings, C. A. (2005). Champions of product innovations: Defining, developing, and validation a measure of champion behavior. *Journal of Business Venturing, 20*(5), 641-661.

Hsu, Y. H., & Fang, W. (2009). Intellectual capital and new product development performance: The mediating role of organizational learning capability. *Technological Forecasting and Social Change, 76*(5), 664-677.

Hu, A. G., Jefferson, G. H., & Jinchang, Q. (2005). R&D and technology transfer: Firm-level evidence from Chinese industry. *Review of Economics and Statistics, 87*(4), 780-786.

Huff, J. O., Huff, A. S., & Thomas, H. (1992). Strategic renewal and the interaction of cumulative stress and inertia. *Strategic Management Journal, 13*(S1), 55-75.

Hunt, S. D., & Morgan, R. M. (1995). The comparative advantage theory of competition. *The Journal of Marketing, 59*(April), 1-15.

Hwang, D., Yang, M. G. M., & Hong, P. (2015). Mediating effect of IT-enabled capabilities on competitive performance outcomes: An empirical investigation of ERP implementation. *Journal of Engineering and Technology Management, 36*(1), 1-23.

Ifinedo, P. (2008). Impacts of business vision, top management support, and external expertise on ERP success. *Business Process Management Journal, 14*(4), 551-568.

Intarapanich, S., & Ussahawanitchakit, P. (2011). Dynamic technology capability, firm competitiveness enhancement, and organizational stability: Evidence from IT businesses in Thailand. *Journal of International Business & Economics, 11*(4), 93-120.

Jabar, J., Soosay, C., & Santa, R. (2011). Organisational learning as an antecedent of technology transfer and new product development: A study of manufacturing firms in Malaysia. *Journal of Manufacturing Technology Management, 22*(1), 25-45.

Jaiyeoba, O. O. (2013). Effect of management behaviours and environmental dynamics on market orientation behaviours among Botswana's small service firms. *Business Management and Strategy, 4*(2), 91-110.

Jamshidi, H., & Moazemi, M. (2016). The Impact of External Environment on Export Performance. *Journal of Business & Financial Affairs, 5*(4), 1-6.

Janssen, R. L. (2010). *Exploring the Impact of Culture*. Master thesis in Business Administration Track: International Management, University of Twente. [In Netherlands].

Jaworski, B. J., & Kohli, A. K. (1993). Market orientation: Antecedents and consequences. *Journal of Marketing, 57*(3), 53-70.

Jeong, I., Pae, J. H., & Zhou, D. (2006). Antecedents and consequences of the strategic orientations in new product development: The case of Chinese manufacturers. *Industrial Marketing Management, 35*(3), 348-358.

Jermias, J., & Gani, L. (2004). Integrating business strategy, organizational configurations and management accounting systems with business unit effectiveness: A fitness landscape approach. *Management Accounting Research, 15*(2), 179-200.

Jitpaiboon, T., & Kalaian, S. A. (2005). Analyzing the effect of top management support on Information System (IS) performance across organizations and industries using hierarchical linear modeling. *Journal of International Information Management, 14*(2), 131-143.

Johannesson, J., & Palona, I. (2010). The dynamics of strategic capability. *International Business Research, 3*(1), 3-12.

Johnson, L. K. (2002). The organizational identity trap: The answer to the question, "who are we?" is complex, elusive and can confound strategic change. (Strategy). *MIT Sloan Management Review, 43*(4), 11-12.

Kak, A. (2002). Sustainable competitive advantage with core competence: A review. *Global Journal of Flexible Systems Management, 3*(4), 23-38.

Kalyani, M. (2011). Innovative culture: An intervention strategy for sustainable growth in changing scenario. *International Journal of Business Administration, 2*(4), 84-92.

Kathuria, V. (2000). Productivity spillovers from technology transfer to Indian manufacturing firms. *Journal of International Development, 12*(3), 343-369.

Kearns, G. S. (2006). The effect of top management support of SISP on strategic IS management: Insights from the US electric power industry. *Omega, 34*(3), 236-253.

Kedia, B. L., & Bhagat, R. S. (1988). Cultural constraints on transfer of technology across nations: Implications for research in international and comparative management. *Academy of Management Review, 13*(4), 559-571.

Keller, W. (2004). International technology diffusion. *Journal of Economic Literature, 42*(3), 752-782.

Kim, C. S., & Inkpen, A. C. (2005). Cross-border R&D alliances, absorptive capacity and technology learning. *Journal of International Management, 11*(3), 313-329.

Kim, J., & Hong, J. (2016). The framework for evaluation of the technology transfer. *Advanced Science and Technology Letters, 126*, 61-64.

Kim, Y., Lee, Z., & Gosain, S. (2005). Impediments to successful ERP implementation process. *Business Process Management Journal, 11*(2), 158-170.

Kneller, R., Pantea, S., & Upward, R. (2010). Does absorptive capacity affect who benefits from international technology transfer?. *ESTG Twelfth Annual Conference, September 2010*, Lausanne, Switzerland.

Kohut, M. (2016). The influence of foreign direct investment on international technology transfer. *Handel Wewnętrzny, 4*(363), 69-76.

Kongruang, C. (2009). Determinants and channels of FDI spillovers. *Songklanakarin Journal of Social Sciences and Humanities, 15*(1), 161-173.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607-610.

Krstić, B., & Petrović, B. (2012). The role of knowledge management in increasing enterprise's innovativeness. *Economics and Organization, 9*(1), 93-110.

Kumar, S., Luthra, S., Haleem, A., Mangla, S. K., & Garg, D. (2015). Identification and evaluation of critical factors to technology transfer using AHP approach. *International Strategic Management Review, 3*(1), 24-42.

Kumaraswamy, M. M. (1998). Industry development through creative project packaging and integrated management. *Engineering, Construction and Architectural Management, 5*(3), 228-237.

Kumaraswamy, M. M., & Shrestha, G. B. (2002). Targeting 'technology exchange' for faster organizational and industry development. *Building Research & Information, 30*(3), 183-195.

Kundu, N., Bhar, C., & Pandurangan, V. (2015). Managing technology transfer: An analysis of intrinsic factor. *South Asian Journal of Management, 22*(3), 69-95.

Langlois, R. N., & Steinmuller, W. E. (2000). Strategy and circumstance: The response of American firms to Japanese competition in semiconductors, 1980 –1995. *Strategic Management Journal, 21*(10/11), 1163–1173.

Laranja, M. (2009). The development of technology infrastructure in Portugal and the need to pull innovation using proactive intermediation policies. *Technovation, 29*(1), 23-34.

Ledwith, A., & O'Dwyer, M. (2009). Market orientation, NPD performance and organisational performance in small firms, *Journal of Product and Innovation Management, 26*(6), 652-661.

Lee, J., & Win, H. N. (2004). Technology transfer between university research centers and industry in Singapore. *Technovation, 24*(5), 433–442.

Lee, R. P. (2010). Extending the environment-strategy-performance framework: The roles of multinational corporation network strength, market responsiveness, and product innovation. *Journal of International Marketing, 18*(4), 58-73.

Leiblein, M. J., Reuer, J. J., & Dalsace, F. (2002). Do make or buy decisions matter? The influence of organizational governance on technological performance. *Strategic Management Journal, 23*(9), 817-833.

Leng, Z., Liu, Z., Tan, M., & Pang, J. (2015). Speed leaders and quality champions: Analyzing the effect of market orientation and technology orientation alignment on new product innovation. *Management Decision, 53*(6), 1247-1267.

Leonard-Barton, D. (1992a). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal, 13*(S1), 111–125.

————. (1992b). The factory as learning laboratory. *Sloan Management Review, 34*(1), 23–38.

Leonardi, P. M. (2007). Activating the informational capabilities of information technology for organizational change. *Organization Science, 18*(5), 813-831.

Lerch, F., Wagner, R., & Mueller-Seits, G. (2010). Technology transfer and absorptive capacity – Processual insights from four cases in optics in the U.S. and Germany. In Zack, M., Athanassiou, N., & Demirkan, I. (Eds.), *International Conference on Organizational Learning, College of Business Administration, Northeastern University, 3-6 June 2010*, Boston, Massachusetts, International Conference on Organizational Learning, 2010. pp. 1-39.

Levin, M. (1993). Technology transfer as a learning and development process: An analysis of Norwegian programmes on technology transfer. *Technovation, 1*3(8), 497-518.

Lewis, E. F., Hardy, M., & Snaith, B. (2013). Estimating the effect of nonresponse bias in a survey of hospital organizations. *Evaluation & the Health Professions, 36*(3), 330-351.

Li, T., & Calantone, R. J. (1998). The impact of market knowledge competence on new product advantage: Conceptualization and empirical examination. *The Journal of Marketing, 3*(3), 13-29.

Li, J. J., Poppo, L., & Zhou, K. Z. (2008). Do managerial ties in China always produce value? Competition, uncertainty, and domestic vs. foreign firms. *Strategic Management Journal, 29*(4), 383-400.

Li, Y., Zhao, Y., & Liu, Y. (2006). The relationship between HRM, technology innovation and performance in China. *International Journal of Manpower, 27*(7), 679-697.

Li, Y. H., Huang, J. W., & Tsai, M. T. (2009). Entrepreneurial orientation and firm performance: The role of knowledge creation process. *Industrial Marketing Management, 38*(4), 440-449.

Lichtenthaler, U., & Lichtenthaler, E. (2010). Technology Transfer across Organizational Boundaries: Absorptive capacity and desorptive capacity. *California Management Review, 53*(1), 154-170.

Lin, Y., & Wu, L. Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research, 67*(3), 407-413.

Liu, P. L., Chen, W. C., & Tsai, C. H. (2005). An empirical study on the correlation between the knowledge management method and new product development strategy on product performance in Taiwan's industries. *Technovation, 25*(6), 637-644.

Liu, X., & Wang, C. (2003). Does foreign direct investment facilitate technological progress?: Evidence from Chinese industries. *Research Policy, 32*(6), 945-953.

Loch, C., Stein, L., & Terwiesch, C. (1996). Measuring development performance in the electronics industry. *Journal of Product Innovation Management, 13*(1), 3-20.

Louise, G. M. (2009). *Technology Transfer through Foreign Direct Investment to Developing Countries-The Role of Home Country Measures*. [Online]. Available from: http://www.eolss.net/sample-chapters/c15/E1-31-03-01.pdf [accessed 27 March, 2016].

Lusia, K. (2016). *The Effects of Technological Turbulence on the Balance of Internal and External Exploration*. [Online]. Available from: http://essay.utwente.nl/70215/1/Lusia_BA_BMS.pdf [accessed 27 March, 2016].

Luukkonen, T. (2002). Technology and market orientation in company participation in the EU framework programme. *Research Policy, 31*(3), 437-455.

Ma, H. (1999). Creation and preemption for competitive advantage. *Management Decision, 37*(3), 259-267.

Macdonald, S. (1995). Learning to change: An information perspective on learning in the organization. *Organization Science, 6*(5), 557-568.

Maher, L. (2014). Building a culture for innovation: A leadership challenge. *World Hospitals and Health Services, 50*(1), 4-6

Makki, S. S., & Somwaru, A. (2004). Impact of foreign direct investment and trade on economic growth: Evidence from developing countries. *American Journal of Agricultural Economics, 86*(3), 795-801.

Malik, K. (2002). Aiding the technology manager: A conceptual model for intra-firm technology transfer. *Technovation, 22*(7), 427-436.

Marin, A., & Bell, M. (2006). Technology spillovers from foreign direct investment (FDI): The active role of MNC subsidiaries in Argentina in the 1990s. *The Journal of Development Studies, 42*(4), 678-697.

Maryska, M., Doucek, P., & Kunstova, R. (2012). The Importance of ICT Sector and ICT University Education for the Economic Development. *Procedia-Social and Behavioral Sciences, 55*(October), 1060-1068.

McCarter, M. W., Fawcett, S. E., & Magnan, G. M. (2005). The effects of people on the supply chain world: Some overlooked issues. *Human Systems Management, 24*(3), 197-208.

Mcloughlin, D., & Horan, C. (2000). The production and distribution of knowledge in the markets-as-networks tradition. *Journal of Strategic Marketing, 8*(2), 89-103.

McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review, 25*(1), 117-127.

Menguc, B., Auh, S., & Ozanne, L. (2010). The interactive effect of internal and external factors on a proactive environmental strategy and its influence on a firm's performance. *Journal of Business Ethics, 94*(2), 279-298.

Menon, A., Bharadwaj, S. G., Adidam, P. T., & Edison, S. W. (1999). Antecedents and consequences of marketing strategy making: A model and a test. *The Journal of Marketing, 63*(April), 18-40.

Ministry of Industry. (2016). *Industry Development Strategy Thailand 4.0 in 20 years (2017 - 2036)*. [Online]. Available from: http://www.oie.go.th/sites/default/files/attachments/industry_plan/thailandindustrialdevelopmentstrategy4.0.pdf [accessed 11 February, 2017].

Mirbagheri, S., & Hejazinia, M. (2010). Mobile marketing communication: Learning from 45 popular cases. *International Journal of Mobile Marketing, 5*(1), 175-192.

Mitra, A., Sharma, C., & Véganzonès-Varoudakis, M. A. (2014). Trade liberalization, technology transfer, and firms' productive performance: The case of Indian manufacturing. *Journal of Asian Economics, 33*(August), 1-15.

Mojtahed, R., Nunes, J. M. B., & Peng, G. C. (2011). *The Role of the Technology Acceptance Model in Information Systems Research: A Case Study*. Proceedings of the IADIS International Workshop on ISRTAM, University of Sheffield 20 July 2011. Rome, Italy. Online http://eprints.whiterose.ac.uk/74741/1/WRRO_74741.pdf.

Motohashi, K., & Yuan, Y. (2010). Productivity impact of technology spillover from multinationals to local firms: Comparing China's automobile and electronics industries. *Research Policy, 39*(6), 790-798.

Mouzas, S. (2006). Efficiency versus effectiveness in business networks. *Journal of Business Research, 59*(10), 1124-1132.

Mumford, M. D. (2000). Managing creative people: Strategies and tactics for innovation. *Human Resource Management Review, 10*(3), 313-351.

Murovec, N., & Prodan, I. (2009). Absorptive capacity, its determinants, and influence on innovation output: Cross-cultural validation of the structural model. *Technovation, 29*(12), 859-872.

Myers, M. B., Daugherty, P. J., & Autry, C. W. (2000). The effectiveness of automatic inventory replenishment in supply chain operations: Antecedents and outcomes. *Journal of Retailing, 76*(4), 455-481.

Nakata, C., & Sivakumar, K. (1996). National culture and new product development: An integrative review. *The Journal of Marketing, 60*(1), 61-72.

Nakata, C., Zhu, Z., & Izberk-Bilgin, E. (2011). Integrating marketing and information services functions: A complementarity and competence perspective. *Journal of the Academy of Marketing Science, 39*(5), 700-716.

Narver, J. C., & Slater, S. F. (1990). The effect of a market orientation on business profitability. *Journal of Marketing, 54*(4), 20-35.

Neuman, W. L. (2006). *Social Research Methods: Qualitative and Quantitative Approaches*. Toronto: Pearson Education International.

Nhuta, S. (2012). An analysis of the forces that determine the competitive intensity in the airline industry and the implications for strategy. *International Journal of Physical and Social Sciences, 2*(9), 433-469.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory.* 3rd ed. New York: McGraw-Hill.

Nurdin, M. (2014). Technology transfer model through industrial collaboration for product development and technopreneurship in polytechnic education. In Ali, A., Rahim, A., Khadem, M., & Rahman, M. A. (EdS.), *Proceedings of the 2014 International Conference on Industrial Engineering and Operations Management (IEOM 2014), 7-9 January 2014, Indonesia,* Bali, IEOM, pp. 2366-2370.

O'Cass, A., & Weerawardena, J. (2010). The effects of perceived industry competitive intensity and marketing-related capabilities: Drivers of superior brand performance. *Industrial Marketing Management, 39*(4), 571-581.

OECD. (2008a). *OECD Benchmark Definition of Foreign Direct Investment.* 4th ed. Paris: OECD.

OECD. (2008b). The impact of foreign direct investment on wages and working conditions. In Pursey, S. (Ed), *Employment and Industrial Relations: Promoting Responsible Business Conduct in a Globalising Economy, OECD-ILO Conference on Corporate Social Responsibility, 23-24 June 2008*, Paris, France, OECD Conference Centre. pp 3-31.

OECD/Eurostat. (2005). *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*. 3rd ed. Paris: OECD Publishing.

Omar, R., Takim, R., & Nawawi, A. H. (2011). The concept of absorptive capacity in technology transfer (TT) projects. In Ismail, K., Takim, R., & Nawawi, A. H. *International Conference on Intelligent Building and Management, 2-4 May 2011,* Sydney, Australia, Private Parnership Bids. pp. 328-334.

Orfila-Sintes, F., & Mattsson, J. (2009). Innovation behavior in the hotel industry. *Omega, 37*(2), 380-394.

Osano, H. M., & Koine, P. W. (2016). Role of foreign direct investment on technology transfer and economic growth in Kenya: A case of the energy sector. *Journal of Innovation and Entrepreneurship, 5*(1), 31-55.

Oumlil, R., & Juiz, C. (2016). An up-to-date survey in barriers to open innovation. *Journal of Technology Management & Innovation, 11*(3), 137-152.

Pansuppawatt, P., & Ussahawanitchakit, P. (2011), Strategic organizational creativity of medical and cosmetic businesses in Thailand: An empirical investigation of the antecedents and consequences. *International Journal of Strategic Management, 11*(2), 1-25.

Papulova, E., & Papulova, Z. (2006). Competitive strategy and competitive advantages of small and midsized manufacturing enterprises in Slovakia. [Online]. Available from: http://www.g-casa.com/download/Papulova-Competitive Strategy.pdf [accessed 11 February, 2017].

Parnell, J. A. (2011). Strategic capabilities, competitive strategy, and performance among retailers in Argentina, Peru and the United States. *Management Decision, 49*(1), 139-155.

Patel, P. C., Terjesen, S., & Li, D. (2012). Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity. *Journal of Operations Management, 30*(3), 201-220.

Paulraj, A., Lado, A. A., & Chen, I. J. (2008). Inter-organizational communication as a relational competency: Antecedents and performance outcomes in collaborative buyer–supplier relationships. *Journal of Operations Management, 26*(1), 45-64.

Pavlou, P. A., & El Sawy, O. A. (2011). Understanding the elusive black box of dynamic capabilities. *Decision Sciences, 42*(1), 239-273.

Pawar, B. S., & Eastman, K. K. (1997). The nature and implications of contextual influences on transformational leadership: A conceptual examination. *Academy of Management Review, 22*(1), 80–109.

Peteraf, M. A. (1993). The comerstones of competitive advantage: A resource-based view. *Strategic Management Journal, 14*(3), 179-191.

Peteraf, M. A., & Barney, J. B. (2003). Unraveling the resource-based tangle. *Managerial and Decision Economics, 24*(4), 309-323.

Pettigrew, A. M. (1979). On studying organizational cultures. *Administrative Science Quarterly, 24*(4), 570–581.

Pittigrew, A. M., Ferlie, E., & McKee, L. (1992). *Shaping Strategic Change: Making Change in Large Organizations: The Case of the National Health Service*. Newbury Park: Sage.

Pongpearchan, P., & Ussahawanitchakit, P. (2011). Strategic entrepreneurship management competency and firm success: A comparative study of SMEs in auto and electronic parts in Thailand, *International Journal of Business Strategy, 11*(2), 1-31.

Pontrandolfo, P., & Okogbaa, O. G. (1999). Global manufacturing: Are view and a framework for planning in a global corporation. *International Journal of Production Research, 37*(1), 1–19.

Poon, J. P., & Sajarattanochote, S. (2010). Asian transnational enterprises and technology transfer in Thailand. *European Planning Studies, 18*(5), 691-707.

Porter, M. (1996). What is strategy?. *Harvard Business Review*, November-December, 61-78.

Prasnikar, Z., Lisjak, M., Buhovac, A., & Stembergar, M. (2008). Identifying and exploiting the inter relationships between technological and marketing capabilities. *Long Range Planning, 41*(5), 530-554.

Prempree, K., Ussahawanitchakit, P., & Boonlua, S. (2013). Management accounting governance and firm value of textile manufacturing businesses in Thailand. *International Journal of Business Strategy, 13*(4), 41-72.

Protsenko, A. (2004). *Vertical and Horizontal Foreign Direct Investments in Transition Countries*. Ph.D. Dissertation in Economics University of Munich, Germany.

Rabinovich, E., Dresner, M. E., & Evers, P. T. (2003). Assessing the effects of operational processes and information systems on inventory performance. *Journal of Operations Management, 21*(1), 63-80.

Ragu-Nathan, B. S., Apigian, C. H., Ragu-Nathan, T. S., & Tu, Q. (2004). A path analytic study of the effect of top management support for information systems performance. *Omega, 32*(6), 459-471.

Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal, 25*(1), 23–37.

Reddy, N. M., & Zhao, L. (1990). International technology transfer: A review. *Research Policy, 19*(4), 285-307.

Reed, R., & DeFillippi, R. J. (1990). Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review, 15*(1), 88-102.

Reuter, C., Foerstl, K. A. I., Hartmann, E. V. I., & Blome, C. (2010). Sustainable global supplier management: the role of dynamic capabilities in achieving competitive advantage. *Journal of Supply Chain Management, 46*(2), 45-63.

Rezazadeh, B., Karami, H., & Karami. A. (2016). Technology orientation, dynamic capabilities and SMEs performance. *Strategic Management Quarterly, 4*(1), 41-60.

Ritter, T., & Gemünden, H. G. (2003). Network competence: Its impact on innovation success and its antecedents. *Journal of Business Research, 56*(9), 745-755.

Rodgers, R., & Hunter, J. E. (1991). Impact of management by objectives on organizational productivity. *Journal of Applied Psychology, 76*(2), 322-326.

Rolstadås, A. (1998). Enterprise performance measurement. *International Journal of Operations & Production Management, 18*(9/10), 989-999.

Rothaermel, F. T., & Hess, A. M. (2007). Building dynamic capabilities: Innovation driven by individual-, firm-, and network-level effects. *Organization Science, 18*(6), 898-921.

Rubera, G., & Droge, C. (2013). Technology versus design innovation's effects on sales and Tobin's Q: The moderating role of branding strategy. *Journal of Product Innovation Management, 30*(3), 448-464.

Saggi, K. (2002). Trade, foreign direct investment, and international technology transfer: A survey. *The World Bank Research Observer, 17*(2), 191-235.

Sajid, M., Al-bloush, H. B., Mohammed, A. F., Monsef, S., & Sadeghi, M. (2015). Role of innovation in the development of new products for improving organizational performance. *Journal of Advanced Management Science, 3*(3), 261-264.

Sánchez, J. (2012). The influence of entrepreneurial competencies on small firm performance. *Revista Latinoamericana de Psicología, 44*(2), 165-177.

Santa, R., Ferrer, M., Bretherton, P., & Hyland, P. (2010). Contribution of cross-functional teams to the improvement in operational performance. *Team Performance Management: An international Journal, 16*(3/4), 148-168.

Santoro, M. D., & Bierly, P. E. (2006). Facilitators of knowledge transfer in University-Industry Collaborations: A knowledge-based perspective. *IEEE Transactions on Engineering Management, 53*(4), 495-507.

Santos, J. B., & Brito, L. A. L. (2012). Toward a subjective measurement model for firm performance. *BAR-Brazilian Administration Review, 9*(6), 95-117.

Sapienza, H. J., Autio, E., George, G., & Zahra, S. A. (2006). A capabilities perspective on the effects of early internationalization on firm survival and growth. *Academy of Management Review, 31*(4), 914-933.

Schein, E. (2004). *Organizational Culture and Leadership*. 3rd ed. San Francisco, CA: Jossey-Bass.

Schilling, M. A. (2008). *Strategic Management of Technological Innovation*. Irvin, USA: McGraw-Hill.

Schmidt, T. (2010). Absorptive capacity one size fits all? A firm-level analysis of absorptive capacity for different kinds of knowledge. *Managerial and Decision Economics, 31*(1), 1-18.

Schoute, M. (2011). The relationship between product diversity, usage of advanced manufacturing technologies and activity-based costing adoption. *The British Accounting Review, 43*(2), 120-134.

Sekaran, U. (2003). *Research Methods for Business: A Skill Building Approach*. 4th ed. New York: John Wiley and Sons Inc.

Selmi, N. (2013). The difficulties of achieving technology transfer: Issues of absorptive capacity. *Journal of Communication of IBIMA, 2013*(2013), 1-15.

Shaw, R. J., Kaufman, M. A., Bosworth, H. B., Weiner, B.J., Zullig, L. L., Lee, S. Y., … Jackson, G. L. (2013). *Organizational Factors Associated with Readiness to Implement and Translate a Primary Care Based Telemedicine Behavioral Program to Improve Blood Pressure Control: The HTN-IMPROVE Study*. [Online]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC3847033/ [accessed 19 November, 2016].

Singh, P. K. (2012). Management of business processes can help an organization achieve competitive advantage. *International Management Review, 8*(2), 19-26.

Slater, S. F., Hult, G. T. M., & Olson, E. M. (2010). Factors influencing the relative importance of marketing strategy creativity and marketing strategy implementation effectiveness. *Industrial Marketing Management, 39*(4), 551-559.

Souder, W. E. (1988). Managing relations between R&D and marketing in new product development projects. *Journal of Product Innovation Management, 5*(1), 6-19.

Spyropoulou, S., Skarmeas, D., & Katsikeas, C. S. (2010). The role of corporate image in business-to-business export ventures: A resource-based approach. *Industrial Marketing Management, 39*(1), 752-760.

Sriboonlue, P. (2015). Strategic innovation capability and firm sustainability: Evidence from auto parts businesses in Thailand. *Journal of Business and Retail Management Research, 10*(2), 11-29.

Staw, B. M., & Szwajkowski, E. (1975). The scarcity-munificence component of organizational environments and the commission of illegal acts. *Administrative Science Quarterly, 20*(3), 345-354.

Sutanto, E. M. (2017). The influence of organizational learning capability and organizational creativity on organizational innovation of Universities in East Java, Indonesia. *Asia Pacific Management Review, 22*(3), 128-135.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics*. Massachusetts: Allyn and Bacon.

Talke, K., Soren, S., Jaap, E. W., & Lutz, A. (2009). What about design newness? Investigating the relevance of a neglected dimension of product innovativeness. *Journal of Product Innovation Management, 26*(6), 601–615.

Tatikonda, M. V., & Stock, G. N. (2003). Product technology transfer in the upstream supply chain. *Journal of Product Innovation Management, 20*(6), 444-467.

Teece, D. J. (2007). Explicating dynamic capabilities- the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319-1350.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533.

Thailand Board of Investment. (2016). Thailand is entering the digital era. *Thailand Investment Review, 26*(12), 1-12.

The Policy-Research Platform Project. (2010). บริษัทข้ามชาติให้อะไรกับไทย. *TRF Policy Brief, 1*(15), 1-8.

Thomas, E. (2013). Supplier integration in new product development: Computer mediated communication, knowledge exchange and buyer performance. *Industrial Marketing Management, 42*(6), 890-899.

Thong, J. Y., Yap, C. S., & Raman, K. S. (1996). Top management support, external expertise and information systems implementation in small businesses. *Information Systems Research, 7*(2), 248-267.

Todorova, G., & Durisin, B. (2007). Absorptive capacity: Valuing a reconceptualization. *Academy of Management Review, 32*(3), 774-786.

Tondolo, V. A. G., & Bitencourt, C. C. (2014). Understanding Dynamic Capabilities from Its Antecedents, Processes and Outcomes. *BBR-Brazilian Business Review, 11*(5), 122-144.

Tracey, M., Vonderembse, M. A., & Lim, J. S. (1999). Manufacturing technology and strategy formulation: Keys to enhancing competitiveness and improving performance. *Journal of Operations Management, 17*(4), 411-428.

Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition and inertia: Evidence from digital imaging. *Strategic Management Journal, 21*(10/11), 1147–1162.

Trochim, W. M. K. (2006). *Research Methods Knowledge Base*. 2nd ed. Cincinnati, OH: Atomic Dog Publishing.

Tsou, H. T., Chen, J. S., & Liao, W. H. (2014). Market and technology orientations for service delivery innovation: The link of innovative competence. *Journal of Business & Industrial Marketing, 29*(6), 499-513.

Ulrich, D., Jick, T., & Von Glinow, M. A. (1993). High-impact learning: Building and diffusing learning capability. *Organizational Dynamics, 22*(2), 52-66.

UNCTAD. (2001). *Transfer of Technology*. [Online]. Available from: http://unctad.org/en/docs/psiteiitd28.en.pdf [accessed 19 November, 2016].

United Nations. (2017). *World Economic Situation and Prospects 2017*. [Online]. Available from: http://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/ publication/2017wesp_full_en.pdf [accessed 27 March, 2016].

Ungan, M. (2004). Factors affecting the adoption of manufacturing best practices. *Benchmarking, 11*(5). 504-520.

Ussahawanitchakit, P. (2008). Organizational learning capability, organizational commitment, and organizational effectiveness: An empirical study of Thai accounting firms. *Journal of International Business Strategy, 8*(3), 1-12.

Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of Management Review, 1*(4), 801-814.

Vorhies, D. W., & Harker, M. (2000). The capabilities and performance advantages of market-driven firms: An empirical investigation. *Australian Journal of Management, 25*(2), 145-171.

Wallach, J. E. (1983). Individuals and organizations: The cultural match. *Training and Development Journal, 37*(2), 29-36.

Wang, C. L., & Ahmed, P. K. (2007). Dynamic capabilities: A review and research agenda. *The International Journal of Management Reviews, 9*(1), 31-51.

Waranantakul, W., Ussahawanitchakit, P., & Jhundra-indra, P. (2013). Service brand identity strategy and marketing performance: An empirical evidence from travel agency businesses in Thailand. *International Journal of Business Strategy, 13*(4), 5-40.

Wei, Y. S., O'Neill, H., Lee, R. P., & Zhou, N. (2013). The impact of innovative culture on individual employees: The moderating role of market information sharing. *Journal of Product Innovation Management, 30*(5), 1027-1041.

Weerawardena, J., O'Cass, A., & Julian, C. (2006). Does industry matter? Examining the role of industry structure and organizational learning in innovation and brand performance. *Journal of Business Research, 59*(1), 37-45.

White, R. E., & Hamermesh, R. C. (1981). Toward a model of business unit performance: An integrative approach. *Academy of Management Review, 6*(2), 213-223.

Wie, T. K. (2005). The major channels of international technology transfer to Indonesia: An assessment. *Journal of the Asia Pacific Economy, 10*(2), 214-236.

Wiesenthal, T., Dowling, P., Morbee, J., Thiel, C., Schade, B., Russ, P., ... Londo, M. (2012). *Technology Learning Curves for Energy Policy Support: (JRC Scientific and Policy Reports)*. Luxembourg: Publications Office of the European Union.

Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A configurational approach. *Journal of Business Venturing, 20*(1), 71-91.

Wilden, R., Gudergan, S. P., Nielsen, B. B., & Lings, I. (2013). Dynamic capabilities and performance: strategy, structure and environment. *Long Range Planning, 46*(1), 72-96.

William, F., & Gibson, D. V. (1990). *Technology Transfer: A Communication Perspective*. Beverly Hills, CA.: Sage.

Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal, 24*(10), 991-995.

Wright, G. (1997). Towards a more historical approach to technological change. *The Economic Journal, 107*(444), 1560-1566.

Yam, R. C., Lo, W., Tang, E. P., & Lau, A. K. (2011). Analysis of sources of innovation, technological innovation capabilities, and performance: An empirical study of Hong Kong manufacturing industries. *Research Policy, 40*(3), 391-402.

Yamin, S., Gunasekaran, A., & Mavondo, F. T. (1999). Relationship between generic strategies, competitive advantage and organizational performance: an empirical analysis. *Technovation, 19*(8), 507-518.

Yang, Y., Lee, P. K., & Cheng, T. C. E. (2015). Operational improvement competence and service recovery performance: The moderating effects of role stress and job resources. *International Journal of Production Economics, 164*(June), 134-145.

Yoon, T. (2009). *An Empirical Investigation of Factors Affecting Organizational Adoption of Virtual Worlds*. Doctoral Dissertation in Partial Fulfillment of the Requirements, The Florida State University, U.S.A.

Yu, Y., Dong, X. Y., Shen, K. N., Khalifa, M., & Hao, J. X. (2013). Strategies, technologies, and organizational learning for developing organizational innovativeness in emerging economies. *Journal of Business Research, 66*(12), 2507-2514.

Zahra, S. A., & Covin, J. G. (1993). Business strategy, technology policy and firm performance. *Strategic Management Journal*, *14*(1), 451-478.

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review, 27*(2), 185-203.

Zahra, S. A., Larrañeta, B., & Galán, J. L. (2010). Absorptive capacity and technological innovation. In Narayanan, V. K. & Connor, G. C. O. (Eds.), *Encyclopedia of Technology and Innovation Management,* West Sussex, U.K., Wiley-Blackwell. pp. 131-134.

Zahra, S. A., van de Velde, E., & Larrañeta, B. (2007). Knowledge conversion capability and the performance of corporate and university spin-offs. *Industrial & Corporate Change, 16*(4), 569-608.

Zhao, L., & Reisman, A. (1992). Toward meta research on technology transfer. *IEEE Transactions on Engineering Management, 39*(1), 13-21.

Zhou, K. Z., Gao, G. Y., Yang, Z., & Zhou, N. (2005). Developing strategic orientation in China: Antecedents and consequences of market and innovation orientations. *Journal of Business Research, 58*(8), 1049-1058.

Zhou, K. Z., Yim, C. K., & Tse, D. K. (2005). The effects of strategic orientations on technology-and market-based breakthrough innovations. *Journal of Marketing, 69*(2), 42-60.

Zikmund, W. G. (2003) *Business Research Methods*. 7th ed. Ohio: Thompson South-Western.

Zikmund, W. G., & Babin, B. J. (2007). *Exploring Marketing Research*. 9th ed. Ohio: Thompson South-Western.

Zott, C., Amit, R., & Massa, L. (2011). The business model: recent developments and future research. *Journal of Management, 37*(4), 1019-1042.

APPENDICES

APPENDIX A

The Original Items

Table 1A: Original Items in Scales

Construct	Items
Technology Learning Capability (TLC)	
TLC 1	Firm believes that continuous technology learning helps administration of the firm more effectively.
TLC 2	Firm encourages the systematic education and understanding of new technologies to be more productive of achieving the goal.
TLC 3	Firm emphasizes the continuous technology improvement of employees' skills, knowledge, ability, and training to increase the operational potential.
TLC 4	Firm supports the exchange of knowledge about technology within the organization to help develop better practices that respond to situations.
Technology Acceptance Orientation (TAO)	
TAO 1	Firm believes that its technology is useful and valuable to the organization's operations to help firm to better manage its work.
TAO 2	Firm recognizes the use of appropriate technology to develop new products and services that will allow for differentiation and advantage over competitors.
TAO 3	Firm emphasizes the continually applying technology to operations that will help organization's performance more effectively.
TAO 4	Firm supports to integrate technology in a systematic way across the organization to maximize the use of resources and technology.
Technology Innovation Focus (TIF)	
TIF 1	Firm believes that having new technology in the operation of the organization will help the management business to be more successful.
TIF 2	Firm encourages the creation of new technologies that are relevant to their operations are always helping to increase operational efficiency.
TIF 3	Firm strives to continuous research and development in the field of technology that will enable sustainable competitiveness.

Table 1A: Original Items in Scales (Continued)

Construct	Items
Technology Innovation Focus (TIF)	
TIF 4	Firm realizes that the allocation of new technology budgets which are sufficiently used in the operation that will help them to manage the technology more effectively.
Technology Exchange Competency (TEC)	
TEC 1	Firm believes that a systematic exchange of technology to increase the potential of the work to achieve more goals.
TEC 2	Firm focuses on the transfer of technology in a tangible way that helps to achieve a more efficient operational process.
TEC 3	Firm encourages employees to use technology in the same way that helps them to coordinate their work faster and more accurately.
TEC 4	Firm supports the integration of the technology capabilities of each unit together that helps the development of internal processes in the organization consistent in the same direction.
Technology Change Awareness (TCA)	
TCA 1	Firm believes that technology is always changing, which means that businesses must focus on learning, understanding, and maximizing the benefits.
TCA 2	Firm realizes that learning and understanding the technology are constantly evolving to enable technology to be applied in the proper operation.
TCA 3	Firm focuses on predictable technology in the future in a tangible way that helps the company achieve its goals and objectives more quickly.
TCA 4	Firm emphasizes the use of historical technology in their analyses on a regular basis that will be able to better align operational strategies with the situation.

Table 1A: Original Items in Scales (Continued)

Construct	Items
New Product Development (NPD)	
NPD 1	Firm is constantly creating new products and services.
NPD 2	Firm develops products and services that are different and distinctive from the competitors clearly.
NPD 3	Firm has improved its products and services to continue to more market share from competitors.
NPD 4	Firm has always expanded its scope and added new production lines of new products and services.
Valuable Operational Improvement (VOI)	
VOI 1	Firm has continuously improved its approach to operations.
VOI 2	Firm has developed work processes to suit the situation as well.
VOI 3	Firm has a modern, faster, and more efficient way of working.
VOI 4	Firm has changed its way of working to achieve its goals in the future faster.
Outstanding Business Effectiveness (OBE)	
OBE 1	Firm has a good track record on its goals and objectives.
OBE 2	Firm manages cost and non-performance effectively.
OBE 3	Firm makes full use of available resources and cost effectively.
OBE 4	Firm always manages the process of excellence.
Sustainable Organizational Competitiveness (SOC)	
SOC 1	Firm is constantly innovating its products and services.
SOC 2	Firm has ability to meet the needs of customers as well.
SOC 3	Firm has new products and services that are unique and difficult to imitate competitors.
SOC 4	Firm has a distinct management from its competitors.

Table 1A: Original Items in Scales (Continued)

Construct	Items
Firm Performance (FPM)	
FPM 1	Firm has a performance that meets its goals and objectives clearly.
FPM 2	Firm has continued to profit from its operations.
FPM 3	Firm's market share has increased compared to last year.
FPM 4	Firm has old customers back to buy goods or use the service continuously.
FPM 5	Firm has new customers increasing continuously every year.
FPM 6	Firm is confident that it will be able to survive in the future.
Proactive Business Policy (PBP)	
PBP 1	Firm believes that future business planning that helps to make management more efficient.
PBP 2	Firm strives to find new ways of doing business in a dynamic way.
PBP 3	Firm supports the development of new products and services that help them to be more competitive.
PBP 4	Firm gives important to technology investments in continual improvement and development that help ensure greater efficiency and effectiveness.
Top Management Support (TMS)	
TMS 1	Firm executive believes that continued organizational development that helps businesses succeed faster.
TMS 2	Firm executive strives to a more structured workflow that will enable the organization to function well and achieve its objectives.
TMS 3	Firm executive encourages continually investing in research and development that continues growing in the future.
TMS 4	Firm executive gives importance to the development of human resources to ensure that they are well-versed in their work.

Table 1A: Original Items in Scales (Continued)

Construct	Items
Organizational Resource Availability (ORA)	
ORA 1	Firm believes that having a well-equipped resource helps to achieve its goals.
ORA 2	Firm emphasizes to continue workforce availability and will enable greater efficiency.
ORA 3	Firm has the appropriateness of the budget allocation that helps to be more competitive.
ORA 4	Firm focuses on applying knowledge to the benefits of operations that help businesses achieve greater success.
Competitive Market Intensity (CMI)	
CMI 1	At present, the competition in the market is constantly intense, so firm must focus on developing management more effectively.
CMI 2	Customers have a variety of needs, so firm needs continuous research and development to meet the needs of customers in a timely manner.
CMI 3	Competitors are highly competitive, so firm must focus on improving and developing the organization to help firm have a competitive advantage.
CMI 4	New competitors are constantly growing, and firm is constantly striving to create strategies and guidelines for its operations.
Technology Growth Munificence (TGM)	
TGM 1	At present, technology is growing steadily, enables firm to apply the technology to better manage its operations.
TGM 2	Technology is diverse and consistent with the performance of the business so that firm can choose the appropriate technology and more beneficial to the organization.
TGM 3	Technology is more modern, easier to find and cheaper than in the past, so firm can apply to their activities more easily and quickly.

Table 1A: Original Items in Scales (Continued)

Construct	Items
Technology Growth Munificence (TGM)	
TGM 4	Technology is constantly evolving; enables firm to seamlessly integrate technology into quality enhancements and operational efficiencies across the organization.
Innovative Culture (INC)	
INC 1	Firm believes that having a corporate culture that emphasizes creativity and innovation will help firm grow faster.
INC 2	Firm encourages the creation of an appropriate working environment that will enable creative personnel to find new and effective ways to achieve their goals.
INC 3	Firm supports employees to be constantly involved in the improvement of their operations so that they are more efficient and effective.
INC 4	Firm recognizes the importance of exchanging new ideas among personnel, which will lead to continuous improvement of work processes.

APPENDIC B

Item Factor Loading and Reliability Analysis in Pre-Test

Table 1B: Item Factor Loading and Reliability Analysis in Pre-Test[a]

Construct	Items	Factor Loading	Item Total Correlation	Reliability (Alpha)
Firm Performance (FPM)	FPM1	0.801	0.721	0.939
	FPM2	0.919	0.877	
	FPM3	0.932	0.894	
	FPM4	0.859	0.796	
	FPM5	0.891	0.837	
	FPM6	0.863	0.801	
Technology Learning Capability (TLC)	TLC1	0.804	0.566	0.710
	TLC2	0.856	0.642	
	TLC3	0.665	0.436	
	TLC4	0.627	0.396	
Technology Acceptance Orientation (TAO)	TAO1	0.709	0.543	0.847
	TAO2	0.834	0.683	
	TAO3	0.861	0.735	
	TAO4	0.899	0.792	
Technology Innovation Focus (TIF)	TIF1	0.764	0.574	0.810
	TIF2	0.838	0.664	
	TIF3	0.812	0.659	
	TIF4	0.800	0.656	
Technology Exchange Competency (TEC)	TEC1	0.931	0.852	0.847
	TEC2	0.751	0.592	
	TEC3	0.807	0.649	
	TEC4	0.826	0.676	
Technology Change Awareness (TCA)	TCA1	0.919	0.850	0.923
	TCA2	0.941	0.892	
	TCA3	0.882	0.790	
	TCA4	0.915	0.840	

[a]n=30

Table 1B: Item Factor Loading and Reliability Analysis in Pre-Test[a] (Continued)

Construct	Items	Factor Loading	Item Total Correlation	Reliability (Alpha)
New Product Development (NPD)	NPD1	0.902	0.818	0.906
	NPD2	0.908	0.829	
	NPD3	0.908	0.825	
	NPD4	0.821	0.703	
Valuable Operational Improvement (VOI)	VOI1	0.841	0.722	0.903
	VOI2	0.959	0.917	
	VOI3	0.856	0.742	
	VOI4	0.865	0.757	
Outstanding Business Effectiveness (OBE)	OBE1	0.789	0.627	0.848
	OBE2	0.814	0.670	
	OBE3	0.834	0.686	
	OBE4	0.886	0.778	
Sustainable Organizational Competitiveness (SOC)	SOC1	0.850	0.727	0.871
	SOC2	0.762	0.611	
	SOC3	0.924	0.846	
	SOC4	0.856	0.736	
Proactive Business Policy (PBP)	PBP1	0.810	0.637	0.837
	PBP2	0.869	0.735	
	PBP3	0.857	0.737	
	PBP4	0.802	0.662	
Top Management Support (TMS)	TMS1	0.887	0.798	0.907
	TMS2	0.922	0.857	
	TMS3	0.946	0.889	
	TMS4	0.814	0.696	

[a]n=30

Table 1B: Item Factor Loading and Reliability Analysis in Pre-Test[a] (Continued)

Construct	Items	Factor Loading	Item Total Correlation	Reliability (Alpha)
Organizational Resource Availability (ORA)	ORA1	0.785	0.600	0.809
	ORA2	0.876	0.756	
	ORA3	0.752	0.548	
	ORA4	0.842	0.694	
Competitive Market Intensity (CMI)	CMI1	0.843	0.710	0.849
	CMI2	0.845	0.675	
	CMI3	0.949	0.896	
	CMI4	0.714	0.531	
Technology Growth Munificence (TGM)	TGM1	0.886	0.749	0.837
	TGM2	0.814	0.640	
	TGM3	0.767	0.616	
	TGM4	0.822	0.688	
Innovative Culture (INC)	INC1	0.653	0.463	0.794
	INC2	0.720	0.521	
	INC3	0.895	0.756	
	INC4	0.873	0.701	

[a]n=30

APPENDIX C

Test of Non-Response Bias

Table 1C: Chi-Square Statistic

Comparison	First Group	Second Group	Value	Pearson Chi-Square Asymp. Sig (2-sided)
Business Model			0.023	0.879
• Limited Companies	116	117		
• Partnership	27	26		
Total	143	143		
Business Location			2.358	0.884
• Bangkok	69	68		
• Northern Region	18	18		
• Central Region	20	15		
• Northeastern Region	10	10		
• Eastern Region	6	6		
• Western Region	12	12		
• Southern Region	8	14		
Total	143	143		
Business Ownership			0.265	0.607
• Thai Affairs	136	134		
• Foreign Affairs	7	9		
Total	143	143		
Operational Capital (Baht)			0.386	0.943
• Less than 25,000,000	110	110		
• 25,000,000 – 50,000,000	21	20		
• 50,000,001 – 75,000,000	5	4		
• More than 75,000,000	7	9		
Total	143	143		
Period of time in operating business (Years)			0.100	0.992
• Less than 5	1	1		
• 5 – 10	6	7		
• 11 – 15	22	21		
• More than 15	114	114		
Total	143	143		

N of Valid Cases = 286

Table 1C: Chi-Square Statistic (Continued)

Comparison	First Group	Second Group	Value	Pearson Chi-Square Asymp. Sig (2-sided)
Number of employees (Persons)			0.000	1.000
• Less than 10	56	56		
• 10 – 50	73	73		
• 51 – 100	6	6		
• More than 100	8	8		
Total	143	143		
Average revenue per year (Baht)			1.167	0.761
• Less than 25,000,000	87	86		
• 25,000,000 – 50,000,000	32	36		
• 50,000,001 – 75,000,000	11	7		
• More than 75,000,000	13	14		
Total	143	143		

N of Valid Cases = 286

APPENDIX D

Test the Assumption of Regression Analysis

Appendix D: Results of testing the basic assumption of regression analysis

Ordinary Least Squares (OLS) regression analysis is employed by SPSS program for test the inter-relationship between independent and dependent variables. The seventeen regression equations are developed from the relation model and the hypotheses that include examined assumption of regression analysis according to Hair and colleagues (2010) as follow: 1) Linearity of phenomenon measured, 2) Constant variance of the error terms (Homoscedasticity), 3) Independence of the error term, 4) Normality of the error term distribution, and 5) Test of multicollinearity. The results of assumption testing are shown following.

1. Linearity of phenomenon measured

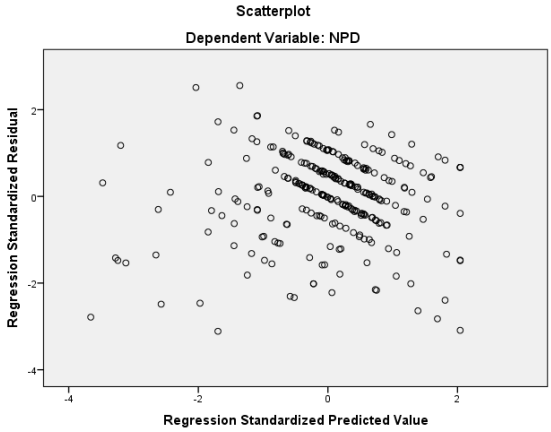
The linearity of the relationship between dependent and independent variables depends on the degree to which the change in the dependent variable is associated with the independent variable. If this assumption is not true, the predicted value of dependent variable will be error. Linearity can be examined in several method such as RESET (Regression Equation Specification Error Test) or Lack of fit. The easily examining for linearity will be using the remaining residual plots. This research establishes a scatter plot of each regression equation that shows the relationship between standardized residual and standardized predicted value. The result of residual plot in all equations that not found linear along the horizontal axis, curvilinear, and tendency line. Therefore, there are nonlinearity problem. In other words, all regression equations, in this research, show that dependent variable has the linearity relationship with independent variable.

2. Constant variance of the error terms (Homoscedasticity)

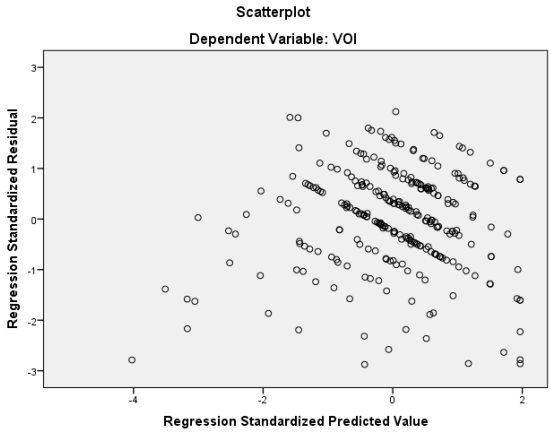
Homoscedasticity refers to the assumption that the variance of dependent variable value must be relatively equal at each value of independent variable, or called the equal variance dispersion. If the variance is unequal across values of independent variable, show that there is heteroscedasticity problem. The statistical test for multivariate analysis of variance that can use to BP (Breusch-Pagan-Godfrey) or Box's M test. However, the best examining for the test of homoscedasticity is graphical of residual plot. In this research, the result from scatter plot of each regression equation represent the relationship value between standardized residual and standardized predicted that

there are no pattern of distribution. Thus, the each model in this research are constant variance of the error terms as follow.

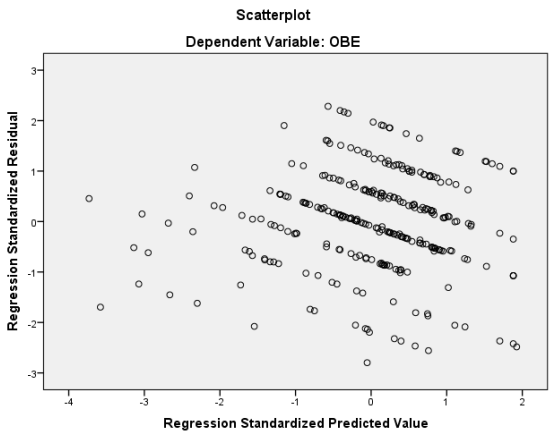
Equation 1: $NPD = \alpha_1+\beta_1 TLC+\beta_2 TAO+\beta_3 TI+\beta_4 TEC+\beta_5 TCA+\beta_6 FA+\beta_7 FS+\varepsilon_1$



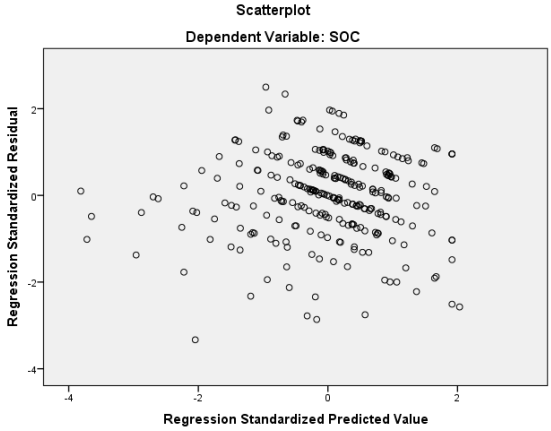
Equation 2: $VOI = \alpha_2+\beta_8 TLC+\beta_9 TAO+\beta_{10} TIF+\beta_{11} TEC+\beta_{12} TCA+\beta_{13} FA+\beta_{14} FS+\varepsilon_2$



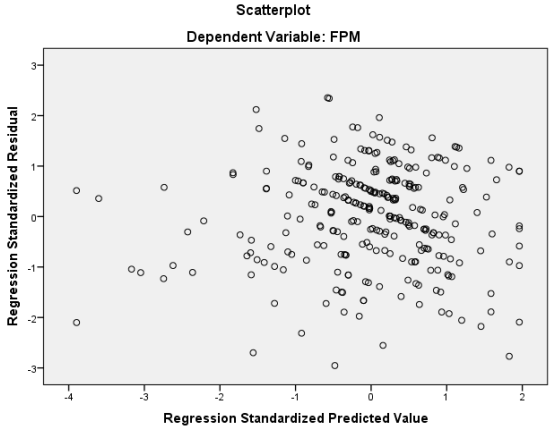
Equation 3: $OBE = \alpha_3+\beta_{15} TLC+\beta_{16} TAO+\beta_{17} TIF+\beta_{18} TEC+\beta_{19} TCA+\beta_{20} FA+\beta_{21} FS+\varepsilon_3$



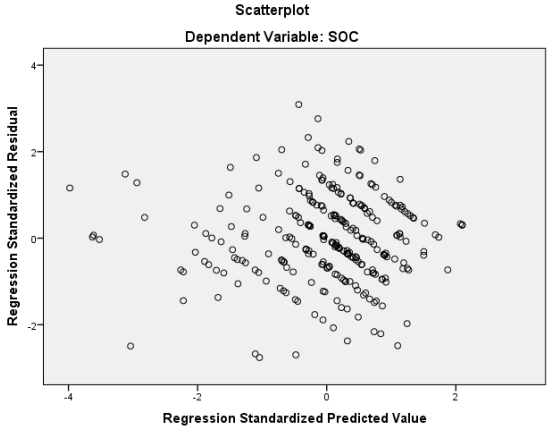
Equation 4: $SOC = \alpha_4+\beta_{22}TLC+\beta_{23}TAO+\beta_{24}TIF+\beta_{25}TEC+\beta_{26}TCA+\beta_{27}FA+\beta_{28}FS+\varepsilon_4$



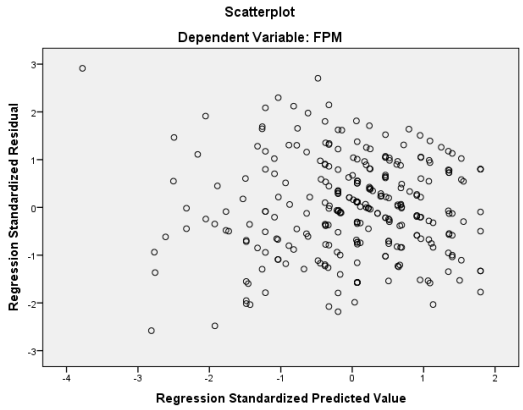
Equation 5: $FPM = \alpha_5+\beta_{29}TLC+\beta_{30}TAO+\beta_{31}TIF+\beta_{32}TEC+\beta_{33}TCA+\beta_{34}FA+\beta_{35}FS+\varepsilon_5$



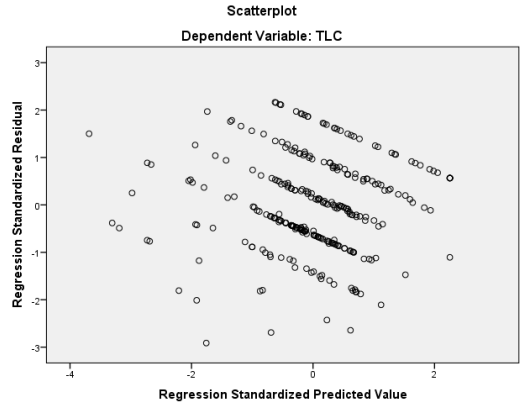
Equation 6: $SOC = \alpha_6+\beta_{36}NPD+\beta_{37}VOI+\beta_{38}OBE+\beta_{39}FA+\beta_{40}FS+\varepsilon_6$



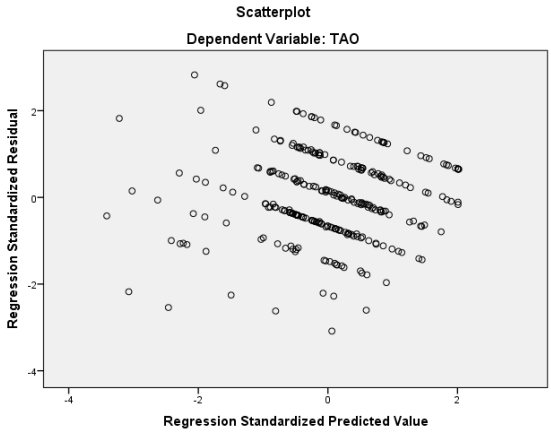
Equation 7: $FPM = \alpha_7+\beta_{41}SOC+\beta_{42}FA+\beta_{43}FS+\varepsilon_7$



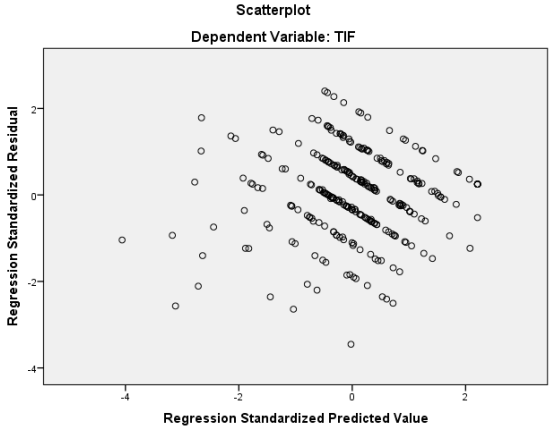
Equation 8: $TLC = \alpha_8+\beta_{44}PBP+\beta_{45}TMS+\beta_{46}ORA+\beta_{47}CMI+\beta_{48}TGM+\beta_{49}FA+\beta_{50}FS+\varepsilon_8$



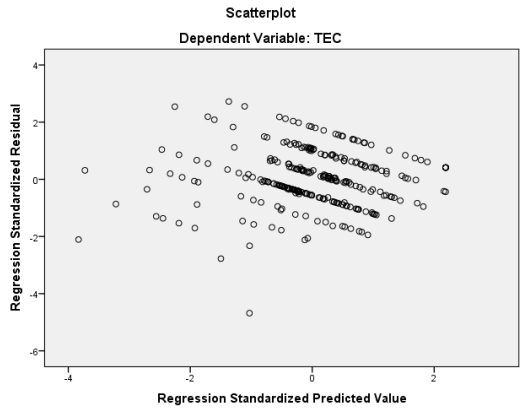
Equation 9: $TAO = \alpha_9+\beta_{51}PBP+\beta_{52}TMS+\beta_{53}ORA+\beta_{54}CMI+\beta_{55}TGM+\beta_{56}FA+\beta_{57}FS+\varepsilon_9$



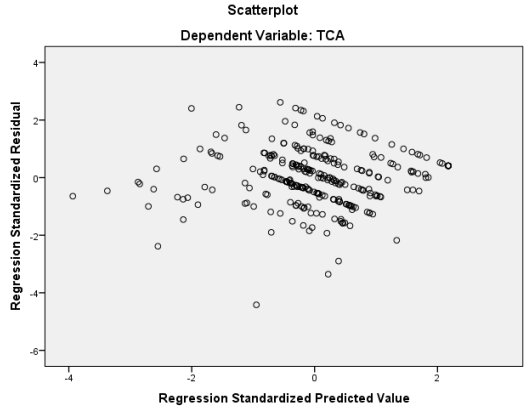
Equation 10: $TIF = \alpha_{10}+\beta_{58}PBP+\beta_{59}TMS+\beta_{60}ORA+\beta_{61}CMI+\beta_{62}TGM+\beta_{63}FA+\beta_{64}FS+\varepsilon_{10}$



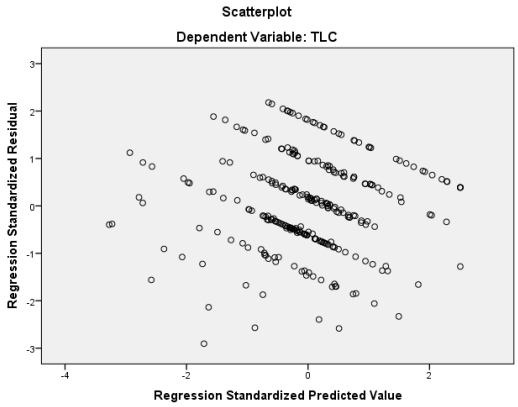
Equation 11: $TEC = \alpha_{11}+\beta_{65}PBP+\beta_{66}TMS+\beta_{67}ORA+\beta_{68}CMI+\beta_{69}TGM+\beta_{70}FA+\beta_{71}FS+\varepsilon_{8}$



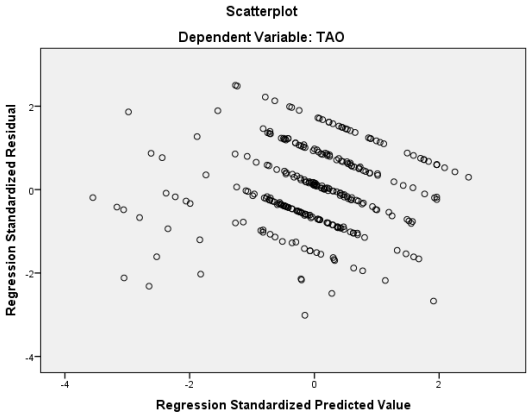
Equation 12: $TCA = \alpha_{12}+\beta_{72}PBP+\beta_{73}TMS+\beta_{74}ORA+\beta_{75}CMI+\beta_{76}TGM+\beta_{77}FA+\beta_{78}FS+\varepsilon_{12}$



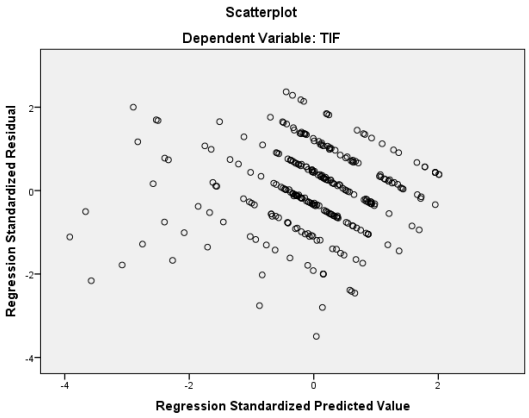
Equation 13: $TLC = \alpha_{13}+\beta_{79}PBP+\beta_{80}TMS+\beta_{81}ORA+\beta_{82}CMI+\beta_{83}TGM+\beta_{84}INC+\beta_{85}(INC*PBP)+\beta_{86}(INC*TMS)+\beta_{87}(INC*ORA)+\beta_{88}(INC*CMI)+\beta_{89}(INC*TGM)+\beta_{90}FA+\beta_{91}FS+\varepsilon_{13}$



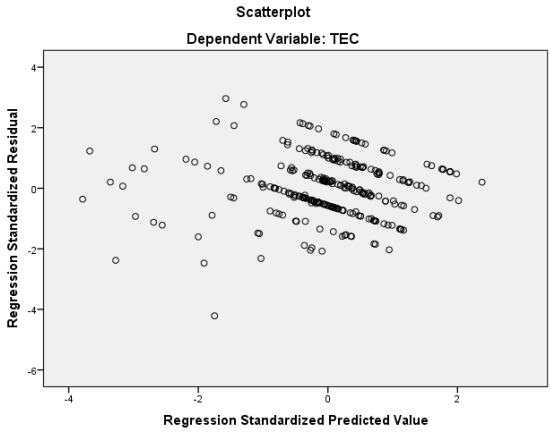
Equation 14: $TAO = \alpha_{14}+\beta_{92}PBP+\beta_{93}TMS+\beta_{94}ORA+\beta_{95}CMI+\beta_{96}TGM+\beta_{97}INC+\beta_{98}(INC*PBP)+\beta_{99}(INC*TMS)+\beta_{100}(INC*ORA)+\beta_{101}(INC*CMI)+\beta_{102}(INC*TGM)+\beta_{103}FA+\beta_{104}FS+\varepsilon_{14}$



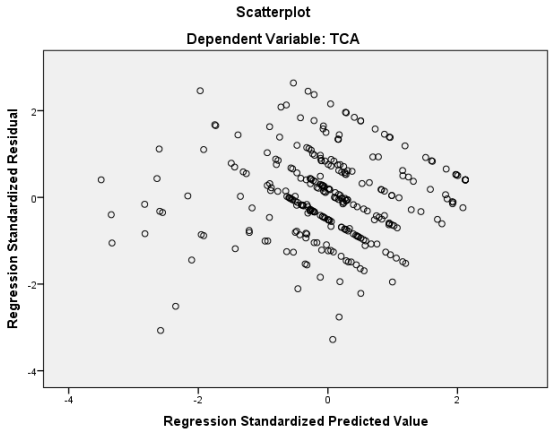
Equation 15: $TIF = \alpha_{15}+\beta_{105}PBP+\beta_{106}TMS+\beta_{107}ORA+\beta_{108}CMI+\beta_{109}TGM+\beta_{110}INC+\beta_{111}(INC*PBP)+\beta_{112}(INC*TMS)+\beta_{113}(INC*ORA)+\beta_{114}(INC*CMI)+\beta_{115}(INC*TGM)+\beta_{116}FA+\beta_{117}FS+\varepsilon_{15}$



Equation 16: $TEC = \alpha_{16} + \beta_{118}PBP + \beta_{119}TMS + \beta_{120}ORA + \beta_{121}CMI + \beta_{122}TGM + \beta_{123}INC + \beta_{124}(INC*PBP) + \beta_{125}(INC*TMS) + \beta_{126}(INC*ORA) + \beta_{127}(INC*CMI) + \beta_{128}(INC*TGM) + \beta_{129}FA + \beta_{130}FS + \varepsilon_{16}$



Equation 17: $TCA = \alpha_{17} + \beta_{131}PBP + \beta_{132}TMS + \beta_{133}ORA + \beta_{134}CMI + \beta_{135}TGM + \beta_{136}INC + \beta_{137}(INC*PBP) + \beta_{138}(INC*TMS) + \beta_{139}(INC*ORA) + \beta_{140}(INC*CMI) + \beta_{141}(INC*TGM) + \beta_{142}FA + \beta_{143}FS + \varepsilon_{17}$



3. Independence of the error terms (Test of Autocorrelation)

Autocorrelation is situation that error term is not independent. Therefore, the independence of the error terms means there are no autocorrelation problem in the relationship between independent variable and dependent variable. Test of autocorrelation is examined by considering Durbin-Watson d statistic that has a value between 1.5 to 2.5 of each regression equation. In this research, the results of Durbin-Watson are about 1.792 – 2.226 to which no autocorrelation all in the equations. In other words, there are independent of the error terms as follow.

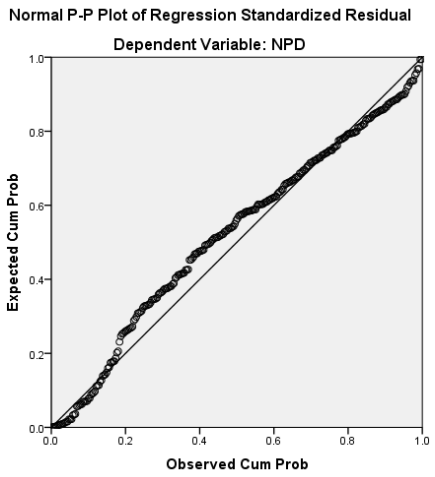
Table 1D: The results of the independence of error terms assumption testing

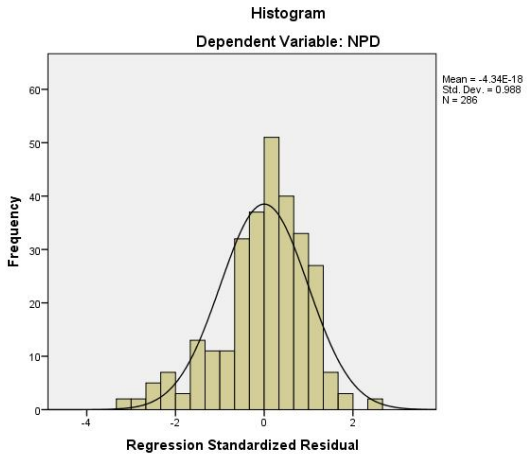
Equation	*Durbin – Watson (d statistics)*
Equation 1: $NPD = \alpha_1+\beta_1 TLC+\beta_2 TAO+\beta_3 TIF+\beta_4 TEC+\beta_5 TCA+\beta_6 FA+\beta_7 FS+\varepsilon_1$	1.832
Equation 2: $VOI = \alpha_2+\beta_8 TLC+\beta_9 TAO+\beta_{10} TIF+\beta_{11} TEC+\beta_{12} TCA+\beta_{13} FA+\beta_{14} FS+\varepsilon_2$	2.016
Equation 3: $OBE = \alpha_3+\beta_{15} TLC+\beta_{16} TAO+\beta_{17} TIF+\beta_{18} TEC+\beta_{19} TCA+\beta_{20} FA+\beta_{21} FS+\varepsilon_3$	1.908
Equation 4: $SOC = \alpha_4+\beta_{22} TLC+\beta_{23} TAO+\beta_{24} TIF+\beta_{25} TEC+\beta_{26} TCA+\beta_{27} FA+\beta_{28} FS+\varepsilon_4$	1.792
Equation 5: $FPM = \alpha_5+\beta_{29} TLC+\beta_{30} TAO+\beta_{31} TIF+\beta_{32} TEC+\beta_{33} TCA+\beta_{34} FA+\beta_{35} FS+\varepsilon_5$	2.122
Equation 6: $SOC = \alpha_6+\beta_{36} NPD+\beta_{37} VOI+\beta_{38} OBE+\beta_{39} FA+\beta_{40} FS+\varepsilon_6$	2.101
Equation 7: $FPM = \alpha_7+\beta_{41} SOC+\beta_{42} FA+\beta_{43} FS+\varepsilon_7$	2.226
Equation 8: $TLC = \alpha_8+\beta_{44} PBP+\beta_{45} TMS+\beta_{46} ORA+\beta_{47} CMI+\beta_{48} TGM+\beta_{49} FA+\beta_{50} FS+\varepsilon_8$	2.070
Equation 9: $TAO = \alpha_9+\beta_{51} PBP+\beta_{52} TMS+\beta_{53} ORA+\beta_{54} CMI+\beta_{55} TGM+\beta_{56} FA+\beta_{57} FS+\varepsilon_9$	2.148
Equation 10: $TIF = \alpha_{10}+\beta_{58} PBP+\beta_{59} TMS+\beta_{60} ORA+\beta_{61} CMI+\beta_{62} TGM+\beta_{63} FA+\beta_{64} FS+\varepsilon_{10}$	2.019
Equation 11: $TEC = \alpha_{11}+\beta_{65} PBP+\beta_{66} TMS+\beta_{67} ORA+\beta_{68} CMI+\beta_{69} TGM+\beta_{70} FA+\beta_{71} FS+\varepsilon_8$	1.929
Equation 12: $TCA = \alpha_{12}+\beta_{72} PBP+\beta_{73} TMS+\beta_{74} ORA+\beta_{75} CMI+\beta_{76} TGM+\beta_{77} FA+\beta_{78} FS+\varepsilon_{12}$	2.073
Equation 13: $TLC= \alpha_{13}+\beta_{79} PBP+\beta_{80} TMS+\beta_{81} ORA+\beta_{82} CMI+\beta_{83} TGM+\beta_{84} INC+ \beta_{85}(INC*PBP)+\beta_{86}(INC*TMS)+\beta_{87}(INC*ORA)+\beta_{88}(INC*CMI)+ \beta_{89}(INC*TGM)+\beta_{90} FA+\beta_{91} FS+\varepsilon_{13}$	2.114
Equation 14: $TAO=\alpha_{14}+\beta_{92} PBP+\beta_{93} TMS+\beta_{94} ORA+\beta_{95} CMI+\beta_{96} TGM+\beta_{97} INC+ \beta_{98}(INC*PBP)+\beta_{99}(INC*TMS)+\beta_{100}(INC*ORA)+\beta_{101}(INC*CMI)+ \beta_{102}(INC*TGM)+\beta_{103} FA+\beta_{104} FS+\varepsilon_{14}$	2.162
Equation 15: $TIF =\alpha_{15}+\beta_{105} PBP+\beta_{106} TMS+\beta_{107} ORA+\beta_{108} CMI+\beta_{109} TGM+\beta_{110} INC+ \beta_{111}(INC*PBP)+\beta_{112}(INC*TMS)+\beta_{113}(INC*ORA)+\beta_{114}(INC*CMI)+ \beta_{115}(INC*TGM)+\beta_{116} FA+\beta_{117} FS+\varepsilon_{15}$	2.024
Equation 16: $TEC =\alpha_{16}+\beta_{118} PBP+\beta_{119} TMS+\beta_{120} ORA+\beta_{121} CMI+\beta_{122} TGM+\beta_{123} INC+ \beta_{124}(INC*PBP)+\beta_{125}(INC*TMS)+\beta_{126}(INC*ORA)+\beta_{127}(INC*CMI)+ \beta_{128}(INC*TGM)+\beta_{129} FA+\beta_{130} FS+\varepsilon_{16}$	1.884
Equation 17: $TCA = \alpha_{17}+\beta_{131} PBP+\beta_{132} TMS+\beta_{133} ORA+\beta_{134} CMI+\beta_{135} TGM+\beta_{136} INC+ \beta_{137}(INC*PBP)+\beta_{138}(INC*TMS)+\beta_{139}(INC*ORA)+\beta_{140}(INC*CMI)+ \beta_{141}(INC*TGM)+\beta_{142} FA+\beta_{143} FS+\varepsilon_{17}$	1.988

4. Normality of the error term distribution

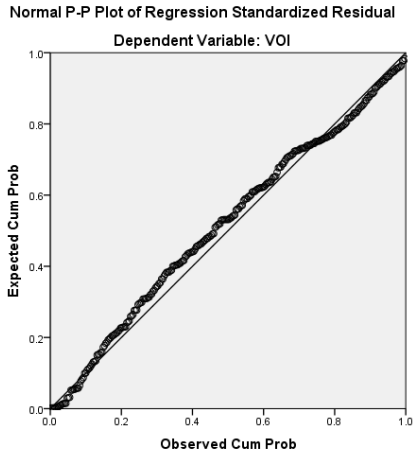
Normality refers to the shape of the data distribution that are normal distribution of an individual metric variable and its correspondence. Examination of normal distribution is both statistical and visual test. This research used a visual check of normal probability plots and the histogram of residuals for the set of independent variables in each the regression equation. The results of all normal probability plots show that the residual line closely follows the diagonal line. Therefore, normality of the error term distribution is in accordance with the assumption.

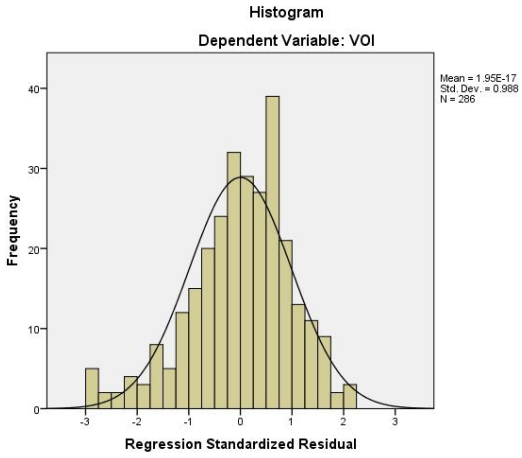
Equation 1: $NPD = \alpha_1+\beta_1 TLC+\beta_2 TAO+\beta_3 TIF+\beta_4 TEC+\beta_5 TCA+\beta_6 FA+\beta_7 FS+\varepsilon_1$



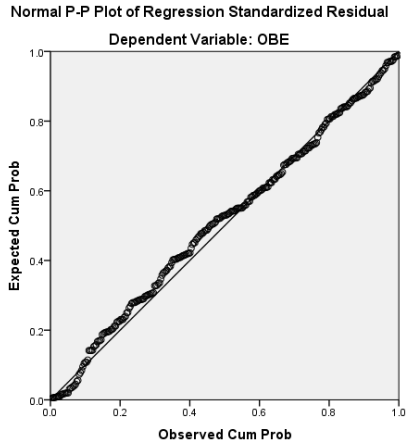


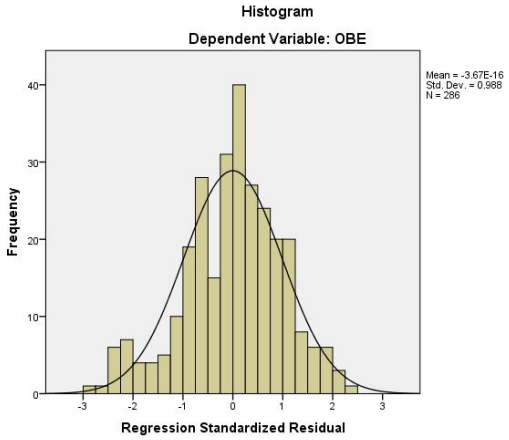
Equation 2: $VOI = \alpha_2+\beta_8 TLC+\beta_9 TAO+\beta_{10} TIF+\beta_{11} TEC+\beta_{12} TCA+\beta_{13} FA+\beta_{14} FS+\varepsilon_2$



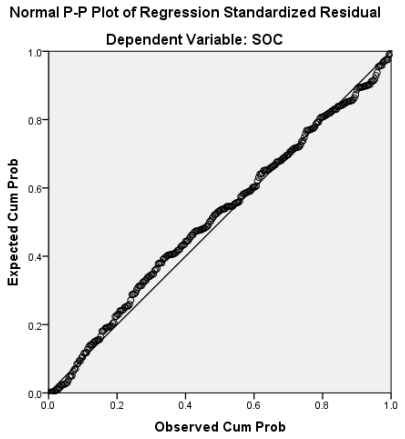


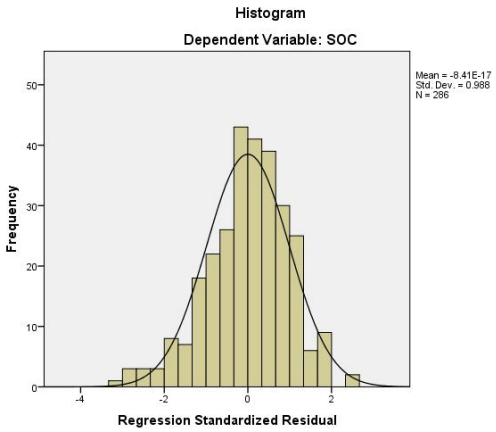
Equation 3: $OBE = \alpha_3+\beta_{15}TLC+\beta_{16}TAO+\beta_{17}TIF+\beta_{18}TEC+\beta_{19}TCA+\beta_{20}FA+\beta_{21}FS+\varepsilon_3$



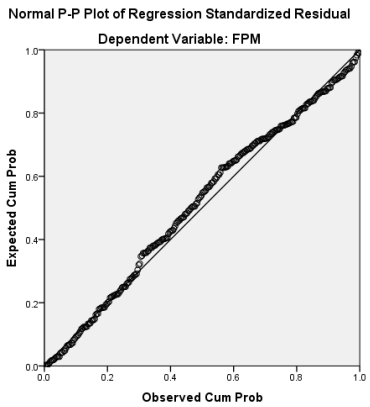


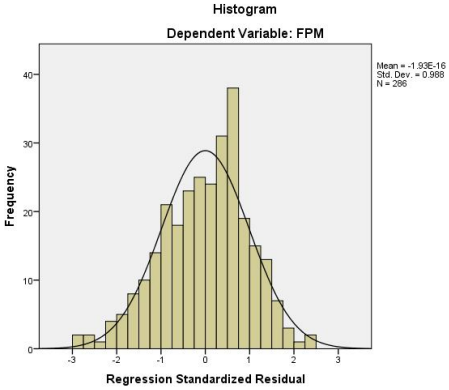
Equation 4: $SOC = \alpha_4+\beta_{22}TLC+\beta_{23}TAO+\beta_{24}TIF+\beta_{25}TEC+\beta_{26}TCA+\beta_{27}FA+\beta_{28}FS+\varepsilon_4$



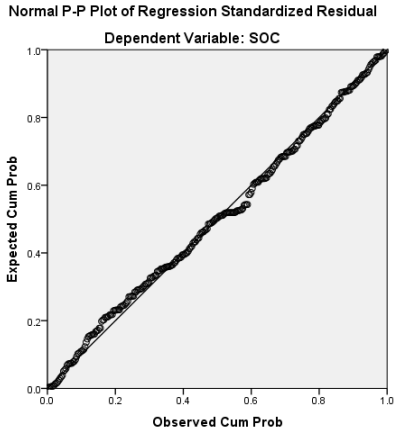


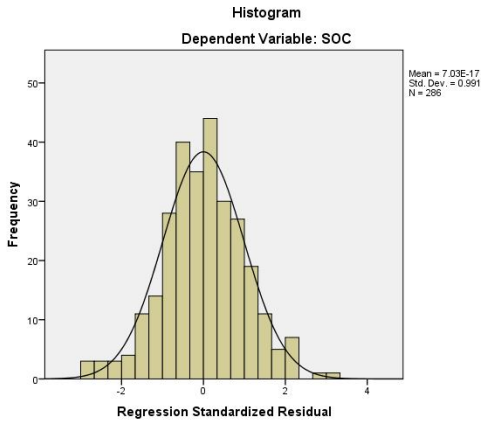
Equation 5: $FPM = \alpha_5+\beta_{29}TLC+\beta_{30}TAO+\beta_{31}TIF+\beta_{32}TEC+\beta_{33}TCA+\beta_{34}FA+\beta_{35}FS+\varepsilon_5$



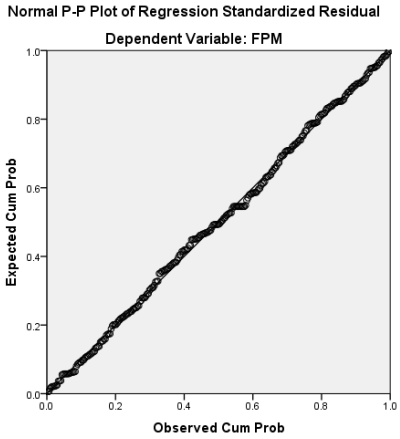


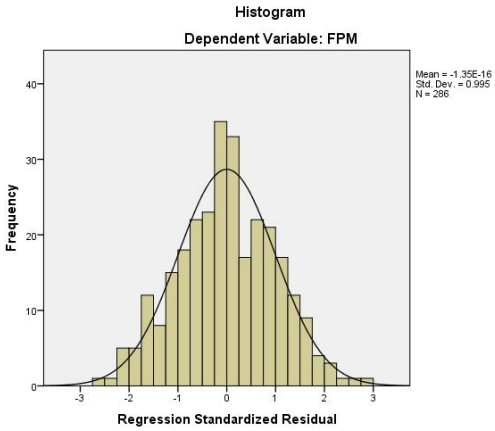
Equation 6: $SOC = \alpha_6+\beta_{36}NPD+\beta_{37}VOI+\beta_{38}OBE+\beta_{39}FA+\beta_{40}FS+\varepsilon_6$



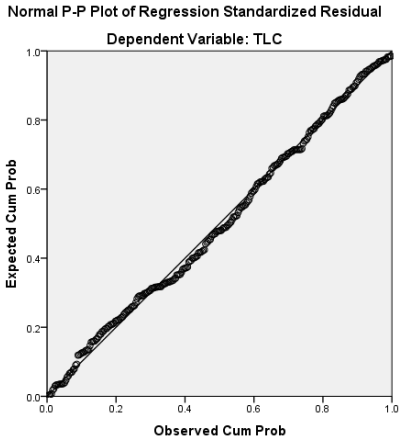


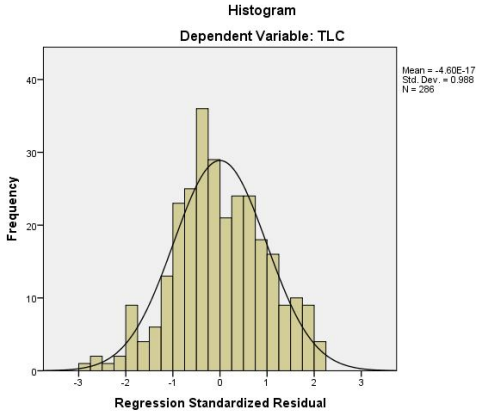
Equation 7: $FPM = \alpha_7+\beta_{41}SOC+\beta_{42}FA+\beta_{43}FS+\varepsilon_7$



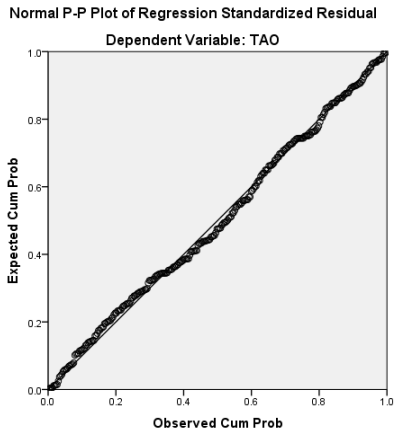


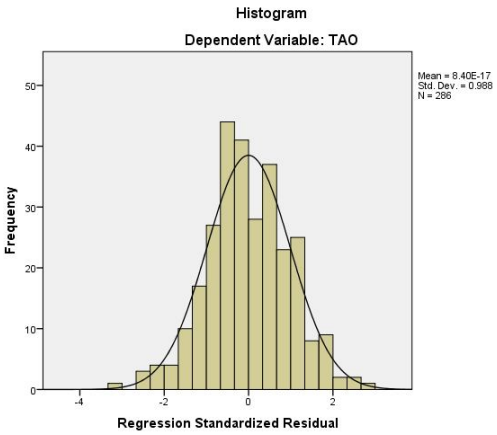
Equation 8: $TLC = \alpha_8+\beta_{44}PBP+\beta_{45}TMS+\beta_{46}ORA+\beta_{47}CMI+\beta_{48}TGM+\beta_{49}FA+\beta_{50}FS+\varepsilon_8$



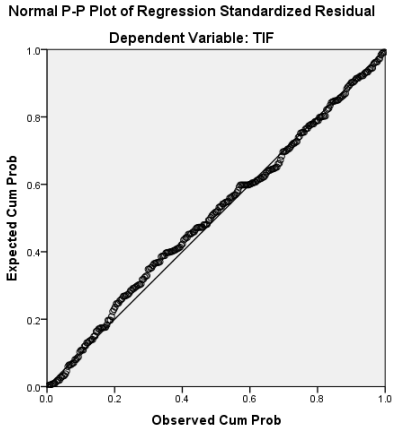


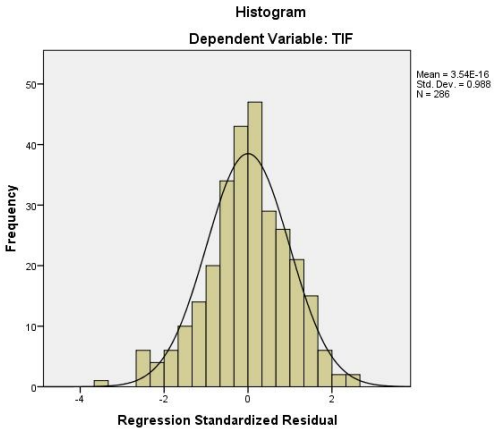
Equation 9: $TAO = \alpha_9+\beta_{51}PBP+\beta_{52}TMS+\beta_{53}ORA+\beta_{54}CMI+\beta_{55}TGM+\beta_{56}FA+\beta_{57}FS+\varepsilon_9$



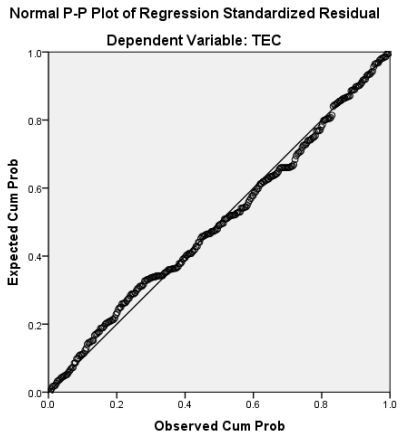


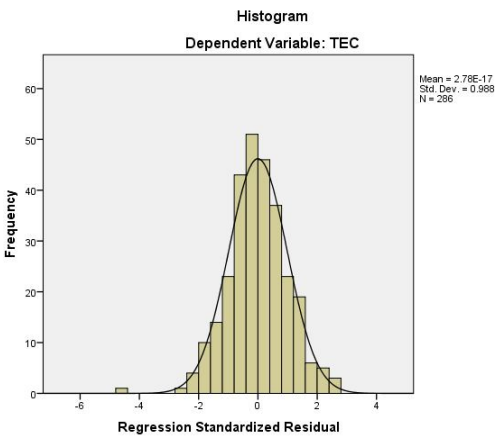
Equation 10: $TIF = \alpha_{10}+\beta_{58}PBP+\beta_{59}TMS+\beta_{60}ORA+\beta_{61}CMI+\beta_{62}TGM+\beta_{63}FA+\beta_{64}FS+\varepsilon_{10}$



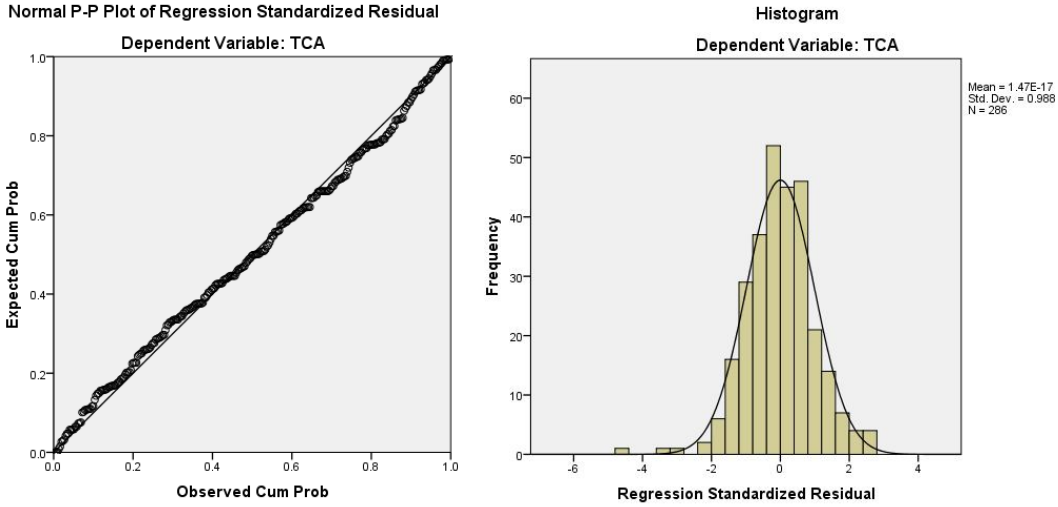


Equation 11: $TEC = \alpha_{11}+\beta_{65}PBP+\beta_{66}TMS+\beta_{67}ORA+\beta_{68}CMI+\beta_{69}TGM+\beta_{70}FA+\beta_{71}FS+\varepsilon_8$

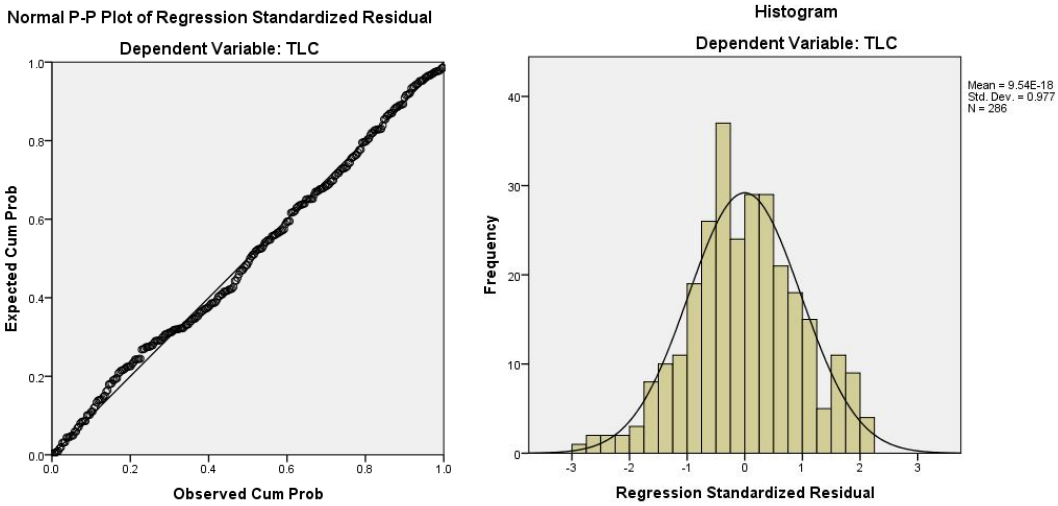




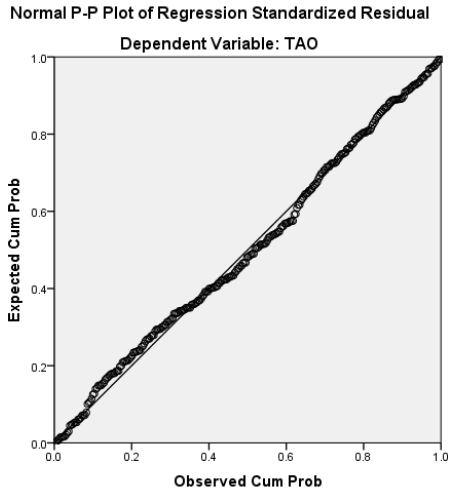
Equation 12: $TCA = \alpha_{12}+\beta_{72}PBP+\beta_{73}TMS+\beta_{74}ORA+\beta_{75}CMI+\beta_{76}TGM+\beta_{77}FA+\beta_{78}FS+\varepsilon_{12}$

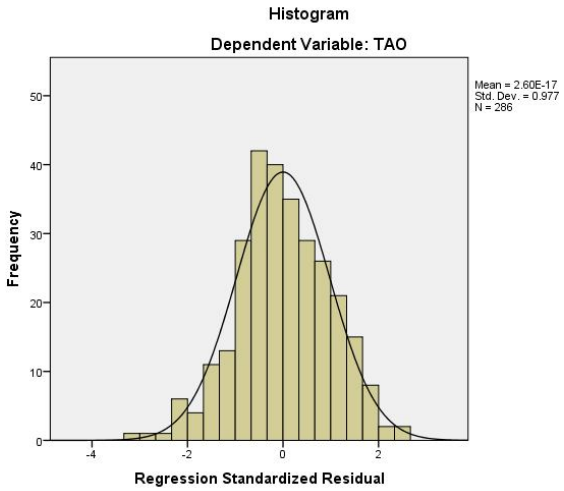


Equation 13: $TLC = \alpha_{13}+\beta_{79}PBP+\beta_{80}TMS+\beta_{81}ORA+\beta_{82}CMI+\beta_{83}TGM+\beta_{84}INC+\beta_{85}(INC*PBP)+\beta_{86}(INC*TMS)+\beta_{87}(INC*ORA)+\beta_{88}(INC*CMI)+\beta_{89}(INC*TGM)+\beta_{90}FA+\beta_{91}FS+\varepsilon_{13}$

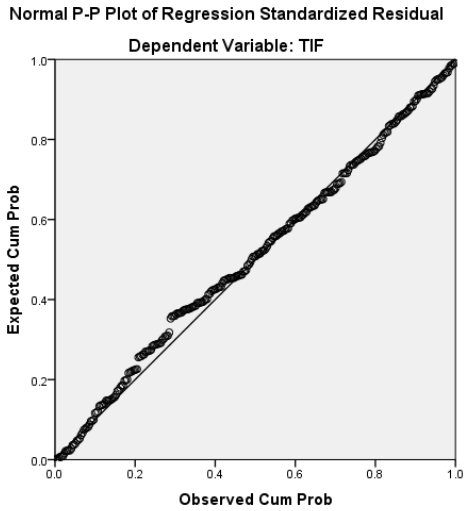


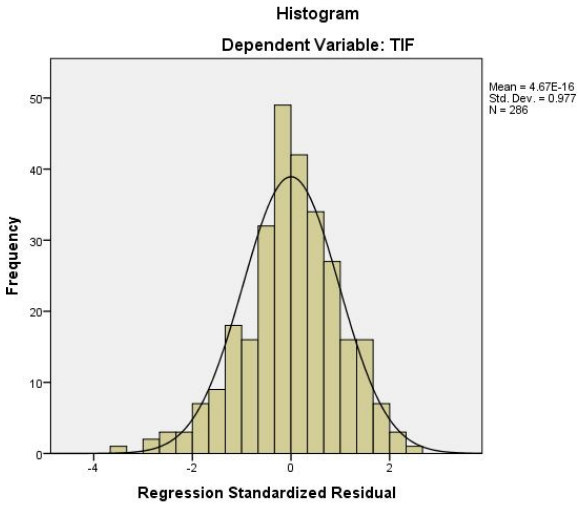
Equation 14: $TAO = \alpha_{14}+\beta_{92}PBP+\beta_{93}TMS+\beta_{94}ORA+\beta_{95}CMI+\beta_{96}TGM+\beta_{97}INC+\beta_{98}(INC*PBP)+\beta_{99}(INC*TMS)+\beta_{100}(INC*ORA)+\beta_{101}(INC*CMI)+\beta_{102}(INC*TGM)+\beta_{103}FA+\beta_{104}FS+\varepsilon_{14}$



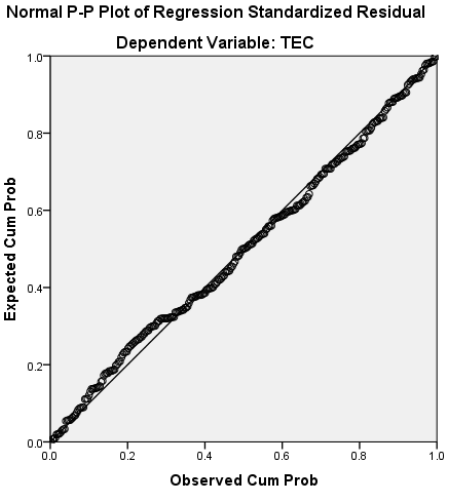


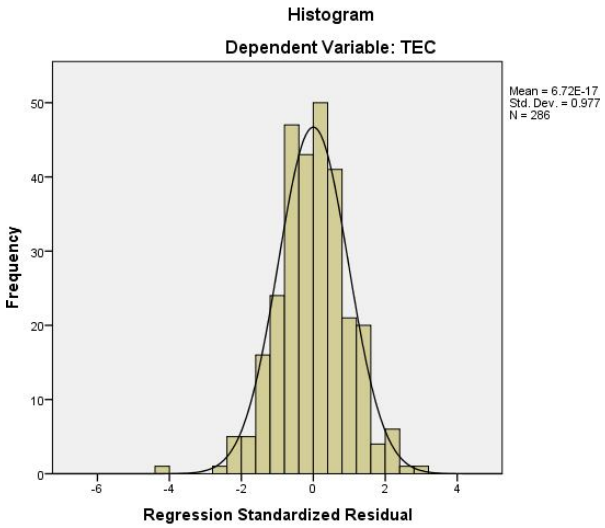
Equation 15: $TIF = \alpha_{15}+\beta_{105}PBP+\beta_{106}TMS+\beta_{107}ORA+\beta_{108}CMI+\beta_{109}TGM+\beta_{110}INC+\beta_{111}(INC*PBP)+\beta_{112}(INC*TMS)+\beta_{113}(INC*ORA)+\beta_{114}(INC*CMI)+\beta_{115}(INC*TGM)+\beta_{116}FA+\beta_{117}FS+\varepsilon_{15}$



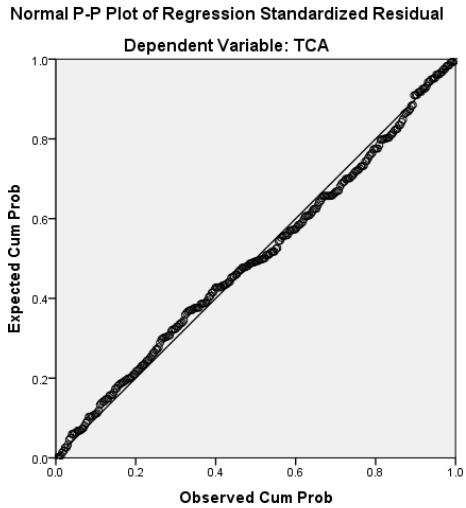


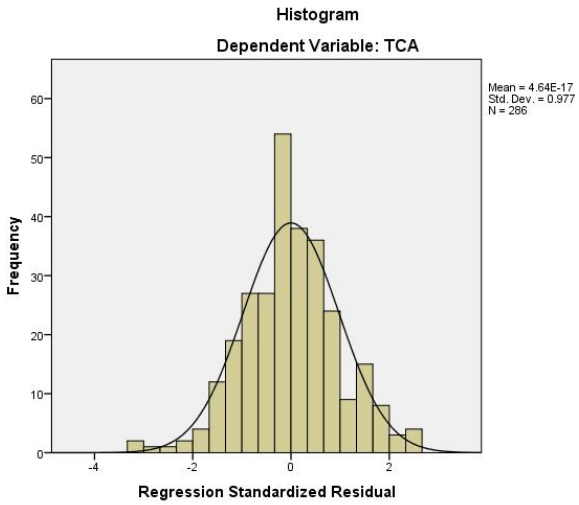
Equation 16: $TEC = \alpha_{16}+\beta_{118}PBP+\beta_{119}TMS+\beta_{120}ORA+\beta_{121}CMI+\beta_{122}TGM+\beta_{123}INC+\beta_{124}(INC*PBP)+\beta_{125}(INC*TMS)+\beta_{126}(INC*ORA)+\beta_{127}(INC*CMI)+\beta_{128}(INC*TGM)+\beta_{129}FA+\beta_{130}FS+\varepsilon_{16}$





Equation 17: $TCA = \alpha_{17}+\beta_{131}PBP+\beta_{132}TMS+\beta_{133}ORA+\beta_{134}CMI+\beta_{135}TGM+\beta_{136}INC+\beta_{137}(INC*PBP)+\beta_{138}(INC*TMS)+\beta_{139}(INC*ORA)+\beta_{140}(INC*CMI)+\beta_{141}(INC*TGM)+\beta_{142}FA+\beta_{143}FS+\varepsilon_{17}$





5. Multicollinearity

To deal with the multicollinearity problem, this research is employed a variance inflation factor (VIF) and a tolerance value as indicators to indicate a high degree of multicollinearity among the independent variables. Regarding Hair and colleagues (2010), a tolerance value must be greater than 0.10 and the VIF should be less than 10, then multicollinearity is not a concerned (Hair et al, 2010). Table 2D, 3D, and 4D illustrate the VIF and tolerance values in each independent variables of construct as show below.

Table 2D: The Results of Multicollinearity Testing (STTC and Its Consequences)

Independent Variables	Dependent Variables													
	NPD		VOI		OBE		SOC		FPM		SOC		FPM	
	Equation 1		Equation 2		Equation 3		Equation 4		Equation 5		Equation 6		Equation 7	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
TLC	0.695	1.440	0.695	1.440	0.695	1.440	0.695	1.440	0.695	1.440				
TAO	0.644	1.552	0.644	1.552	0.644	1.552	0.644	1.552	0.644	1.552				
TIF	0.519	1.927	0.519	1.927	0.519	1.927	0.519	1.927	0.519	1.927				
TEC	0.538	1.860	0.538	1.860	0.538	1.860	0.538	1.860	0.538	1.860				
TCA	0.489	2.046	0.489	2.046	0.489	2.046	0.489	2.046	0.489	2.046				
NPD											0.581	1.721		
VOI											0.450	2.222		
OBE											0.540	1.853		
SOC													0.975	1.026
Firm Age	0.970	1.031	0.970	1.031	0.970	1.031	0.970	1.031	0.970	1.031	0.980	1.021	0.983	1.017
Firm Size	0.954	1.048	0.954	1.048	0.954	1.048	0.954	1.048	0.954	1.048	0.956	1.046	0.969	1.032

Table 3D: The Results of Multicollinearity Testing (STTC and Its Antecedences)

Independent Variables	**Dependent Variables**									
	TLC		TAO		TIF		TEC		TCA	
	Equation 8		Equation 9		Equation 10		Equation 11		Equation 12	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
PBP	0.509	1.966	0.509	1.966	0.509	1.966	0.509	1.966	0.509	1.966
TMS	0.436	2.295	0.436	2.295	0.436	2.295	0.436	2.295	0.436	2.295
ORA	0.629	1.590	0.629	1.590	0.629	1.590	0.629	1.590	0.629	1.590
CMI	0.578	1.730	0.578	1.730	0.578	1.730	0.578	1.730	0.578	1.730
TGM	0.569	1.758	0.569	1.758	0.569	1.758	0.569	1.758	0.569	1.758
Firm Age	0.967	1.032	0.967	1.032	0.967	1.032	0.967	1.032	0.967	1.032
Firm Size	0.938	1.066	0.938	1.066	0.938	1.066	0.938	1.066	0.938	1.066

Table 4D: The Results of Multicollinearity Testing (STTC, Its Antecedences and Moderator)

Independent Variables	**Dependent Variables**									
	TLC		TAO		TIF		TEC		TCA	
	Equation 13		Equation 14		Equation 15		Equation 16		Equation 17	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
PBP	0.454	2.201	0.454	2.201	0.454	2.201	0.454	2.201	0.454	2.201
TMS	0.389	2.572	0.389	2.572	0.389	2.572	0.389	2.572	0.389	2.572
ORA	0.537	1.863	0.537	1.863	0.537	1.863	0.537	1.863	0.537	1.863
CMI	0.533	1.877	0.533	1.877	0.533	1.877	0.533	1.877	0.533	1.877
TGM	0.548	1.826	0.548	1.826	0.548	1.826	0.548	1.826	0.548	1.826
INC	0.462	2.163	0.462	2.163	0.462	2.163	0.462	2.163	0.462	2.163
INC x PBP	0.230	4.350	0.230	4.350	0.230	4.350	0.230	4.350	0.230	4.350
INC x TMS	0.209	4.793	0.209	4.793	0.209	4.793	0.209	4.793	0.209	4.793
INC x ORA	0.441	2.266	0.441	2.266	0.441	2.266	0.441	2.266	0.441	2.266
INC x CMI	0.325	3.080	0.325	3.080	0.325	3.080	0.325	3.080	0.325	3.080
INC x TGM	0.309	3.235	0.309	3.235	0.309	3.235	0.309	3.235	0.309	3.235
Firm Age	0.962	1.040	0.962	1.040	0.962	1.040	0.962	1.040	0.962	1.040
Firm Size	0.889	1.124	0.889	1.124	0.889	1.124	0.889	1.124	0.889	1.124

APPENDIX E

Questionnaire: Thai Version

แบบสอบถามเพื่อการวิจัย

เรื่อง : ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

คำชี้แจง

การวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย ข้าพเจ้าใคร่ขอความอนุเคราะห์จากท่านผู้ตอบแบบสอบถาม ได้โปรดตอบแบบสอบถามชุดนี้ รายละเอียดของแบบสอบถามประกอบด้วยคำถาม 7 ตอน ดังนี้

ตอนที่ 1 ข้อมูลทั่วไปของผู้บริหารธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

ตอนที่ 2 ข้อมูลทั่วไปของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

ตอนที่ 3 ความคิดเห็นเกี่ยวกับศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

ตอนที่ 4 ความคิดเห็นเกี่ยวกับผลการดำเนินงานของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

ตอนที่ 5 ความคิดเห็นเกี่ยวกับปัจจัยภายในที่ส่งผลต่อศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจสารสนเทศและการสื่อสารในประเทศไทย

ตอนที่ 6 ความคิดเห็นเกี่ยวกับปัจจัยภายนอกที่ส่งผลต่อศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจสารสนเทศและการสื่อสารในประเทศไทย

ตอนที่ 7 ความคิดเห็นและข้อเสนอแนะเกี่ยวกับการบริหารจัดการเทคโนโลยีของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

การนำเสนอผลการวิจัยในครั้งนี้จะนำเสนอในลักษณะของภาพรวม โดยไม่มีการเปิดเผยข้อมูลใดๆ ที่ท่านได้ให้มาในแบบสอบถามฉบับนี้ ดังนั้นคำตอบของท่านจะถูกเก็บเป็นความลับ เมื่อท่านตอบแบบสอบถามเสร็จเรียบร้อยแล้ว กรุณาพับใส่ซองจดหมายติดแสตมป์ที่แนบมานี้ ส่งคืนมาตามที่อยู่ที่ระบุไว้ของผู้วิจัยได้โดยตรง อนึ่งหากท่านต้องการรับรายงานสรุปผลการวิจัย โปรดแนบนามบัตรหรือที่อยู่ส่งกลับของท่านมาพร้อมกับแบบสอบถามชุดนี้ ท่านต้องการรายงานสรุปผลการวิจัยหรือไม่

❑ ต้องการ E-mail..... ❑ ไม่ต้องการ

ข้าพเจ้าขอขอบพระคุณที่ท่านได้สละเวลาตอบคำถามทุกข้ออย่างถูกต้องครบถ้วน หากท่านมีข้อสงสัยประการใดเกี่ยวกับแบบสอบถามเพื่อการวิจัยชุดนี้ โปรดติดต่อ นางสาวณัฐอาภา สัจจวาที นิสิตปริญญาเอก สาขาวิชาการจัดการ คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม จังหวัดมหาสารคาม 44150 หมายเลขโทรศัพท์ 081-0581116 E-mail: natarpha.s@mbs.msu.ac.th

ขอขอบพระคุณที่ให้ข้อมูลไว้ ณ โอกาสนี้

(นางสาวณัฐอาภา สัจจวาที)
นิสิตปริญญาเอกหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาการจัดการ
คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม

<u>ตอนที่ 1</u> ข้อมูลทั่วไปของผู้บริหารธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

1. เพศ
   - ❑ ชาย
   - ❑ หญิง

2. อายุ
   - ❑ น้อยกว่า 30 ปี
   - ❑ 30–40 ปี
   - ❑ 41–50 ปี
   - ❑ มากกว่า 50 ปี

3. สถานภาพ
   - ❑ โสด
   - ❑ สมรส
   - ❑ หม้าย/หย่าร้าง

4. ระดับการศึกษา
   - ❑ ปริญญาตรีหรือต่ำกว่า
   - ❑ สูงกว่าปริญญาตรี

5. ประสบการณ์ในการทำงาน
   - ❑ น้อยกว่า 5 ปี
   - ❑ 5-10 ปี
   - ❑ 11-15 ปี
   - ❑ มากกว่า 15 ปี

6. รายได้เฉลี่ยต่อเดือน
   - ❑ ต่ำกว่า 100,000 บาท
   - ❑ 100,000-125,000 บาท
   - ❑ 125,001-150,000 บาท
   - ❑ มากกว่า 150,000 บาท

7. ตำแหน่งงานในปัจจุบัน
   - ❑ กรรมการผู้จัดการ
   - ❑ หุ้นส่วนผู้จัดการ
   - ❑ ผู้จัดการ
   - ❑ อื่น ๆ (โปรดระบุ).....

<u>ตอนที่ 2</u> ข้อมูลทั่วไปเกี่ยวกับธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

1. รูปแบบธุรกิจ
   - ❑ บริษัทจำกัด
   - ❑ ห้างหุ้นส่วน

2. ที่ตั้งของธุรกิจ
   - ❑ กรุงเทพมหานคร
   - ❑ ภาคเหนือ
   - ❑ ภาคกลาง
   - ❑ ภาคตะวันออกเฉียงเหนือ
   - ❑ ภาคตะวันออก
   - ❑ ภาคตะวันตก
   - ❑ ภาคใต้

3. ลักษณะการดำเนินธุรกิจ
   - ❑ กิจการคนไทย
   - ❑ กิจการร่วมทุนกับต่างประเทศ

4. ทุนหมุนเวียนในการดำเนินงาน
   - ❑ ต่ำกว่า 25,000,000 บาท
   - ❑ 25,000,000 - 50,000,000 บาท
   - ❑ 50,000,001 - 75,000,000 บาท
   - ❑ มากกว่า 75,000,000 บาท

5. ระยะเวลาในการดำเนินธุรกิจ
   - ❑ น้อยกว่า 5 ปี
   - ❑ 5 – 10 ปี
   - ❑ 11 – 15 ปี
   - ❑ มากกว่า 15 ปี

6. จำนวนพนักงานทั้งหมดในปัจจุบัน
   - ❑ น้อยกว่า 10 คน
   - ❑ 10 – 50 คน
   - ❑ 51 – 100 คน
   - ❑ มากกว่า 100 คน

7. รายได้เฉลี่ยของกิจการต่อปี
   - ❑ ต่ำกว่า 25,000,000 บาท
   - ❑ 25,000,000 - 50,000,000 บาท
   - ❑ 50,000,001 - 75,000,000 บาท
   - ❑ มากกว่า 75,000,000 บาท

<u>ตอนที่ 3</u> ความคิดเห็นเกี่ยวกับศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ (Strategic Technology Transfer Capability)	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
<u>ศักยภาพการเรียนรู้เทคโนโลยี</u> **<u>(Technology Learning Capability)</u>** 1. กิจการเชื่อมั่นว่าการเรียนรู้เทคโนโลยีอย่างต่อเนื่อง จะช่วยให้กิจการสามารถบริหารงานได้อย่างมีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
2. กิจการส่งเสริมให้มีการศึกษาและทำความเข้าใจเกี่ยวกับเทคโนโลยีใหม่ๆ ที่เกิดขึ้นอย่างเป็นระบบ จะช่วยให้การดำเนินงานบรรลุเป้าหมาย ได้อย่างมีประสิทธิผลมากยิ่งขึ้น	5	4	3	2	1
3. กิจการมุ่งเน้นให้บุคลากรได้เพิ่มทักษะ ความรู้ ความสามารถ และการฝึกอบรมทางด้านเทคโนโลยีอย่างต่อเนื่อง จะช่วยเพิ่มศักยภาพในการดำเนินงานให้สูงขึ้น	5	4	3	2	1
4. กิจการสนับสนุนให้มีการแลกเปลี่ยนความรู้เกี่ยวกับเทคโนโลยีภายในองค์กร จะช่วยให้เกิดการพัฒนาแนวทางปฏิบัติที่สามารถตอบสนองต่อสถานการณ์ต่างๆ ได้ดียิ่งขึ้น	5	4	3	2	1
<u>การมุ่งเน้นการยอมรับเทคโนโลยี</u> **<u>(Technology Acceptance Orientation)</u>** 5. กิจการเชื่อมั่นว่าการมีเทคโนโลยีที่มีประโยชน์และมีคุณค่าต่อการดำเนินงานขององค์กร จะช่วยให้กิจการสามารถบริหารงานให้บรรลุเป้าหมายได้ดียิ่งขึ้น	5	4	3	2	1
6. กิจการตระหนักถึงการใช้เทคโนโลยีที่มีความเหมาะสมในการพัฒนาสินค้าและบริการใหม่ๆ จะช่วยให้เกิดการสร้างความแตกต่างและความได้เปรียบเหนือคู่แข่งขัน	5	4	3	2	1
7. กิจการมุ่งเน้นให้มีการประยุกต์ใช้เทคโนโลยีในการดำเนินงานอย่างต่อเนื่อง จะช่วยให้การปฏิบัติงานขององค์กรมีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
8. กิจการสนับสนุนให้มีการเชื่อมโยงเทคโนโลยีในการดำเนินงานภายในองค์กรเข้าด้วยกันอย่างเป็นระบบ จะช่วยให้การใช้ทรัพยากรและเทคโนโลยีที่มีอยู่ให้เกิดประโยชน์สูงสุด	5	4	3	2	1

ตอนที่ 3 (ต่อ)

ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ (Strategic Technology Transfer Capability)	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
การมุ่งเน้นนวัตกรรมทางเทคโนโลยี (Technology Innovation Focus) 9. กิจการเชื่อมั่นว่าการมีเทคโนโลยีใหม่ๆ ในการดำเนินงานขององค์กรจะช่วยให้กิจการบริหารงานประสบความสำเร็จมากยิ่งขึ้น	5	4	3	2	1
10. กิจการส่งเสริมให้มีการสร้างสรรค์เทคโนโลยีใหม่ๆ ที่เกี่ยวข้องในการปฏิบัติงานให้เกิดขึ้นอยู่เสมอ จะช่วยให้มีประสิทธิภาพในการดำเนินงานเพิ่มมากขึ้น	5	4	3	2	1
11. กิจการมุ่งมั่นในการวิจัยและพัฒนาที่เกี่ยวข้องกับเทคโนโลยีอย่างต่อเนื่อง จะช่วยให้เกิดความสามารถในการแข่งขันได้อย่างยั่งยืน	5	4	3	2	1
12. กิจการตระหนักถึงการจัดสรรงบประมาณด้านเทคโนโลยีใหม่ๆ ที่นำมาใช้ในการดำเนินงานอย่างเพียงพอ จะช่วยให้สามารถบริหารเทคโนโลยีได้อย่างมีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
ความสามารถในการแลกเปลี่ยนเทคโนโลยี (Technology Exchange Competency) 13. กิจการเชื่อมั่นว่าการแลกเปลี่ยนเทคโนโลยีระหว่างกันอย่างเป็นระบบจะช่วยเพิ่มศักยภาพในการทำงานให้บรรลุเป้าหมายมากยิ่งขึ้น	5	4	3	2	1
14. กิจการให้ความสำคัญกับการถ่ายโอนเทคโนโลยีระหว่างกันอย่างเป็นรูปธรรม จะช่วยให้เกิดกระบวนการในการดำเนินงานที่มีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
15. กิจการส่งเสริมให้บุคลากรมีการใช้เทคโนโลยีร่วมกันในการดำเนินงานอยู่เสมอ จะช่วยให้การประสานงานภายในองค์กรมีความถูกต้องแม่นยำและรวดเร็วยิ่งขึ้น	5	4	3	2	1
16. กิจการสนับสนุนให้มีการผสมผสานศักยภาพด้านเทคโนโลยีของแต่ละหน่วยงานเข้าด้วยกัน จะช่วยให้การพัฒนากระบวนการดำเนินงานภายในองค์กรมีความสอดคล้องไปในทิศทางเดียวกัน	5	4	3	2	1

ตอนที่ 3 (ต่อ)

ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ (Strategic Technology Transfer Capability)	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
การตระหนักถึงการเปลี่ยนแปลงเทคโนโลยี (Technology Change Awareness) 17. กิจการเชื่อมั่นว่าเทคโนโลยีจะมีการเปลี่ยนแปลงอยู่เสมอ ซึ่งทำให้กิจการต้องมุ่งเน้นในการศึกษาเรียนรู้ทำความเข้าใจ เพื่อให้เกิดประโยชน์อย่างสูงสุด	5	4	3	2	1
18. กิจการมุ่งมั่นในการเรียนรู้และทำความเข้าใจเทคโนโลยีที่เกิดขึ้นอย่างต่อเนื่อง เพื่อทำให้สามารถนำเทคโนโลยีมาประยุกต์ใช้ในการดำเนินงานได้อย่างเหมาะสม	5	4	3	2	1
19. กิจการให้ความสำคัญกับการคาดการณ์เทคโนโลยีที่อาจจะเกิดขึ้นในอนาคตอย่างเป็นรูปธรรม จะช่วยให้กิจการสามารถบรรลุเป้าหมายและวัตถุประสงค์ที่วางไว้ได้เร็วยิ่งขึ้น	5	4	3	2	1
20. กิจการมุ่งเน้นให้มีการนำข้อมูลเทคโนโลยีในอดีตมาวิเคราะห์อย่างสม่ำเสมอ จะช่วยให้สามารถกำหนดกลยุทธ์ในการดำเนินงานได้สอดคล้องกับสถานการณ์มากยิ่งขึ้น	5	4	3	2	1

ตอนที่ 4 ความคิดเห็นเกี่ยวกับผลการดำเนินงานของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย

ผลการดำเนินงาน	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
การพัฒนาผลิตภัณฑ์ใหม่ (New Product Development) 1. กิจการมีการสร้างสรรค์สินค้าและบริการใหม่ๆ อย่างต่อเนื่อง	5	4	3	2	1
2. กิจการมีการพัฒนาสินค้าและบริการที่มีความแตกต่างและโดดเด่น จากคู่แข่งขันอย่างเห็นได้ชัดเจน	5	4	3	2	1
3. กิจการมีการปรับปรุงสินค้าและบริการให้มีส่วนแบ่งการตลาดเหนือกว่าคู่แข่งขันได้อย่างต่อเนื่อง	5	4	3	2	1

ตอนที่ 4 (ต่อ)

ผลการดำเนินงาน	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
การพัฒนาผลิตภัณฑ์ใหม่ (ต่อ) **(New Product Development)** 4. กิจการมีการขยายขอบเขตและเพิ่มสายการผลิตสินค้าและบริการใหม่ๆ อยู่เสมอ	5	4	3	2	1
การปรับปรุงการปฏิบัติงานที่มีคุณค่า **(Valuable Operational Improvement)** 5.กิจการมีการปรับปรุงพัฒนาแนวทางในการดำเนินงานที่ดีขึ้นอย่างต่อเนื่อง	5	4	3	2	1
6. กิจการมีการดำเนินการพัฒนากระบวนการทำงานให้สอดคล้องกับสถานการณ์ที่เกิดขึ้นได้เป็นอย่างดี	5	4	3	2	1
7. กิจการมีรูปแบบวิธีการทำงานที่มีความทันสมัย รวดเร็ว และมีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
8. กิจการมีการปรับเปลี่ยนวิธีการดำเนินงานให้สามารถบรรลุเป้าหมายในอนาคตได้เร็วยิ่งขึ้น	5	4	3	2	1
ประสิทธิผลของธุรกิจที่โดดเด่น **(Outstanding Business Effectiveness)** 9. กิจการมีการดำเนินงานที่เป็นไปตามเป้าหมายและวัตถุประสงค์ที่ตั้งไว้ได้เป็นอย่างดี	5	4	3	2	1
10. กิจการมีการบริหารจัดการต้นทุนและสิ่งที่ไม่ก่อให้เกิดประโยชน์ได้อย่างมีประสิทธิภาพ	5	4	3	2	1
11. กิจการมีการใช้ประโยชน์จากทรัพยากรที่มีอยู่ได้อย่างเต็มประสิทธิภาพและคุ้มค่า	5	4	3	2	1
12. กิจการมีการบริหารจัดการกระบวนการดำเนินงานที่เป็นเลิศอยู่เสมอ	5	4	3	2	1

ตอนที่ 4 (ต่อ)

ผลการดำเนินงาน	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
ศักยภาพในการแข่งขันขององค์กรอย่างยั่งยืน (Sustainable Organizational Competitiveness) 13. กิจการมีนวัตกรรมสินค้าและบริการที่เกิดขึ้นอย่างต่อเนื่อง	5	4	3	2	1
14. กิจการมีความสามารถตอบสนองความต้องการของลูกค้าได้เป็นอย่างดี	5	4	3	2	1
ศักยภาพในการแข่งขันขององค์กรอย่างยั่งยืน (ต่อ) (Sustainable Organizational Competitiveness) 15. กิจการมีสินค้าและบริการใหม่ๆ ที่มีเอกลักษณ์เฉพาะตัวที่คู่แข่งขันลอกเลียนแบบได้ยาก	5	4	3	2	1
16. กิจการมีการบริหารงานที่โดดเด่นแตกต่างจากคู่แข่งขันอย่างชัดเจน	5	4	3	2	1
ผลการดำเนินงานขององค์กร (Firm Performance) 17. กิจการมีผลการดำเนินงานที่เป็นไปตามเป้าหมายและวัตถุประสงค์ที่วางไว้อย่างชัดเจน	5	4	3	2	1
18. กิจการมีกำไรจากการดำเนินงานดีขึ้นอย่างต่อเนื่อง	5	4	3	2	1
19. กิจการมีส่วนแบ่งทางการตลาดเพิ่มสูงขึ้นเมื่อเทียบกับปีที่ผ่านมา	5	4	3	2	1
20. กิจการมีลูกค้าเก่ากลับมาซื้อสินค้าหรือใช้บริการอย่างต่อเนื่อง	5	4	3	2	1
21. กิจการมีลูกค้าใหม่เพิ่มขึ้นอย่างต่อเนื่องทุกปี	5	4	3	2	1
22. กิจการมั่นใจว่าจะสามารถอยู่รอดได้อย่างมั่นคงในการดำเนินงานในอนาคต	5	4	3	2	1

<u>ตอนที่ 5</u> ความคิดเห็นเกี่ยวกับปัจจัยภายในที่ส่งผลต่อศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจสารสนเทศและการสื่อสารในประเทศไทย

ปัจจัยภายในที่ส่งผลต่อ ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
<u>นโยบายการดำเนินธุรกิจเชิงรุก</u> **<u>(Proactive Business Policy)</u>** 1. กิจการเชื่อมั่นว่าการวางแผนการดำเนินธุรกิจที่มุ่งไปในอนาคต จะช่วยให้การบริหารงานเพิ่มประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
2. กิจการมุ่งมั่นในการแสวงหาวิธีการดำเนินงานใหม่ๆ อย่างไม่หยุดนิ่ง จะช่วยให้ผลการดำเนินงานมีการเติบโตอย่างต่อเนื่อง	5	4	3	2	1
3. กิจการสนับสนุนให้มีการคิดค้นสินค้าและบริการใหม่ๆ อยู่เสมอ จะช่วยให้กิจการมีความสามารถในการแข่งขันมากยิ่งขึ้น	5	4	3	2	1
4. กิจการให้ความสำคัญกับการลงทุนด้านเทคโนโลยีในการพัฒนาและปรับปรุงการทำงานอย่างต่อเนื่อง จะช่วยให้การดำเนินงานมีประสิทธิภาพและประสิทธิผลเพิ่มมากขึ้น	5	4	3	2	1
<u>การสนับสนุนของผู้บริหารระดับสูง</u> **<u>(Top Management Support)</u>** 5. ผู้บริหารกิจการเชื่อมั่นว่าการมีการพัฒนาองค์กรอย่างต่อเนื่องอยู่เสมอ จะช่วยให้กิจการประสบความสำเร็จได้เร็วยิ่งขึ้น	5	4	3	2	1
6. ผู้บริหารกิจการมุ่งมั่นให้มีการจัดโครงสร้างการทำงานให้เป็นระบบมากยิ่งขึ้น จะช่วยให้การดำเนินงานขององค์กรเป็นไปด้วยดีและบรรลุวัตถุประสงค์ที่วางไว้	5	4	3	2	1
7. ผู้บริหารกิจการส่งเสริมให้มีการลงทุนในการวิจัยและพัฒนาอย่างต่อเนื่อง จะช่วยสร้างโอกาสในการเติบโตของกิจการต่อไปในอนาคต	5	4	3	2	1
8. ผู้บริหารกิจการให้ความสำคัญกับการพัฒนาบุคลากรให้มีความรู้ความเข้าใจในงานที่ทำได้เป็นอย่างดี จะช่วยให้การดำเนินงานเกิดประสิทธิภาพสูงสุด	5	4	3	2	1

ตอนที่ 5 (ต่อ)

ปัจจัยภายในที่ส่งผลต่อ ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
ความเพียบพร้อมในทรัพยากรขององค์กร (Organizational Resource Availability) 9. กิจการเชื่อมั่นว่าการมีทรัพยากรที่เพียบพร้อม จะช่วยให้การดำเนินงานบรรลุเป้าหมายได้ดียิ่งขึ้น	5	4	3	2	1
10. กิจการมุ่งเน้นให้บุคลากรมีความพร้อมในการปฏิบัติงานได้อย่างต่อเนื่อง จะช่วยให้การดำเนินงานมีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
11. กิจการมีการจัดสรรงบประมาณในด้านต่างๆ อย่างเหมาะสม จะช่วยให้กิจการมีศักยภาพในการแข่งขันมากยิ่งขึ้น	5	4	3	2	1
12. กิจการให้ความสำคัญกับการนำความรู้มาประยุกต์ใช้ให้เกิดประโยชน์ในการดำเนินงาน จะช่วยให้กิจการประสบความสำเร็จได้ดียิ่งขึ้น	5	4	3	2	1
วัฒนธรรมเชิงนวัตกรรม (Innovative Culture) 13. กิจการเชื่อมั่นว่าการมีวัฒนธรรมองค์กรที่เน้นการสร้างสรรค์และพัฒนาสิ่งใหม่ จะช่วยให้กิจการเติบโตก้าวหน้าได้เร็วยิ่งขึ้น	5	4	3	2	1
14. กิจการส่งเสริมให้มีการสร้างบรรยากาศที่เหมาะสมในการทำงาน จะช่วยให้บุคลากรเกิดความคิดสร้างสรรค์ในการหาแนวทางการปฏิบัติงานใหม่ๆ ที่มีประสิทธิภาพและบรรลุเป้าหมายได้ดียิ่งขึ้น	5	4	3	2	1
15. กิจการสนับสนุนให้บุคลากรเข้ามามีส่วนร่วมในการปรับปรุงการดำเนินงานอยู่เสมอ เพื่อให้เกิดรูปแบบการทำงานที่ต่างจากเดิมและมีประสิทธิภาพมากยิ่งขึ้น	5	4	3	2	1
16. กิจการตระหนักถึงความสำคัญในการแลกเปลี่ยนเรียนรู้แนวคิดใหม่ๆ ระหว่างบุคลากร ซึ่งจะทำให้เกิดการพัฒนากระบวนการทำงานได้อย่างต่อเนื่อง	5	4	3	2	1

<u>ตอนที่ 6</u> ความคิดเห็นเกี่ยวกับปัจจัยภายนอกที่ส่งผลต่อศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจสารสนเทศและการสื่อสารในประเทศไทย

ปัจจัยภายนอกที่ส่งผลต่อ ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
<u>ความเข้มข้นในตลาดการแข่งขัน</u> **<u>(Competitive Market Intensity)</u>** 1. ในปัจจุบันการแข่งขันในตลาดมีความรุนแรงอย่างต่อเนื่อง ทำให้กิจการต่างๆ ต้องมุ่งเน้นในการพัฒนาบริหารการจัดการให้มีประสิทธิภาพมากขึ้น	5	4	3	2	1
2. ลูกค้ามีความต้องการที่หลากหลาย ทำให้กิจการต่างๆ ต้องมีการศึกษาวิจัยและพัฒนาอย่างต่อเนื่อง เพื่อตอบสนองความต้องการของลูกค้าได้ทันท่วงที	5	4	3	2	1
3. คู่แข่งขันมีความสามารถทางการแข่งขันสูง ทำให้กิจการต่างๆ ต้องมุ่งเน้นในการปรับปรุงและพัฒนาองค์กร เพื่อช่วยให้กิจการมีความได้เปรียบในการแข่งขัน	5	4	3	2	1
4. คู่แข่งขันรายใหม่มีจำนวนมากขึ้นและเกิดขึ้นอย่างต่อเนื่อง ทำให้กิจการต่างๆ ต้องมุ่งมั่นในการสร้างสรรค์กลยุทธ์และแนวทางในการดำเนินงานอยู่เสมอ	5	4	3	2	1
<u>การเอื้อต่อการเติบโตทางเทคโนโลยี</u> **<u>(Technology Growth Munificence)</u>** 5. ในปัจจุบันเทคโนโลยีมีการเจริญเติบโตอย่างต่อเนื่อง ทำให้กิจการต่างๆ สามารถประยุกต์ใช้เทคโนโลยีดังกล่าวเพื่อช่วยในการบริหารงานได้ดียิ่งขึ้น	5	4	3	2	1
6. เทคโนโลยีมีความหลากหลายและสอดคล้องกับการปฏิบัติงานได้เป็นอย่างดี ทำให้กิจการต่างๆ สามารถเลือกสรรเทคโนโลยีที่เหมาะสมและมีประโยชน์ต่อองค์กรได้มากยิ่งขึ้น	5	4	3	2	1
7. เทคโนโลยีมีความทันสมัย หาง่าย และราคาถูกกว่าในอดีต ทำให้กิจการต่างๆ สามารถนำมาใช้ประยุกต์ในกิจกรรมต่างๆ ได้สะดวกและรวดเร็วมากยิ่งขึ้น	5	4	3	2	1

ตอนที่ 6 (ต่อ)

ปัจจัยภายนอกที่ส่งผลต่อ ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์	ระดับความคิดเห็น				
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
	5	4	3	2	1
การเอื้อต่อการเติบโตทางเทคโนโลยี (ต่อ) **(Technology Growth Munificence)** 8. เทคโนโลยีมีการพัฒนาอย่างต่อเนื่อง ทำให้กิจการต่างๆ สามารถบูรณาการการใช้เทคโนโลยีในการเสริมสร้างสมรรถนะ คุณภาพ และประสิทธิภาพการดำเนินงานได้อย่างครอบคลุมทั่วทั้งองค์กร	5	4	3	2	1

ตอนที่ 7 **ความคิดเห็นและข้อเสนอแนะเกี่ยวกับการบริหารจัดการเทคโนโลยีของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

ขอขอบพระคุณเป็นอย่างสูงที่ท่านกรุณาสละเวลาตอบแบบสอบถามทุกข้อ
และได้โปรดพับแบบสอบถามและใส่ซองที่แนบมาพร้อมนี้ ส่งคืนผู้วิจัยตามที่อยู่ที่ได้ระบุ

APPENDIX F

Questionnaire: English Version

Questionnaire to the Ph. D. Dissertation Research
"Strategic Technology Transfer Capability and Firm Performance of Information and Communication Technology Businesses in Thailand"

Explanations:

The objective of this research is to investigate "strategic technology transfer capability of information and communication technology businesses in Thailand." The researcher may assistance you to answer the questionnaire with consist of 7 sections as below.

Section 1: Personal information about executive of information and communication technology businesses in Thailand.

Section 2: General information about information and communication technology businesses in Thailand.

Section 3: Opinion on strategic technology transfer capability of information and communication technology businesses in Thailand.

Section 4: Opinion on business outcomes of information and communication technology businesses in Thailand.

Section 5: Opinion on the internal factor that impact on strategic technology transfer capability of information and communication technology businesses in Thailand.

Section 6: Opinion on the external factor that impact on strategic technology transfer capability of information and communication technology businesses in Thailand.

Section 7: Recommendations and suggestions regarding technology management of information and communication technology businesses in Thailand.

Your answer will be kept as confidentiality and your information will not be shared with any outsider party without your permission.

If you want a summary of this research, please indicate your E-mail address or attach your business card with this questionnaire. The summary will be mailed to you as soon as the analysis is completed. Contact Info: Miss. Natarpha Satchawatee, Ph.D. dissertation of branch of management, Mahasarakham Business School, Mahasarakham University, Mahasarakham, Thailand 44150 Cell phone: 081-058-1116
E-mail: natarpha.s@mbs.msu.ac.th

Thank you for your time answering all the questions. I have no doubt that your answer will provide valuable information for academic advancement. If you have any questions with respect to this, please contact researcher directly.

Sincerely yours,

(Natarpha Satchawatee)
Ph.D. Candidate
Mahasarakham Business School
Mahasarakham University, Thailand

Section 1: Personal information about executives of information and communication technology businesses in Thailand

1. Gender
   - ❑ Male
   - ❑ Female

2. Age
   - ❑ Less than 30 years old
   - ❑ 30 – 40 years old
   - ❑ 41 – 50 years old
   - ❑ More than 50 years old

3. Marital Status
   - ❑ Single
   - ❑ Married
   - ❑ Divorced

4. Level of education
   - ❑ Bachelor's degree or lower
   - ❑ Higher than Bachelor's degree

5. Working experiences
   - ❑ Less than 5 years
   - ❑ 5 – 10 years
   - ❑ 11 – 15 years
   - ❑ More than 15 years

6. Average revenues per month
   - ❑ Less than 100,000 Baht
   - ❑ 100,000-125,000 Baht
   - ❑ 125,001-150,000 Baht
   - ❑ More than 150,000 Baht

7. Current position
   - ❑ Managing director
   - ❑ Partner director
   - ❑ Manager
   - ❑ Other (Please Specify).....

Section 2: General information about information and communication technology businesses in Thailand

1. Business Type
   - ❑ Company limited
   - ❑ Partnership

2. Business Location
   - ❑ Bangkok
   - ❑ Central Region
   - ❑ Eastern Region
   - ❑ Southern Region
   - ❑ Northern Region
   - ❑ North-Eastern Region
   - ❑ Western Region

3. Business Ownership
   - ❑ Thai Affairs
   - ❑ Foreign Affairs

4. Operational Capital
   - ❑ Less than 25,000,000 Baht
   - ❑ 50,000,001-75,000,000 Baht
   - ❑ 25,000,000-50,000,000 Baht
   - ❑ More than 75,000,000 Baht

5. The period of time in business
   - ❑ Less than 5 years
   - ❑ 11 – 15 years
   - ❑ 5 – 10 years
   - ❑ More than 15 years

6. Number of full-time employee
   - ❑ Less than 10 employees
   - ❑ 51 – 100 employees
   - ❑ 10 – 50 employees
   - ❑ More than 100 employees

7. Firm's average revenues per year
   - ❑ Less than 25,000,000 Baht
   - ❑ 50,000,001-75,000,000 Baht
   - ❑ 25,000,000-50,000,000 Baht
   - ❑ More than 75,000,000 Baht

Section 3: Opinion on strategic technology transfer capability of information and communication technology businesses in Thailand

Strategic Technology Transfer Capability	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
Technology Learning Capability					
1. Firm believes that continuous technology learning helps administration of the firm more effectively.	5	4	3	2	1
2. Firm encourages the systematic education and understanding of new technologies to be more productive of achieving the goal.	5	4	3	2	1
3. Firm emphasizes the continuous technology improvement of employees' skills, knowledge, ability, and training to increase the operational potential.	5	4	3	2	1
4. Firm supports the exchange of knowledge about technology within the organization to help develop better practices that respond to situations.	5	4	3	2	1
Technology Acceptance Orientation					
5. Firm believes that its technology is useful and valuable to the organization's operations to help firm to better manage its work.	5	4	3	2	1
6. Firm recognizes the use of appropriate technology to develop new products and services that will allow for differentiation and advantage over competitors.	5	4	3	2	1
7. Firm emphasizes the continually applying technology to operations that will help organization's performance more effectively.	5	4	3	2	1

Section 3 (Continued)

Strategic Technology Transfer Capability	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
Technology Acceptance Orientation (Cont.) 8. Firm supports to integrate technology in a systematic way across the organization to maximize the use of resources and technology.	5	4	3	2	1
Technology Innovation Focus 9. Firm believes that having new technology in the operation of the organization will help the management business to be more successful.	5	4	3	2	1
10. Firm encourages the creation of new technologies that are relevant to their operations are always helping to increase operational efficiency.	5	4	3	2	1
11. Firm strives to continuous research and development in the field of technology that will enable sustainable competitiveness.	5	4	3	2	1
12. Firm realizes that the allocation of new technology budgets which are sufficiently used in the operation that will help them to manage the technology more effectively.	5	4	3	2	1
Technology Exchange Competency 13. Firm believes that a systematic exchange of technology to increase the potential of the work to achieve more goals.	5	4	3	2	1
14. Firm focuses on the transfer of technology in a tangible way that helps to achieve a more efficient operational process.	5	4	3	2	1
15. Firm encourages employees to use technology in the same way that helps them to coordinate their work faster and more accurately.	5	4	3	2	1

Section 3 (Continued)

Strategic Technology Transfer Capability	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
Technology Exchange Competency (Cont.) 16. Firm supports the integration of the technology capabilities of each unit together that helps the development of internal processes in the organization consistent in the same direction.	5	4	3	2	1
Technology Change Awareness 17. Firm believes that technology is always changing, which means that businesses must focus on learning, understanding, and maximizing the benefits.	5	4	3	2	1
18. Firm realizes that learning and understanding the technology are constantly evolving to enable technology to be applied in the proper operation.	5	4	3	2	1
19. Firm focuses on predictable technology in the future in a tangible way that helps the company achieve its goals and objectives more quickly.	5	4	3	2	1
20. Firm emphasizes the use of historical technology in their analyses on a regular basis that will be able to better align operational strategies with the situation.	5	4	3	2	1

Section 4: Opinion on business outcomes of information and communication technology businesses in Thailand

Business Outcome	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
New Product Development					
1. Firm is constantly creating new products and services.	5	4	3	2	1
2. Firm develops products and services that are different and distinctive from the competitors clearly.	5	4	3	2	1
3. Firm has improved its products and services to continue to more market share from competitors.	5	4	3	2	1
4. Firm has always expanded its scope and added new production lines of new products and services.	5	4	3	2	1
Valuable Operational Improvement					
5. Firm has continuously improved its approach to operations.	5	4	3	2	1
6. Firm has developed work processes to suit the situation as well.	5	4	3	2	1
7. Firm has a modern, faster, and more efficient way of working.	5	4	3	2	1
8. Firm has changed its way of working to achieve its goals in the future faster.	5	4	3	2	1
Outstanding Business Effectiveness					
9. Firm has a good track record on its goals and objectives.	5	4	3	2	1
10. Firm manages cost and non-performance effectively.	5	4	3	2	1
11. Firm makes full use of available resources and cost effectively.	5	4	3	2	1

Section 4 (Continued)

Business Outcome	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
Outstanding Business Effectiveness (Cont.) 12. Firm always manages the process of excellence.	5	4	3	2	1
Sustainable Organizational Competitiveness 13. Firm is constantly innovating its products and services.	5	4	3	2	1
14. Firm has ability to meet the needs of customers as well.	5	4	3	2	1
15. Firm has new products and services that are unique and difficult to imitate competitors.	5	4	3	2	1
16. Firm has a distinct management from its competitors.	5	4	3	2	1
Firm Performance 17. Firm has a performance that meets its goals and objectives clearly.	5	4	3	2	1
18. Firm has continued to profit from its operations.	5	4	3	2	1
19. Firm's market share has increased compared to last year.	5	4	3	2	1
20. Firm has old customers back to buy goods or use the service continuously.	5	4	3	2	1
21. Firm has new customers increasing continuously every year.	5	4	3	2	1
22. Firm is confident that it will be able to survive in the future.	5	4	3	2	1

Section 5: Opinion on the internal factor that impact on strategic technology transfer capability of information and communication technology businesses in Thailand

Internal factor	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Agree 5
Proactive Business Policy					
1. Firm believes that future business planning that helps to make management more efficient.	5	4	3	2	1
2. Firm strives to find new ways of doing business in a dynamic way.	5	4	3	2	1
3. Firm supports the development of new products and services that help them to be more competitive.	5	4	3	2	1
4. Firm gives important to technology investments in continual improvement and development that help ensure greater efficiency and effectiveness.	5	4	3	2	1
Top Management Support					
5. Firm executive believes that continued organizational development that helps businesses succeed faster.	5	4	3	2	1
6. Firm executive strives to a more structured workflow that will enable the organization to function well and achieve its objectives.	5	4	3	2	1
7. Firm executive encourages continually investing in research and development that continues growing in the future.	5	4	3	2	1
8. Firm executive gives importance to the development of human resources to ensure that they are well-versed in their work.	5	4	3	2	1

Section 5 (Continued)

Internal factor	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
Organizational Resource Availability					
9. Firm believes that having a well-equipped resource helps to achieve its goals.	5	4	3	2	1
10. Firm emphasizes to continue workforce availability and will enable greater efficiency.	5	4	3	2	1
11. Firm has the appropriateness of the budget allocation that helps to be more competitive.	5	4	3	2	1
12. Firm focuses on applying knowledge to the benefits of operations that help businesses achieve greater success.	5	4	3	2	1
Innovative Culture					
13. Firm believes that having a corporate culture that emphasizes creativity and innovation will help firm grow faster.	5	4	3	2	1
14. Firm encourages the creation of an appropriate working environment that will enable creative personnel to find new and effective ways to achieve their goals.	5	4	3	2	1
15. Firm supports employees to be constantly involved in the improvement of their operations so that they are more efficient and effective.	5	4	3	2	1
16. Firm recognizes the importance of exchanging new ideas among personnel, which will lead to continuous improvement of work processes.	5	4	3	2	1

Section 6: Opinion on the external factor that impact on strategic technology transfer capability of information and communication technology businesses in Thailand

External factor	Level of Agreement				
	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Agree 5
Competitive Market Intensity					
1. At present, the competition in the market is constantly intense, so firm must focus on developing management more effectively.	5	4	3	2	1
2. Customers have a variety of needs, so firm needs continuous research and development to meet the needs of customers in a timely manner.	5	4	3	2	1
3. Competitors are highly competitive, so firm must focus on improving and developing the organization to help firm have a competitive advantage.	5	4	3	2	1
4. New competitors are constantly growing, and firm is constantly striving to create strategies and guidelines for its operations.	5	4	3	2	1
Technology Growth Munificence					
5. At present, technology is growing steadily, enables firm to apply the technology to better manage its operations.	5	4	3	2	1
6. Technology is diverse and consistent with the performance of the business so that firm can choose the appropriate technology and more beneficial to the organization.	5	4	3	2	1
7. Technology is more modern, easier to find and cheaper than in the past, so firm can apply to their activities more easily and quickly.	5	4	3	2	1
8. Technology is constantly evolving; enables firm to seamlessly integrate technology into quality enhancements and operational efficiencies across the organization.	5	4	3	2	1

Section 7: Recommendations and suggestions regarding technology management of information and communication technology businesses in Thailand

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Thank you very much for your participation to answer all questions.
Please fold the questionnaire and envelope enclosed with this.
Return to researcher at the specified address.

APPENDIX G

Letters to the Experts

บันทึกข้อความ

หน่วยงาน คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม โทรศัพท์ 043-754333-3431 Fax 043- 754422

ที่ ศธ.0530.10/ **วันที่** 23 พฤษภาคม 2560

เรื่อง ขอเรียนเชิญเป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือวิจัย

เรียน รองศาสตราจารย์ ดร.ปพฤกษ์บารมี อุตสาหะวาณิชกิจ

ด้วย นางสาวณัฐอาภา สัจจวาที นิสิตระดับปริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต (ปร.ด.) สาขาวิชาการจัดการ คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม กำลังศึกษาวิทยานิพนธ์ เรื่อง "ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย" ซึ่งเป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปรัชญาดุษฎีบัณฑิต ดังนั้น เพื่อให้การดำเนินการเป็นไปด้วยความเรียบร้อยและบรรลุตามวัตถุประสงค์ คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม จึงใคร่ขอความอนุเคราะห์ท่านเป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือวิจัยและข้อเสนอแนะเพื่อนำข้อมูลที่ได้ไปดำเนินการทำวิทยานิพนธ์ต่อไป ตามเอกสารแนบท้าย

จึงเรียนมาเพื่อโปรดพิจารณา

(ผู้ช่วยศาสตราจารย์ ดร.นิติพงษ์ ส่งศรีโรจน์)
คณบดีคณะการบัญชีและการจัดการ

บันทึกข้อความ

หน่วยงาน คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม โทรศัพท์ 043-754333-3431 Fax 043- 754422

ที่ ศธ.0530.10/ **วันที่** 13 มิถุนายน 2560

เรื่อง ขอเรียนเชิญเป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือวิจัย

เรียน ผู้ช่วยศาสตราจารย์ ดร.ศรัญญา รักสงฆ์

ด้วย นางสาวณัฐอาภา สัจจวาที นิสิตระดับปริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต (ปร.ด.) สาขาวิชาการจัดการ คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม กำลังศึกษาวิทยานิพนธ์ เรื่อง "ศักยภาพการถ่ายทอดเทคโนโลยีเชิงกลยุทธ์ของธุรกิจเทคโนโลยีสารสนเทศและการสื่อสารในประเทศไทย" ซึ่งเป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปรัชญาดุษฎีบัณฑิต ดังนั้น เพื่อให้การดำเนินการเป็นไปด้วยความเรียบร้อยและบรรลุตามวัตถุประสงค์ คณะการบัญชีและการจัดการ มหาวิทยาลัยมหาสารคาม จึงใคร่ขอความอนุเคราะห์ท่านเป็นผู้เชี่ยวชาญตรวจสอบเครื่องมือวิจัยและข้อเสนอแนะเพื่อนำข้อมูลที่ได้ไปดำเนินการทำวิทยานิพนธ์ต่อไป ตามเอกสารแนบท้าย

จึงเรียนมาเพื่อโปรดพิจารณา

(รองศาสตราจารย์ ดร.สุวรรณ หวังเจริญเดช)
รองคณบดีฝ่ายกิจการนิสิต รักษาการแทน
คณบดีคณะการบัญชีและการจัดการ

VITA

VITA

NAME	Miss Natarpha Satchawatee
DATE OF BIRTH	November 30, 1978
PLACE OF BIRTH	Trat, Thailand
ADDRESS	326 M.20, Kham Riang Sub-District, Kantharawichai District, Mahasarakham Province, Thailand 44150
POSITION	Lecturer
PLACE OF WORK	Mahasarakham Business School, Mahasarakham University

EDUCATION

2000	Bachelor of Science (Computer Science) Chiang Mai University, Chiang Mai, Thailand
2007	Master of Science (Information Technology) King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
2018	Doctor of Philosophy (Management) Mahasarakham University, Mahasarakham, Thailand

RESEARCH

Satchawatee, N., & Ussahawanitchakit, P. (2016). IT capability on firm performance: Evidence from IT service business in Thailand. *The Business and Management Review, 7*(5), 251-258.