THE RELATIONSHIP BETWEEN INFORMATION TECHNOLOGY INVESTMENT AND FIRM PERFORMANCE: WITH THE CONTEXT OF THE "SUFFICIENCY ECONOMY" PHILOSOPHY

NATNARONG JATURAT

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PROGRAM IN BUSINESS ADMINISTRATION FACULTY OF BUSINESS ADMINISTRATION
RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI
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Dissertation Title	The Relationship between Information Technology Investment and Firm Performance: with the context of the "Sufficiency Economy" Philosophy
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Program / Major Subject	Business Administration
Dissertation Advisor	Dr.Terawat Piboongungon
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Academic Year	2011

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May 2012

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ABSTRACT

The objective of this dissertation is to study the relationship between IT investment and firm performance within the context of the Sufficiency Economy Philosophy. Population in this study is manufacturing firms selected from the list of the Department of Business Development, Ministry of Commerce, Thailand. Both qualitative and quantitative methods are employed and the study includes theories behind the Sufficiency Economy Philosophy and IT management, Chief Information Officer (CIO) proxy as IT Moderation, Knowledge Management proxy as IT Self-Immunity, and IT Chargeback proxy as IT Reasonableness.

In the quantitative method, data were collected from 373 firms – 23.31 % of 1,600 by means of questionnaire and analyzed by means of Structural Equation Model (SEM) analysis while the Convergent Validity was measured by Confirm Factor Analysis and the value of factor loading used in the study was greater than 0.6. Discriminate Validity was tested by SEM method, comparing fix variance and fix/free covariance. Concerning the qualitative method, data were collected from selected CIO of manufacturing firms by means of an in-depth interview technique.

Research findings are as follows: the relationship between IT investment and the firm performance with the context of the Sufficiency Economy Philosophy has a model fit and regression weight significantly supporting all hypotheses ($p<.05$).

Only IT Chargeback has direct relation to firm performance while the Knowledge Management and CIO affect the firm performance through the IT Chargeback.

Keywords: IT Investment, Firm Performance, Sufficiency Economy Philosophy

Acknowledgements

I honesty to thank you Dr.Terawat Piboongungon, the major dissertation advisor, Dr. Werayuth Charoenruengkit, co-advisor, for their valued advice, encouragement and guidance for dissertation successful.

I truly thank you all committee member, Associate Professor Dr.Supapon Cheniam, Assistant Professor Dr.Daranee Pimchangthong, and Associate Professor Dr.Arunee Intrapairoth for all construction comment.

My dissertation will not successful with out my family; my parent, my beloved wife, and my son who gives encourage me and their supported to accomplishment.

Special thanks for my sponsor, Faculty of Business Administration, Rajamangala University of Technology Thanyaburi, who supports and encouragement me to study in PhD.

Natnarong Jaturat

May 2012

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Abbreviations

Abbreviations	Meaning
IT_INF	IT Infrastructure
IT_PROD	IT in Production
IT_IS	IT in Information Systems
IT_INV	IT Investment
IT_SEP	IT Investment with Sufficiency Economy Philosophy
IT_MOD	IT Moderation
IT_REA	IT Reasonableness
IT_SEL	IT Self-Immunity
CIO	Chief Information Officer
IT_CHB	IT Chargeback
KM	Knowledge Management
ROA	Return on Asset
CON	IT Convenience
COM	IT Competitive Advantage
IT_STG	Strategic IT
Df	Degree of freedom
P	P-value
GFI	Goodness of fit index
AGFI	Adjusted goodness of fit in
RMR	Root mean square residual
CFI	Comparative fit index
NFI	Normed fit index

CHAPTER ONE

INTRODUCTION

Background and Statement of the Problem

It is generally assumed that business firms tend to invest in various areas such as production, human skills, and business infrastructure in order to increase their performance. This is also including the investment in IT infrastructure and a skilled workforce because IT has been recognized by business firms as an important operational business tool for gaining competitiveness.

According to a survey(National Statistical Office Thailand, 2010), it has shown that 500,000 business firms which employed Information Communication and Technology (ICT) in year 2009 using 2,369,889 computers for their business. The average of firm expenditure was 21,630 THB per firm. However, the average of ICT expenditure in Healthcare sector was 529,663 THB which is the maximum expenditure from the survey. The net total of ICT expenditure in year 2009 was 1,000 million THB.

The IT Investment in the business firm is an investment in hardware, software, and IT staff. Business firm used IT as a tool for improving productivity, quality and effectiveness. One of the benefits from IT Investment is information systems. Business firm can employ IT for storing data, such as business operation, production and sale report, into information systems that can access and retrieve easily. The information systems have supported business to have readiness in the future. They can be accessed and used as Decision Support Systems (DSS) in order to assist executive making decision efficiently. In addition, information systems also have supported business firm to present to Electronic Commerce or Global Market

immediately(Porter, 2001). It also give benefit to business firm to have option value ability in the future(Ranganathan & Carol, 2006).

There are two factors affected business firm that have to reinvestment in IT which are business environment and internal business firm strategies changed. For example, when competitors have efficient IT to service customers, business firms have to reinvest in IT equally or better than their competitors.

Although IT Investment has benefit to a business firm, one obstacle of IT is rapidly obsolescent. The Moor's law shows the evolutions of the development of technology are twice every 12-18 months (Brynjolfsson & Hitt, 1998). It shows that business firms have to reinvest in IT every two years, if they do not want to be behind their competitors.

In the last two decades, several researches have investigated the relationship between IT investment and firm's performance. Some researches have presented that some IT strategies have positive effect on firm's performance and some do not have effect on firm's performance. The phenomenal has known as "Productivity Paradox Problem"(Brynjolfsson & Hitt, 1998).

The IT strategies that have positive result to firm's performance, have been listed as follows: knowledge management(Tanriverdi, 2005), resource based view(Ferguson, Finn, & Hall, 2005), IT governance(De Haes & Van Grembergen, 2009), IT agility(Sambamurthy, Anandhi, & Varun, 2003), and IT cost management(Jeanne, Michael, & Cynthia Mathis, 1999; Peacock & Tanniru, 2005; Thouin, Hoffman, & Ford, 2008).

Some strategies will have effect on firm's performance if they manage IT as suitable environment show as follows: CIO background(Curtis & Sambamurthy, 1999), environment(Chen, 2007; Iyer, Germain, & Claycomb, 2009; Keramati,

Azadeh, & Mehran-Gohar, 2009; Ranganathan & Carol, 2006), developing and developed country(J. K. Kim, Xiang, & Lee, 2009; Shih, Kraemer, & Dedrick, 2007), culture(N. Shin, 2009; S. K. Shin, Ishman, & Sanders, 2007), firm size.

During a recession of economy, demand of customers both products and services have been decreased. Business firms are in pressure and have to decide for business survival. One choice is to decrease expenditure. Business firm always focus on budget cutting because they thought that they can use old IT and it does not affect to current business production. If business firms reduce IT investment, they will decrease their competitive advantage. Thus, business firms have to manage budget cutting of IT investment to continue having competitive advantage. To balance budget cutting and competitive advantage, business firms have to understand factors that affect firm's performance and have ability to manage IT investment.

Purpose of the Study

His Majesty King Bhumipol Adulyadej has introduced the Sufficiency Economy Philosophy to the Thai community for long time. Many organizations accepted the concept and successfully adjusted their investment processing activities accordingly to survive and sustain effectiveness. The Sufficiency Economy Philosophy consisted of three main concepts: moderation, reasonableness, and self-immunity concept. Moderation concept means not without extreme or insatiable one's desire. Reasonableness concept is the goodness of reason and judgment related rationality decision and consideration. Self-immunity concept is managerial infrastructure ready handling to the impact of changes.

There are researches that used the Sufficiency Economy Philosophy applied in their approach, show as following: Kantabutra(2010) and Puntasen, Premchuen, and Keitdejpunya(2003) suggested how to properly use technology, innovation and,

knowledge to advance business efficiency. The IT is a part of technology that uses to support business process and operation. The research of Sophit and Prasong (2008) studied managing information technology with Sufficiency Economy Philosophy of CIO in Thailand Organization. They found that CIO agree with using Sufficiency Economy Philosophy manage IT.

This research have differenced from previous research by showing that Sufficiency Economy Philosophy comprise of many factors to be IT with the context of Sufficiency Economy Philosophy. There are three concepts of IT with the context of Sufficiency Economy Philosophy including IT Moderation, IT Reasonableness, and IT Self-Immunity. The objectives of this study are:

1. To study the current IT satisfaction.

2. To develop and test a model between IT investment with firm's performance and with the context of Sufficiency Economy Philosophy.

3. To find the related factor of the relationship of IT with Sufficiency Economy Philosophy.

Research Question and Hypothesis

Research Question

According to previous research, IT investment has suitable management therefore it will have effect on firm's performance. In addition, IT is rapidly obsolescent. This research study to know that how to manage IT investment to maximize outcome, how to manage to sustainable, and what are the IT investment relate with firm's performance.

Sufficiency Economy has three concepts: Moderation, Reasonableness, and Self-Immunity. The IT investment with Sufficiency Economy Philosophy may have sequence before effect on firm's performance. Therefore, this research wants to study

how to management IT with firm's performance to sustainable. The research questions are as following:

1. Does the Sufficiency Economy philosophy associates with IT investment affect to firm's performance?

2. Does the intangible and tangible firm's performance related?

3. How does organization manage the IT investment to affect firm's performance?

Hypothesis

When business firm invest in IT, they have to manage IT to the most benefit. Business firm have to manage IT follow the Sufficiency Economy Philosophy as following: 1) CIO and IT staff are the most important. CIO has a right decision to IT staff for response suitable work and knowledge skill. CIO has to be justice, faithful, accountability, and comply with law. Moreover, CIO has to be strategic orientation. 2) Basically, IT investment involves all departments therefore it is an overhead cost. If business firms want to monitor the real cost, they have to implement IT chargeback. IT chargeback will use to be the information for reinvestment IT in the future. 3) Business firms have to continue improving business operation to response to competitive advantage. Knowledge from experience has benefit. It can use for supporting the next IT investment. It reduces risk and prepares for economy change.

For testing after IT investment and managing with the context of Sufficiency Economy Philosophy will have positive effect on firm's performance the first and the second hypothesis are following:

H1 : The IT Investment has positive effect on IT with Sufficiency Economy Philosophy

H2: The IT with Sufficiency Economy Philosophy has positive effect on firm's performance

Firms have invested in IT for supporting work performance of their employees, business operation, and customer service. To study convenience has effect on profitability, the last hypothesis is:

H3: The intangible has positive effect on tangible firm's performance

Research Framework

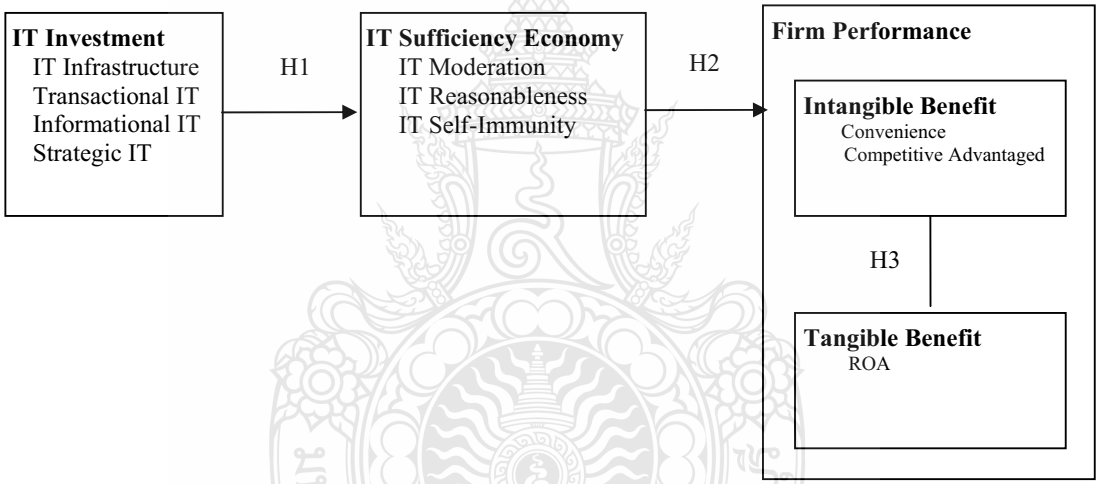

Figure 1-1 Research Frameworks

Definition of Terms

The definitions as following provide understanding of vocabulary in this research study.

Moderation Concept: without being extreme or insatiable in one's desire.

Moore's Law: trends of computing hardware, the number transistor that can be place on IC will double every two years.

Reasonableness Concept: goodness of reason and judgment related rationality decision and consideration.

Self-Immunity Concept: managerial infrastructure ready handling to the impact of changes.

Sufficiency Economy Philosophy: the concept and successfully adjustment to the middle path in life as the optimal route for conduct.

Limitation of the Study

This study still has some limitation shows as follow:

1. Due to business firm invest IT into complementarily, it hard to observe directly of the impact of IT.

2. This study use profitability as a proxy of firm's performance. Profitability may come from other factors not only from IT investment.

3. When business invests IT, it does not response outcome immediately. It has to implement for period of time that depending on existing business firm experience and characteristic of IT. This study assumes that business firm are already implemented IT for several years.

Scope of the Study

This research is a study about IT investment with the context of Sufficiency Economy Philosophy. The research samples of this study are business firms in manufacturing. The Chief Information Officer is a proxy of business firm for answering questionnaire and interview. In statistic analysis, this research uses two kinds of firm's performance. Intangible firm's performance were surveyed from questionnaire, whereas tangible use ROA that compute from financial statements in year 2009, collected from an online database of Department of Business Development of the Ministry of Commerce of Thailand.

Organization of the Study

This research consists of five chapters. Chapter one covers the statement of the problem, purpose of the study, research question, hypothesis, research framework, limitation of study and significant of the study. Chapter two reviews the previous study that related with IT investment and firm's performance. It also shows the selection variable into research framework including IT infrastructure, Transaction IT, Information IT, Strategic IT, CIO, IT governance, Knowledge Management, IT chargeback, Attitude rating of IT benefit and Return on Asset. Chapter three covers the research methodology that consists of quantitative research for analyzing data and hypothesis testing and qualitative research for confirming and validation the results respectively. Chapter four presents and discusses the research finding. Chapter five composes the conclusion, discussion, research implication, research limitation and future research.

CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

The review of relevant literature in this chapter comprises of three sections. The first section describes the review of the previous research that related to this study, particularly IT investment, IT management, and business performance. The second section explains theoretical framework that demonstrates how to create research model. The last section presents the concept of IT investment with the context of Sufficiency Economy Philosophy.

IT Investment

Management in globalization, executive have to have various skills. One of the skills is the ability to manage investment. IT investment is one important factor because business firm need IT to increase efficiency of their operation and also-expect to gain more profit. Some business firms have invested IT in some segment whereas some have invested IT in all segments. It is necessary for executive to make a decision in order to implementing IT in various segments properly. Marianne, Peter and Don ST(1999) state that executive have to manage IT with portfolio that business firm to know that how much of IT to appropriate IT investment.

IT investment comprises of purchasing hardware, software and hiring IT staff. Hardware is computer, communication devices, and automates processing equipment. Software is an instruction program for controlling and operating computer hardware automatically as required. However, to manage both hardware and software-business firm need to have IT staff to implement and control IT to meet requirements.

Jameshed (2006) divides IT investment into four parts, show as follows: IT Infrastructure, Transactional IT, Informational IT, and Strategic IT

IT Infrastructure is a procurement of hardware, communication device, and automates processing equipment into complementarily between employee and production machine. Business firms expect that IT infrastructure will be handling business work conveniently.

Transactional IT is applying IT into business operation in order to provide efficient communication between departments using electronic data. It includes the procurement of raw material, production, and delivery products and services to customers.

Information IT is making use of IT to store information of business operation. The information is connected by communication networks. Each department is able to use information to work together for supporting plan, monitoring, and decision making. Furthermore, Information IT also supports a study of customers' behavior in order to improve quality of products and services.

Strategic IT is making use of IT to have a competitive advantage, such as implementing IT for increasing an ability of business firm, creating value and uniqueness of products and services. Moreover, business firm also use IT as a tool for retaining a competitive advantage and protecting market share from competitors.

As described above, it can be concluded that IT investment is the procurement of IT into any segments of the business firms to fulfill business's operation which included planning, purchasing raw material, production, and delivery products and services to customers.

IT Management

After investing IT into the business firm, it cannot guarantee that firm performance will be successful or achievement. IT investment will affect ~~to~~ firm performance if a firm has a good management. It is indicated that IT investment has no direct effect on firm's performance, but through the mediator, as presented in Figure 2-1.

Figure 2-1 Relationship model between IT investment and Firm Performance and mediator affiliates.

According to previous research, the result shows that there are many mediator that affect ~~to~~ firm performance. This step shows the review of the literature of the mediator factor that involves with this study, show as following: Chief Information Office, IT Governance, IT Chargeback, Activities based-costing, Knowledge Management, IT Environment, IT Capability and Resource-based View, and Research and Development.

Chief Information Officer

One of the important factors that support IT investment to influence on firm's performance is Chief Information Officer (CIO). CIO is executive under supervision of Chief Executive Officer (CEO). In 1970s, business firm gives importance to IT investment because it uses substantial cost for investment. Business firm expects to receive return on investment. They emerge title of CIO on top management with responsibility for managing hardware, software, and IT staff. In addition, CIO need to have IT skill and business skills because they have to adopt both skills to be an advantage for a business operation. Moreover, in a study of Sobol and Klein (Sobol &

Klein, 2009) found that CIO with IT background and strategic oriented to IT rather than utilitarian oriented or generic management.

IT Governance

Besides CIOs have to have IT skill and the understanding of business process, they also have to be faithful and accountability, which is called IT Governance. IT Governance is a subset of corporate governance. Business firm brings IT to be tools to service stakeholder for monitoring business that it has operation follow as impartial, faithful, accountability and comply with laws. The report from IT Governance will present a detail of management whether it reach a goal of a business or not.

In 1996, the Information Systems Audit and Control Association (ISACA) and Information Systems Audit and Control Association (ITGI) proposed COBIT (Control Objectives for Information and related Technology) to be a guideline how to use IT to most efficiently. COBIT comprises of 34 processes that group into four parts, Plan and Organize, Acquire and Implement, Deliver and Support, and Monitor and Evaluate. Each process has to meet seven information criteria: Effectiveness, Efficiency, Confidentiality, Integrity, Availability, Compliance, and Reliability. Each process also consists of five IT resources, People, Application system, Technology, Facility, and Data. COBIT is one of IT governance for ensuring that IT investment to be transparent and accountability.

Bowen, Cheung and Rohde(2007) divide IT governance research into two groups, IT governance as structure and IT governance as process. The IT governance as structure involves functions for making decision responsible both business and IT executive, whereas IT governance involves the process of IT implementing. De haes

and Van Grembergen (2009) state that the business and IT alignment maturity is higher when organization are applying a mix of mature IT governance practice.

IT Chargeback

Due to IT is used to support all departments, it is charged to overhead cost. This cost is charged to all departments as equal, but in fact, each department may use IT differently.

If business firm need to know a real cost of IT, they have to implement IT chargeback. IT chargeback will result real cost of using IT in each department. It also shows that IT investment is used for worthwhile or not. Ross and Beath (2006) suggest that IT chargeback fulfills the fairs and reasonable financial report and leads to the right reinvestment IT.

However, IT chargeback is cost allocation and related only with internal cost. IT chargeback does not reduce current cost, but it details real organization's cost that leads to faith and reasonableness.

Activities Based-Costing

Activity based-costing (ABC) is a costing model that identify actual cost of product from each activity. ABC will result real cost for decision to define price of products and services. It also uses to make a decision to stop the product if the product cannot make profit.

The study of Peacock and Tanniru (2005) show that ABC provided useful for a firm to evaluate and decision of how to investment new technology.

Knowledge Management

The knowledge management has been a significant component because the business firm can use them for decision making in a future. Basically, knowledge management comprises of creation, representation, and adoption. Knowledge is

divided into two types: Explicit Knowledge and Tacit Knowledge. Explicit knowledge is the knowledge that can be explained into data and easy to understand. Tacit knowledge is an individual experience of people. Business firm has created knowledge management for transferring tacit to explicit knowledge. The knowledge is created through a spiral process of socialization, externalization, combination, and internalization (SECI)(Nonaka, 1994).

Due to Resource-Advantage theory of competition, knowledge has the characteristic of heterogeneity, uniqueness and immobility, effect to firm performance as the competitive advantage. The rival difficulty imitates because knowledge is complexity. Therefore, if the business firm wants to achieve performance, the knowledge management is an important consideration.

Li, Huang and Tsai (2009) examine the Taiwan firms and find that on Entrepreneurial orientation, Knowledge creating and firm performance. They have found that Entrepreneurial orientation has positive effect to firm performance by mediating of knowledge creating.

Besides knowledge effect on financial firm's performance, it also affects new product performance(Vaccaro, Parente, & Veloso, 2010). Knowledge from inter-organization or intra-organization is more effective than that from single-organization. It will encourage to knowledge sharing because the culture and experience will transfer between them (Vaccaro, et al., 2010; Yang, 2010).

The renewal innovation not only becomes necessary for survives and ability to compete with rival, but it also advances to knowledge creation. The study of Díaz-Díaz, Aguiar-Díaz, and DeSaá-Pérez (2008) have found that knowledge management has indirect effected to firm performance and mediated by innovation. In addition, the finding of Craighead, Hult, and Ketchen Jr (2009) show that firm need to manage

knowledge of supply chain's innovation–cost strategy because it enhances to superior performance.

IT Environment

The environment is the one of IT-investment success factors. The appropriate use of IT will stimulate to achievement. The previous research have found that cross functional (Chen, 2007), across multiple organization(Ranganathan & Carol, 2006) and agility(Sambamurthy, et al., 2003) will impact on performance. In addition, business firm takes advantage of synergy from working together(Tanriverdi, 2005). Synergy leads to reduce a cost and increate benefits from learning together. Furthermore, the large firm size with suitable IT investment will support to knowledge learning.

The IT investment in developed and developing countries do not the difference outcome (J. K. Kim, et al., 2009). IT could archive performance similarly. However, the giving precedent Interaction Property and communication service that advantage of developed countries will be support to quick performance (Shih, et al., 2007). In addition, culture also important to consideration such as the relative business in China that sharing information together will support to achieve performance (S. K. Shin, et al., 2007).

IT Capability and Resource-based Views

Resource-based View (RBV) is the theory supporting business to competitive advantage. RBV will advance business to over the competitor with more latency. Business has both tangible and intangible resource. For example, hardware is tangible, whereas knowledge is intangible resource. If business firm need to have competitive advantage, resource should be valuable, rare, imperfectly imitable and substitutability.

Research and Development

Customer requirement in product and service are constantly changed. Business firm have to improve product and service to meet customer requirement. Research and development (R&D) is a tool for create innovation and increate quality and service. When customer adopt product, it will bring to have competitive advantage and market share. The R&D will not only provide an efficiency of production, but also increate product development and safe resource and energy of production.

Review of Firm's Performance

Firm's Performance

The Firm performance is the result of assessment the achievement of business value. There are many assessment techniques to evaluate the achievement of business such as productivity, profitability, quality of product or service, employee satisfaction, and customer satisfaction. However, the measurement successes of IT are difficult because business uses complementary between IT and business process. The firm performance cannot be directly measured from only business success.

Markus and Soh (1995) suggest that business should measure the business value such as competitive advantage instead of considering only productivities. They synthesize model from five models, "Appropriate Use"(Henry C. Lucas, 1993), "Strategic Fit"(Grabowski & Lee, 1993), "IT Asset"(Markus & Soh, 1993), "Leveraging IS Processes"(Beath, Goodhue, & Ross, 1994), "IT Impact"(Sambamurthy & Zmud, 1994). Figure 2-2 presents Markus and Soh model .

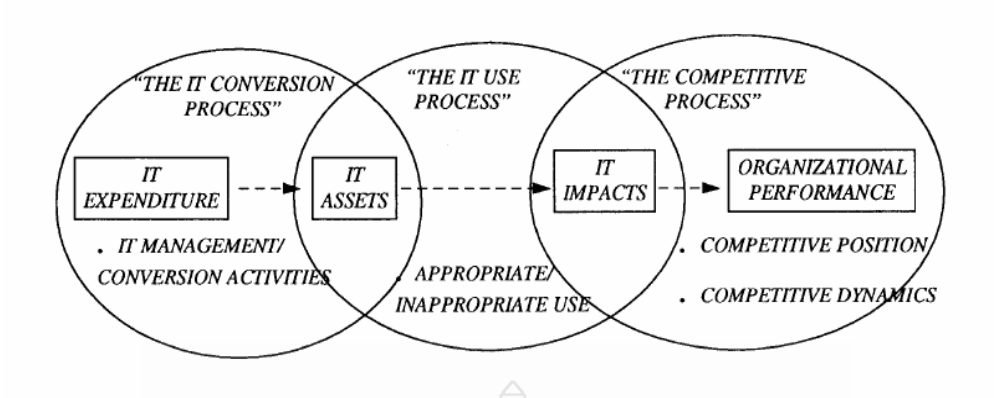

Figure 2-2 Markus and Soh Model(1995)

Soh and Markus describe the detail of three parts of models as follows:

The first process is the IT Conversion Process. When business firm has purchased IT, IT will be converted into IT Asset by considering with facultative strategies, organization structure, accurate IT and good management.

The second process is the IT Use Process. It shows that the quality of IT asset has an influence on IT Impact. IT Asset comprises of IT infrastructure, hardware, software and people who expertise in an application portfolio. The IT Asset need to be used appropriately in order to influence on the IT.

The last process is Competitive Process. It is a result of IT Impact. The Information Technology can increate outcome such as advantage and customers' satisfaction. Business may redesign the organization to information-centric which will bring them to a better management and a right decision making.

According to Markus and Soh and Markus Model (1995), Ko(2003) has argued that Markus and Soh model has not been empirically tested. Ko has developed different model. The new model has been redesigned into two processes and assessment outcome from both intangible and tangible firm performance, as shown in Figure 2-3.

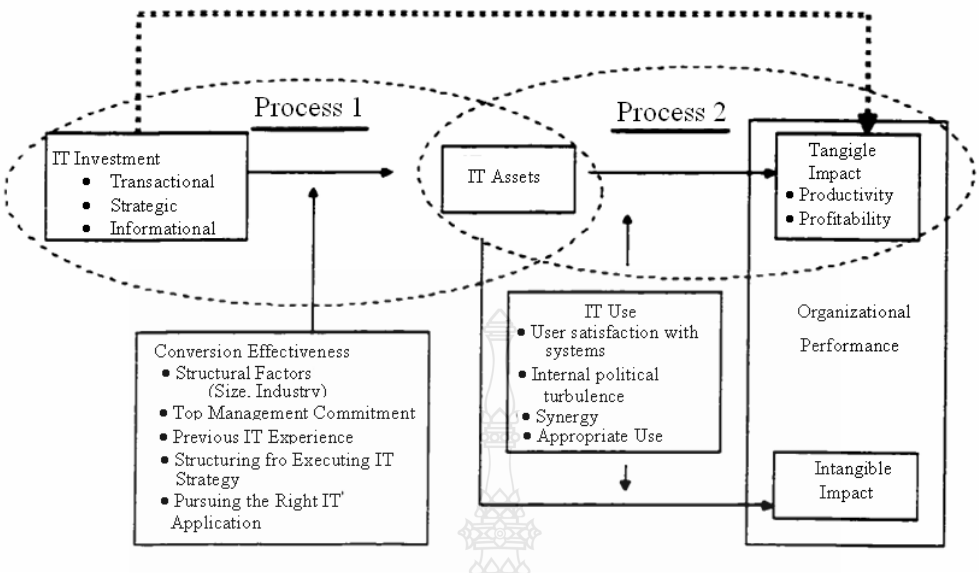

Figure 2-3 Ko Model(2003)

Ko(2003) studies the relationship between IT investment and firm performance that is proposed by Weill(1989). Weill describes that the IT investment would impact to performance by conversion effectiveness strategies. Ko(2003) has analyzed conversion effectiveness from the previous research of Markus and Soh, Hoogeveen Oppelland and recommended that the conversion effectiveness would affect firstly to IT Assets from five factors – 1) Size and industries, 2) Top management commitment, 3)Previous IT experience, 4) Structure for executing IT strategy and 5)Pursuing the right IT applications. The IT Asset consists of know-how with IT resource and IT infrastructure. IT know-how is the abstract or intangible assets, whereas infrastructure is people, resources and business procedure.

In Figure 2-3, Ko explains that IT asset will impact on performance, but it has to be used properly. She suggests the strategic activities and properly uses are the business value. She argues that conversion factors drive IT asset to firm performance are 4 factors: (1)User Satisfaction with Systems, (2)Internal Political

Turbulence, (3) Synergy and (4) Appropriate use. Moreover, her model employs the assessment of the performance both direct and indirect.

Performance Metric

From the review, it has been found that there are four different methods for the assessment of firm's performance: Profitability ratio, Tobin's q, abnormal return, and attitude rating.

Profitability ratio. Profitability is financial metric that employ annual report to analyze the ratio of net profit during the year by considering with the investment, equity and asset. The profitability that being used to evaluate in IT investment are Return on Investment (ROI), Return on Asset (ROA), and Return on Equity (ROE). The ROI is the ratio between net profit and total of investment. The ROA is the ratio between net profit and total asset. And, the ROE is the ratio between net profit and total equity. Although, profitability does not come from IT investment, however, it still can reflect the operation and firm's performance which is supported by IT.

The literature search has found that many studies use profitability to evaluate the firm performance such as Thouin, Hoffman, and Ford. (2008), Keramati, Azadeh, and Mehran-Gohar, (2009), Anthony Byrd, Lewis, and Byrd (2006), Kim, Xiang, and Lee (2009), Neirotti and Paolucci (2007), and Radhika and Edward (2003) as shown in Table 2.1.

Table 2.1 The prior research methodology and performance metrics by Profitability

Author	Methodology	Metrics	Finding
Thouin, Hoffman, and Ford. (2008)	Quantitative Regression	Profitability ratio	The IT investment on IT personal not associated with increases in the profitability of Heath Care industries.
Keramati, Azadeh, and Mehran-Gohar, (2009)	Quantitative Correlation	Profit Deposit	The performance of IT-investment on Bank strongly positive with environmental changes and more proactive branch strategy
Anthony Byrd, Lewis, and Byrd (2006)	Quantitative Regression	Profitability ratio -Profit per employee -Revenue per employee	The alignment of IT strategy and business strategy are moderator of IT investment to firm's performance.
Kim, Xiang, and Lee (2009)	Quantitative Correlation	ROA, ROE, Profit margin, Sale growth, earning per share growth	The IT investment has a positive impact on firm's performance not different between developed countries and developing countries.
Neirotti and Paolucci (2007)	Quantitative Regression	Profitability ratio -net premium written -lost ratio -expend ratio	The Italian insurance sector increased their productivity through IT regardless of their IT management capabilities.

Author	Methodology	Metrics	Finding
Radhika and Edward (2003)	Quantitative Regression	Profitability ratio	Firm with good IT capability, applied Resource-Based View, impact and sustain the firm's performance.

Tobin's q. Tobin's q is the ratio between the market value and corporate net worth value. The Tobin's q is greater than one then the market value is more than corporate net value. If Tobin's q greater than one then implies that investor has confident that unmeasured greater than record asset of firm. The unmeasured of firm are unrecorded asset such as human, know-how, and firm ability. The review of literature found that some research used Tobin's q in the IT investment study such as Chari and Devaraj (2007), N. Shin (2009), Tanriverdi (2005), and Jooh and Utpal (2002) as shown in Table 2.2.

Table 2.2 The prior research methodology and performance metrics by Tobin's q

Author	Methodology	Metrics	Finding
Chari and Devaraj (2007)	Quantitative Regression	Tobin's q	International diversification is a significant positive function to firm with height IT investment, but negative with low IT investment.
N. Shin (2009)	Quantitative Regression	Tobin's q	The related diversification increased IT Investment improves firm's performance.

Author	Methodology	Metrics	Finding
Tanriverdi (2005)	Quantitative Structural Equation Model	Tobin's q	Knowledge Management cross-unit synergy increate the financial performance of firm.
Jooh and Utpal (2002)	Quantitative Regression	Tobin's q, Financial ratio	R & D, studied as control variable, is the positive relationship between IT-investment and firm's performance.

Abnormal return. Abnormal return is the different between expected outcome and actual outcome. The outcome is collected and analyzed as regression model. Then the different outcome from actual study at the day and the outcome from the model is abnormal return. The cumulative abnormal return (CAR) is the sum of abnormal return during a period of a study day. There are several IT investment researches that study the secondary data set which have been recorded IT investment and outcome over many years. They turn back to observe outcome at the time when they have invested IT. If the actual was greater than normal return, it indicated that there was an abnormal return. Then testing the cumulative abnormal return in a statistic analysis whether the result has greater different from zero or not.

The review found that several previous researches used abnormal return to assess firm's performance: Ranganathan and Carol(2006) and Ferguson, Finn, and Hall (2005) as shown in Table 2.3.

Table 2.3 The prior research methodology and performance metrics by abnormal return

Author	Methodology	Metrics	Finding
Ranganathan and Carol(2006)	Quantitative Regression	Abnormal return	Firm's adoption ERP implement across multiple organizations or multiple geographical site, result in grater increase in market value of investment.
Ferguson, Finn, and Hall (2005)	Quantitative Regression	Abnormal return -Market price	The innovative investment in electronic commerce must meet the competitive advantage and not easy to imitation.

Attitude rating. Attitude rating is utilized questionnaires to collect the opinion from firm's employees or CIO about the current IT affected firm's performance.

There are many IT investment researches that used attitude rating to scale the performance as follow: Curtis and Sambamurthy (1999), Chen (2007), Iyer (2009), Krell and Matook (2009), Paul, Kenneth, and Vijay (2000), Shin, Ishman, and Sanders (2007), Gonzalez-Benito (2007), and Bharadwaj and Tiwana (2005), and shown in Table 2.4.

Table 2.4 The prior research methodology and performance metrics by attitude rating

Author	Methodology	Metrics	Finding
Curtis and	Quantitative	Attitude Rating	The CIO, IT background, is

Author	Methodology	Metrics	Finding
Sambamurthy (1999)	Correlation		positive relationship between IT investment and firm's performance
Chen (2007)	Quantitative Correlation	Attitude Rating	Training employee proficiency and cross-functional will return better performance of NPD
Iyer (2009)	Quantitative Regression	Attitude rating -Financial -Market -Operation Performance	B2B supply chain, environment demand unpredictable and product turbulent, negative relationship to firm's performance.
Krell and Matook (2009)	Quantitative Regression	Attitude Rating - competitive advantage	IT-investment form government regulation and non-regulation should wide-range and post-implement combine is a way of the completive advantage achievement.
Paul, Kenneth, and Vijay (2000)	Quantitative One way ANOVA	Attitude Rating	IT Strategic alignment and IT investment evaluate contribute to higher business value
Shin, Ishman, and Sanders (2007)	Quantitative Correlation	Attitude rating	The successful of information sharing of China come from Asian Culture.
Gonzalez-	Quantitative	Attitude rating	Firm should consider IT-

Author	Methodology	Metrics	Finding
Benito (2007)	, Factor Analysis, Regression		investment in purchase function implementation that affects sequential another business process.
Bharadwaj and Tiwana (2005)	Quantitative Regression	Attitude rating - Attractive of e-business project	Firm developed knowledge-augmenting relative to relational capacity in their assessment.

Grounded Theory Method

Grounded theory is the research method that was developed by Glaser and Strauss in the 1967(Coleman & O' Connor, 2007; Douglas, 2003). Grounded theory method study in the raw data collection rather than beginning with the hypothesis. It involves the social science studied for describe a unique or generalize explanation data through the analysis in qualitative research. The procedure of create grounded theory will be analyzed several times until justified by used the process as following: 1) the first interview, 2) exploring the topics that were discovered in the first step, 3) developing relationships between the categories that illustrate the conceptual, 4) search for any evidence that could refute the findings, then modified the conceptual, and 5) the iteration search until finding justified and then result to conclusion.

Theoretical Framework

The development of a theoretical framework followed the Weill model(1989) which developed the model for study the IT investment with firm's performance. Weill's finding shows that the IT investment will impact to firm's performance successfully by conversion effectiveness strategy. In addition, the relationship

between them is incremental firm's performance over the previous year. With the firm's performance, Weill proposes that it increased performance from previous year.

For context with Sufficiency Economy Philosophy, IT investment should optimal suitable with business firm by balancing between IT benefits and risks, called moderation. Firms should have the ability to monitor and measure the worth of IT usage, called reasonableness. Business firm should accumulate knowledge both successful and unsuccessful to use for decision making in future that leads to self-immunity. Hence, it can be concluded that firm should have a consideration of moderation, reasonableness and self-immunity when applying IT-investment to business. However, the underlining conditions of the Sufficiency Economy are knowledge and morality. Firms should also pay more attention to constitute knowledge that influent to organizational learning and effectiveness. Moreover, executive should take responsibility with morality, fairness, and clarification. Taking all statements mentions above, this study will introduce the IT-investments with the context of Sufficiency Economy Philosophy.

Model of Research

According to Weil Model this research added theory that related with Sufficiency Economy, to study that how they affect to firm performance, see Figure 2-5.

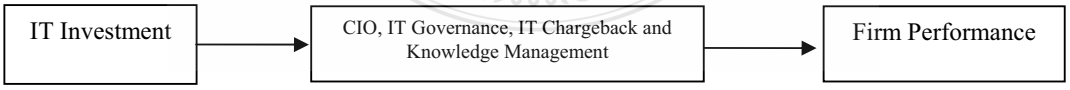

Figure 2-5 Conversion effectiveness of IT investment with firm performance

The IT investment with the context of Sufficiency Economy Philosophy comprise of three concepts including IT Moderation, IT Reasonableness, and IT Self-Immunity.

IT Moderation Concept

The IT investment should consider the investment with the Moderation Concept which is managed by CIO. The CIO has to design an appropriate IT planning by considering the limitation of resource and IT staff and using IT governance to manage IT as the ethics, accountability, and comply with laws.

IT Reasonableness Concept

The responsible of CIO is not only suitable with business firm, but also reasonableness. Business firm have to monitor IT to worthwhile use. IT Chargeback is a tool to record IT usage to show real cost. The result from IT reasonableness will affect business firm to use IT as worthwhile.

IT Self-Immunity Concept

When an organization plans to have a new IT investment, they should have leverage the knowledge from previous firm's performance before design new strategies of IT investment. The knowledge from solution and problem will feed back to consider before the decision to reinvest IT next year.

The Statistic Research Model

According to research objective and research framework in chapter one, this research develop the statistic research model for hypothesis testing. The IT investment represents independent variable, IT with Sufficiency Economy philosophy represents ~~to~~ mediator and firm performance represents dependent variable. This model will use for statistic by Structural Equation Model Analysis, as show in Figure 2-6.

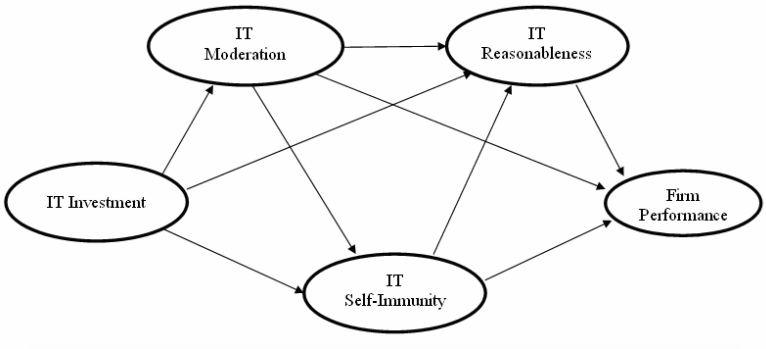

Figure 2-6: The Statistic Research Framework

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter presents research methodology that studies the relationship between IT investment and firm performance with the context of Sufficiency Economy Philosophy. The chapter comprises of four parts including Research design, Quantitative Methodology, Qualitative Methodology, and Sequence of Analysis.

Research Design

This research is cross-sectional that observes from population or research sample at one specific point in time. The methodology divided into quantitative research and qualitative research. Quantitative research uses questionnaire as instrument of survey data. The result from survey shows the relationship of research framework. The qualitative research uses deep-interview to interview Chief Information Officer (CIO). The data from the interview uses to confirm the result of quantitative research.

Quantitative Methodology

Population and Sampling

This research studies CIO, IT Governance, IT Chargeback, and Knowledge Management. Thus the large business firms with total asset more than 200 Million THB are suitable for this study because they have CIO and be implemented Knowledge Management. The 4,139 businesses firm lists on the Department of Business Development of the Ministry of Commerce of Thailand are research

population. Sample size was computed by Yamane formula with 95% of confidence levels.

$$n = N/(1+N*(e)2)$$

Where n is the sample size, N is the population, and e is error value

The 4,139 firms applied into Yamane formula with 95% of confidence levels are 365 firms.

There are 23 groups. Each group is a representative of population in each industry as presented in table 3.1.

Table 3.1 The population and distribution of sample size

Division of Manufacturing	Population (N)	Sample (n)
Food products and beverages	693	62
Tobacco products	4	1
Textiles	204	18
Wearing apparel, except fur apparel	100	9
Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear	55	5
Wood and of productions of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	65	6
Pulp, paper and paper products	121	11
Publishing, printing, and reproduction of recorded media	65	6
Coke, refined petroleum products and nuclear fuel	54	5
Chemicals and chemical products	412	37
Rubber and plastics products	490	44
Other non-metallic mineral products	161	14

Division of Manufacturing	Population (N)	Sample (n)
Basic metals	235	21
Structural metal products, tanks, reservoirs and steam generators	276	25
Machinery and equipment	237	21
Office, accounting and computing machinery	39	3
Electrical machinery and apparatus	109	10
Radio, television and communication equipment and apparatus	164	15
Medical, precision and optical instruments, watches and clocks	33	3
Motor vehicles, trailers and semi-trailers	345	31
Transport equipment	44	4
Furniture; manufacturing	182	16
Recycling	4	1
Total	**4,092**	**368**

Data Gathering

Data were collected from two sources. First, the secondary data from firm list on Department of Business Development of the Ministry of Commerce of Thailand database. Data were filtered and chosen only firms with total asset more than 200 Million THB. The selected field uses in this research are firm name, year of establishment, total asset, net profit, and sale growth of year 2009.

The second part of data is primary data that gathered by sending questionnaires to CIO. The respondents represent CIOs' attitude of giving important to IT investment with the context of Sufficiency Economy Philosophy and benefit

from using IT. Questionnaires have been sent to CIO by mail with letter for introduction and request for survey that issued by university.

Research Instrumentation

Questionnair. The questionnaire is a tool for gathering data from research samples. The questionnaire was constructed from review of the literature in chapter two and design for meet the research objective and research question in chapter one. The questionnaire comprises of four parts.

First part of questionnaire is questions about IT investment to conduct the CIO attitude of level of giving important to IT Investment. Question number 1 to 4 are the level of firm giving important to purchase computer, software, communication device and hire IT staff into business firm. Question number 5 to 8 are the level of firm giving important to bring IT into business process including planning, purchasing material, production, and delivery product. Question number 9 to 12 are the level of firm giving important to store information and using them for decision making in the future. Question number 13 to 16 are the level of firm give importance to use IT supporting firm strategies to sustain competitive advantage, product differentiate and value added to products and services.

The second part is questions about IT management in the context of Sufficiency Economy Question number 17 to 20 are the level of firm giving important to CIO background in IT and business, considering the environment, and be IT strategic. Question number 21 to 24 are the level of firm giving important to the faithfulness of CIO and IT department, the proper of IT staff workload, and complying with IT law. Question number 25 to 28 are the level of firm giving important to monitor the IT usage to be worthwhile and consider the report before making a decision to invest in IT next year. Question number 29 to 32 are the level of

firm give importance to study new knowledge, record, exchange, and use them to make a decision to invest in IT next year.

The third part is questions about attitude rating for the level of firm's benefit from IT usage. The questions in this part divided into two benefits including firm's convenience and firm's competitive advantage. Question numbers 33 to 36 are the level of satisfied with firm's convenience in operation, administration, communication and customer services. Question number37 to 40 are the level of satisfied with firm's competitive advantage about ready for future change, more advantage, better service, and better quality than competitor.

The last part is the questionnaire about demographics including experience, education and job position.

Test for Response Bias. Because questionnaire was used for collecting attitude from research sample, the bias may occur from respondents. This research has designed methodology to prevent and detect respondent bias in social and non response bias.

Social bias is errors that come from respondent try to fill differing potential answer into questionnaire, because they try to answer to show their good behavior. To prevent social bias, questionnaire should be designed by avoiding content that affect respondents' feeling impairment.

The questionnaires have been sent to CIOs. However, they would not have time to do the questionnaires therefore, they would ask their colleagues to do for them. The return questionnaire will be cancelled if all answers are the same and not intend to answer the questionnaire. Therefore, this questionnaire will not be used for research data. In addition, it is assumed that the late return of the questionnaires would be response bias. The response bias will be tested by comparing the first and

the second half of the data between the late return questionnaires and the existing questionnaires using the model. If they are not different, this shows that there is no response bias.

Measurement

Scale. This study uses Likert 5 scale to receive the attitude from survey questionnaire. The Likert 5 scale use as a proxy of interval scale for presenting the level of firm's give importance to IT investment, give importance to IT with Sufficiency Economy Philosophy and level of firm's benefit from IT.

Level of give important

1 = Very unimportant

2 = Unimportant

3 = Moderately Important

4 = Important

5 = Very Important

Level of firm's benefit from IT

1 = Very dissatisfied

2 = Dissatisfied

3 = Moderately Satisfied

4 = Satisfied

5 = Very Satisfied

Measurement. The measurement of give importance to IT investment measure from four variables including IT Infrastructure, Transactional IT, Informational IT, and Information Systems. The detail and definition of each variable is presented in table 3.2.

Table 3.2 Definition and measurement of independent Variables.

Variable	Definition	Measurement
IT Infrastructure	Purchase Computer for Support Business Operation, Purchase Communication Devices to Use in Business Firm, Purchase Software for Support Business Operation, Employ IT staff	- Interval variable - Like 5 scale
Transactional IT	Use IT in Production Planning, Use IT in Raw Material Management, Use IT in Production Process, Use IT in Product and Service Delivery Management	- Interval variable - Like 5 scale
Informational IT	Store information for Support Planning, Store Information of Each Business Operation, Store Information Support Decision Making, and Store Information for Future Use.	- Interval variable - Like 5 scale
Strategic IT	Define IT in Strategic Planning, Use IT for Retain Competitive Advantage, Use IT for Make Uniqueness of Production and Service, Use IT for Increase Product and Service Values.	- Interval variable - Like 5 scale

The measurement of IT strategies that related with IT Sufficiency Economy Philosophy used three mediator variables including IT Moderation, IT Reasonableness, and IT Self-Immunity. IT Moderation use CIO and IT Governance

as proxy of measurement. IT Reasonableness use IT Chargeback as a proxy of measurement. IT Self-Immunity use Knowledge Management as proxy of measurement. The variable and definition is presented in table 3.3.

Table 3.3 Definition and measurement of mediator variables.

Variable	Definition	Measurement
CIO	CEO has IT Skill, CIO Understand Business Process, CIO Consider Firm Suitable before Invest IT, CIO has Strategic Orientations.	- Interval scale - Like 5 scale
IT Governance	Business Firm Give Important for Suitable Work to IT Staff, Can Transparency Verification of Executive, Can Transparency Verification of All Department, Comply with the Law.	- Interval scale - Like 5 scale
IT Chargeback	Monitor IT Usage, Manage IT Budget, Worthwhile Use of IT, and Report IT Investment to be Use Next Time.	- Interval scale - Like 5 scale
Knowledge Management	Study New IT Knowledge, Exchange and Discriminate IT Knowledge, Record IT Knowledge, and Bring IT Investment Knowledge to be Use Next Time.	- Interval scale - Like 5 scale

The measurement of benefit from IT measure from two types which are convenience to work and have competitive advantage as presented in table 3.4.

Table 3.4 Definition and measurement of dependent variables.

Variable	Definition	Measurement
IT Convenience	Work Convenience, Management Convenience , Communication Convenience, and Customer Service Convenience	- Interval scale - Like 5 scale
IT Competitive Advantage	Readiness for Future Change, Increase Business Capability, Customer Service is better than Competitor, Quality of Product is Better than Competitor	- Interval scale - Like 5 scale

The secondary data from Department of Business Development of Ministry of Commerce of Thailand in year 2009 are ROA, SaleGrowth, and firm's years. ROA is a ratio of profit and total asset. SaleGrowth computed from sale (2009) minus sale (2008). Firm's year computed from current minus establishment firm year.

Table 3.5 Definition and measurement of ROA

Variable	**Definition**	**Measurement**
ROA	The ability to make profit from the management asset	Net profit / Total Asset
Sale Growth	The increasing sale from previous year.	Sale – Sale of last year
Firm's year	Age of firm.	Current year – year Establishment

Validity and Reliability

Content Validity Testing: The content validity uses for assessing the questionnaire cover the theory. The questionnaire was assessed by five expertises in information technology by IOC (Index of item objective congruence) method. The result from the assessment uses to adjust and improve a question to be more accurate.

Convergent Validity Testing: The Convergent validity uses in Structural Equation Model analysis for assessing variables that is related to what it should theoretically be related to. The CFA (Confirm Factor Analysis) is the method for testing. After CFA analysis, if they were be able to arrange in the same group, it means that they are good represent of latent variables.

Discriminate Validity Testing: The one of testing that has to assess while SEM analysis is Convergent Validity Testing. The SEM method use it for assessing correlation among latent variables to confirm that they are good represent of latent variable and do not correlate with other latent variable.

Reliability Testing. The questionnaire was sent to 30 research sample firms. The reliability testing analyzes and selects only the Cronbach's alpha score above .7, if the score is lower than .7, it will be dropped out.

The reliability testing will be tested again after receiving questionnaire back from business firm. This testing is one of requirements of SEM analysis.

Result Methodology

The analysis of demographic data of respondents will use mean, frequency, percentage, and standard deviation. The analysis of descriptive statistic that studied about IT management with Sufficiency Economy Philosophy compares with scale with following.

The scale levels of firm gives important that calculated from 5-1/5 = 0.80.

1.00 - 1.79 = Very unimportant

1.80 – 2.59 = Unimportant

2.60 – 3.39 = Moderately Important

3.40 – 4.19 = Important

4.20 – 5.00 = Very Important

The scale levels of firm satisfaction that calculated from 5-1/5 = 0.80.

1.00 - 1.79 = Very dissatisfied

1.80 – 2.59 = Dissatisfied

2.60 – 3.39 = Moderately Satisfied

3.40 – 4.19 = Satisfied

4.20 – 5.00 = Very Satisfied

The Structural Equation Model analyze as follows:

1) Investigate variable with Reliability, Convergent Validity, Discriminant Validity.

2) Create Model from research framework

3) Define observe and latent to research model.

4) Analyze model for calculating regression weight

5) Assessment the Model Fit

a. Chi-Square should not have significant, p-value < .05

b. Chi-Square/ Degree of Freedom should be less than 2.00

c. RMR (Root Mean Square Residual) should be less than 0.05

d. Good of fit index close to 1

e. Root Mean Square Error of Approximation should be less than 0.05

f. NFI (Normed Fit Index) and CFI (Comparative Fit Index) close to 1

g. Examine the Hoelter value should be more than 200 for confirming that research samples are appropriate with the model.

According to research framework and hypothesis in chapter one, this study use Structural Equation Model Analysis. Thus, for hypothesis testing the statistic research model was created as follows:

The first model uses to test that IT investment has effect on IT Sufficiency Economy and IT Sufficiency Economy has effect on intangible firm's performance, as shown in Figure 3-1.

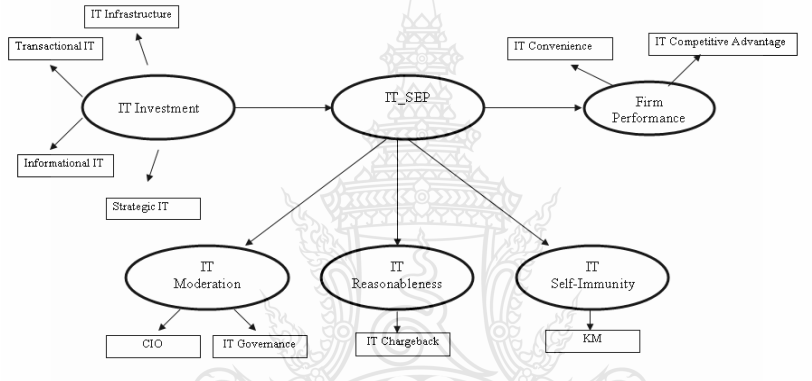

Figure 3-1 Statistic research model with intangible firm performance

The first model test IT investment has effect on IT Sufficiency Economy and IT Sufficiency Economy has effect on tangible firm's performance, as shown in Figure 3-2.

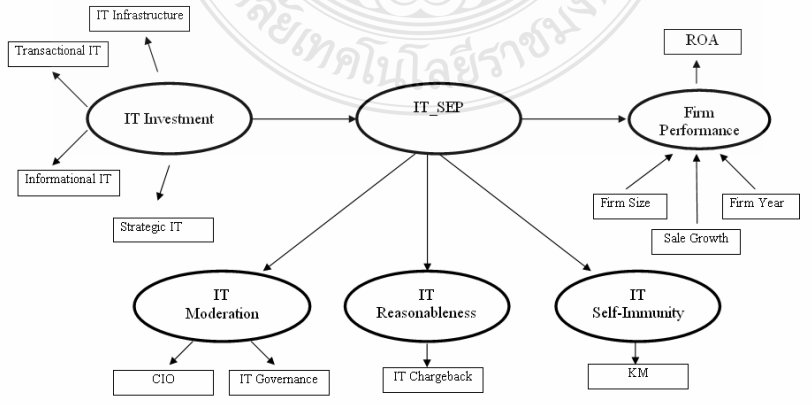

Figure 3-2 Statistic research model with tangible firm performance

According to the first and second model, the third model extends to analyze the relationship between intangible and tangible firm's performance, as shown in Figure 3-3.

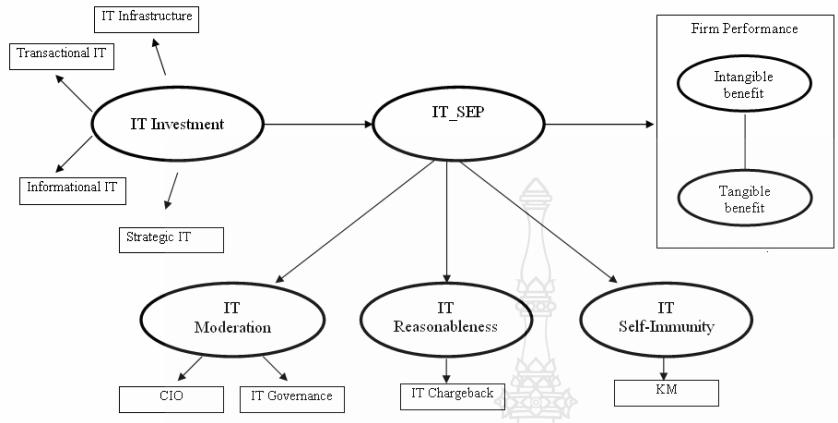

Figure 3-3 Statistic research model with intangible and tangible firm performance

The last model analyze the detail and direction of IT Investment affect to firm's performance through IT Sufficiency Economy Philosophy.

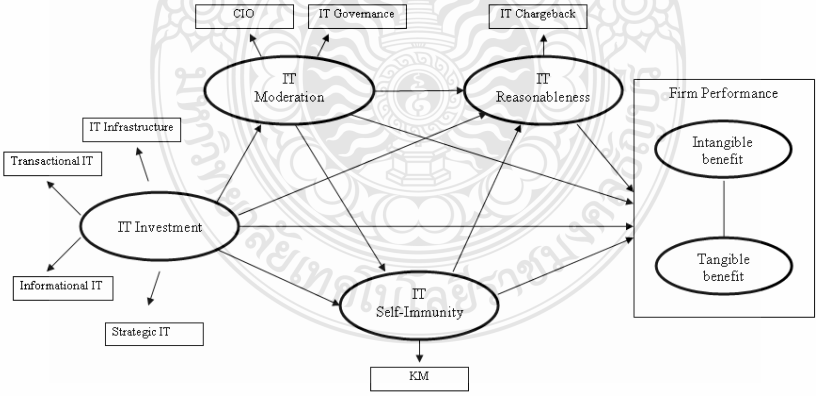

Figure 3-4 Statistic research model for intangible and tangible benefit and show direction

Qualitative Methodology

The qualitative research uses the deep interview from CIO to confirm the result of quantitative research.

Population and Sample

The qualitative research populations are the same as quantitative research. This step not defined amount of research sample, but it will iteration interview until working hypothesis accepted.

Research Instrument

Deep-Interview. Deep-Interview is the face-to-face interview with CIO. The questions are open-ended questions that providing the answer explaining without controlling. The answer will phase by statement responds.

The questions of deep interview are 8 parts as follows:

1. Consent to participate
2. Confidentiality Policy
3. IT Strategies questions
4. IT moderation concept questions
5. IT reasonableness concept questions
6. IT self-immunity concept questions
7. Open question
8. Gratefulness

Result Methodology

The interview for qualitative research was analyzed in inductive description. Firstly, the deep-interview with the first CIO, then proposed to the working hypothesis. Secondly, the next interview performed again. The answer from next CIO had been tested with working hypothesis. The working hypothesis had

been adapted into new working hypothesis, if the result from the next interview disagrees with previous working hypothesis. The process had been repeated until the next interview had generalized with working hypothesis until it had been accepted all hypotheses.

Sequence of Analysis

This research uses both methodologies: quantitative and qualitative research. The sequence of analysis present as follows:

1The Quantitative Research

Pretesting

1) Content Validity

2) Reliability test, only 30 tryout sampling data

- Cronbach's alpha testing

3) Redesign questionnaire if cronbach's alpha less than 0.7

Statistic Analysis

1) Descriptive Statistic Analysis

-Mean, Frequency

2) Reliability testing

-Cronbach's alpha testing

3) Validity Testing

-Confirm Factor Analysis (Convergent validity)

-SEM Method (Discriminate Validity)

4) Structure Equation Model Testing

4.1) Create Model

4.2) Analysis Model

4.3) Measure of fit:

-Consider X^2, X^2/df, degree of freedom, P-value, RMSEA, GFI

-If model not fit, it has to modification indices and go to analyze model again.

4.4) If model fit

-Analyze the regression weight, p-value

-Analyze direct and indirect relation ship

5) Quantitative Research reporting

2. The Qualitative Research

1) Interview

-Description content analysis

-Propose working hypothesis

2) Iteration Interview

-Description content analysis

-Repeat until working hypothesis justify

3) Qualitative research report

3. Analysis both quantitative research and qualitative research

4. Conclusion

CHAPTER FOUR

RESEARCH RESULT

Introduction

This chapter presents a research result that comprises of two sections. Section one is result of a quantitative research including Pre-testing, demographic data, and Structural Equation Model analysis. Section two is a qualitative research result of the interview from Chief Information Officer.

Quantitative Result

Pre-Testing

The questionnaire was tested in term of content validity and reliability before collecting data research sample.

Content Validity

The content validity was assessed by-expertise including four scholars: Assoc.Prof.Dr.Somchai Prakancharoen, Asst. Prof. Dr.Suwarin Pattamavorakun, Assoc.Prof.Wasun Kunam, Dr.Jakkri Srinonchart, and one from business sector: Mr.Danai Chudtong, the Senior IT manager of Krungthai Card Public Company Limited. The assessment used IOC (Index of Item-objective Congruence) method to score each question according to theory, research objective, and accurate meaning. After testing each question, the result of the IOC score was 0.91 which was accepted in term of the content validity. However, some questions were modified based on expertise's suggestion.

Reliability Testing

The reliability testing is a measurement for internal consistency of the questionnaire. The questionnaires were mailed to 40 firms. After receiving the questionnaires back from the research samples, data was analyzed using Cronbach's

alpha to test the reliability of the questions. The test results of each questions' group is presented in Table 4.1.

Table 4.1 Reliability statistic

Question	Cronbach's Alpha
Part 1: IT investment	
IT Infrastructure	.706
IT in Production	.885
Information Systems	.903
Strategic IT	.824
Part 2: IT with context Sufficiency Economy Philosophy	
Chief Information Officer	.831
IT Governance	.809
IT Chargeback	.775
Knowledge Management	.865
Part 3: Firm benefit	
IT Convenience	.935
Competitive Advantage	.858

In Table 4.1, the Cronbach's alpha testing of Information Systems and IT Convenience testing score above .9, IT in Production, Strategic IT, CIO, IT Governance, Knowledge Management and Competitive Advantage have testing score above .8, IT Infrastructure and IT Chargeback has testing score above .7. This indicates that the questionnaire is reliable.

Response Rate

To prevent-the less of return, the questionnaires were mailed to 1,600 manufacturing firms which more than sample size that calculated in chapter three. The 373 firms had returned the questionnaires. It is a 23.31% of 1,600. The top five firms respondents show as follows: Electrical machinery and apparatus returned 67 firms, Food products and beverages returned 55 firms, Motor vehicles, trailers and semi-trailers return 49 firms, Radio, television and communication equipment and apparatus returned 47 firms, Rubber and plastics products return 42 firms. A minority respondent is Office, accounting and computing machinery that return 1 firm.

Table 4.2 Firm respondent

Type of Firm	Size	Sent	Return
Food products and beverages	62	247	55
Textiles	18	71	8
Wearing apparel, except fur apparel	9	45	6
Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear	5	31	5
Wood and of productions of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	6	24	5
Pulp, paper and paper products	11	55	8
Publishing, printing, and reproduction of recorded media	6	26	3
Coke, refined petroleum products and nuclear fuel	5	25	10
Chemicals and chemical products	37	149	32
Rubber and plastics products	44	180	42

Type of Firm	Size	Sent	Return
Other non-metallic mineral products	14	77	15
Basic metals	21	104	25
Structural metal products, tanks, reservoirs and steam generators	25	104	33
Machinery and equipment	21	81	22
Office, accounting and computing machinery	3	11	1
Electrical machinery and apparatus	10	67	67
Radio, television and communication equipment and apparatus	15	47	47
Medical, precision and optical instruments, watches and clocks	3	12	3
Motor vehicles, trailers and semi-trailers	31	142	49
Transport equipment	4	23	7
Furniture; manufacturing	16	75	10
Total	368	1,600	373

Demographic Data

Questionnaire that sent to research sample was defined the respondent are CIO or executive who responsible for IT management. The questions were asking about demographical which consist of five parts: gender, age, education, position, and experience. After receiving questionnaire back, the demographic data and detail of companies was summarized as shown in Table 4.3.

Table 4.3 Demography summary

	Frequency	Percentage
Gender		
Female	101	27.1
Male	272	72.9
Age		
20-30	63	16.9
31-40	179	48.0
41-50	112	30.0
51-60	18	4.8
more than 60	1	0.3
Education		
Under Bachelor degree	22	5.9
Bachelor degree	219	58.7
Master degree	129	34.6
Doctoral	3	0.8
Position		
Administrator	67	18.0
Manager	145	39.9
Head of department	99	26.5
Operation	60	16.1
Other	2	0.5
Experience average 13.29 years		

In table 4-3, the result of demographic data of respondent consists of five parts show as following:

Gender.

According to demographic data, the respondents who response or manage IT were male, 272(72.9%) and female, 110(27.1%). It showed that the majority of IT responsible was male.

Age.

According to demographic data, the respondents were between the ages of 31-40 years old, 179 (48.0%) , between the ages of 41-50 years old, 112(30.0%), between the age of 20-30 years old, 63(16.9%), between 51-60 years old, 18(4.8%), and more than 60 years old, 1(0.3%). It showed that the majority of IT responsible was between the ages of 30-50 years old.

Education.

According to demographic data, the respondents were bachelor degree, 219(58.7%), master degree, 129(34.6%), lower than bachelor degree, 22(5.9%), and doctoral degree, 3(0.8%). It showed that the majority of IT responsible was bachelor degree.

Position.

According to demographic data, the respondents were manager, 145(39.9%), head of department, 99(26.5%), administrator, 67(18%), operation, 60(16.1%), and other,2(0.5%). It showed that the majority of IT responsible was manager.

Experience.

According to demographic data, the respondents have average work experience 13.29 years.

Descriptive Statistic

IT Expenditure

The questions asked about amount of IT investment including purchasing IT, Software, and IT expenditure for IT outsourcing. The result of analysis of average IT expenditure for each industry group is shown in Table 4.4.

Table 4.4 The descriptive statistic of IT spending

Type of Firm	Average of IT Spending (THB)
Food products and beverages	10,012,105.26
Textiles	860,000.00
Wearing apparel, except fur apparel	7,500,000.00
Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear	2,560,000.00
Wood and of productions of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	4,000,000.00
Pulp, paper and paper products	6,600,000.00
Publishing, printing, and reproduction of recorded media	5,100,000.00
Coke, refined petroleum products and nuclear fuel	12,024,444.44
Chemicals and chemical products	4,714,482.76
Rubber and plastics products	3,797,812.50
Other non-metallic mineral products	3,687,500.00
Basic metals	1,197,303.00
Structural metal products, tanks, reservoirs and steam	2,284,782.61

Type of Firm	Average of IT Spending (THB)
generators	
Machinery and equipment	3,590,000.00
Office, accounting and computing machinery	104,800,000.00
Electrical machinery and apparatus	9,662,500.00
Radio, television and communication equipment and apparatus	6,864,285.71
Medical, precision and optical instruments, watches and clocks	4,050,000.00
Motor vehicles, trailers and semi-trailers	5,828,974.36
Transport equipment	13,285,714.29
Furniture; manufacturing	5,097,142.86

According to table 4.4, the top fives industrial groups that high spending on IT were Office, Accounting and Computing Machinery (104,800,000.00 THB), Transport Equipment (13,285,714.29 THB), Coke Refined Petroleum Products and Nuclear Fuel (12,024,444.44 THB), Food Products and Beverages (10,012,105.26 THB), and Electrical Machinery and Apparatus(9,662,500.00 THB) respectively. Whereas the industrial group that less spending on IT was Textile (860,000.00 THB)

IT Investment

The giving importance to IT investment is independent variable of the study that divided into four variables which are the IT infrastructure, IT Production, Information Systems, and Strategic IT as presented in table 4.5.

Table 4.5 The descriptive statistic of IT investment

Variable	Min	Max	Mean	S.D.	Result
Giving Importance to IT Infrastructure					
Purchase Computer for Support Business Operation	1	5	4.000	0.770	Important
Purchase Communication Devices to Use in Business Firm	2	5	3.967	0.792	Important
Purchase Software for Support Business Operation	2	5	3.928	0.811	Important
Employ IT staff	1	5	3.429	0.949	Important
Giving importance to IT in production					
Use IT in Production Planning	1	5	3.790	0.994	Important
Use IT in Raw Material Management	1	5	3.689	0.955	Important
Use IT in Production Process	1	5	3.560	1.002	Important
Use IT in Product and Service Delivery Management	1	5	3.766	0.942	Important
Giving importance to Information Systems					
Store information for Support Planning	1	5	4.000	0.803	Important
Store Information of Each Business Operation	1	5	3.849	0.860	Important
Store Information Support Decision Making	1	5	3.876	0.874	Important
Store Information for Future Use.	1	5	3.965	0.849	Important
Giving importance to Strategic IT					
Define IT in Strategic Planning	1	5	3.345	0.904	Moderately

Variable	Min	Max	Mean	S.D.	Result
Use IT for Retain Competitive Advantage	1	5	3.466	0.884	Important
Use IT for Make Uniqueness of Production and Service	1	5	3.176	0.956	Moderately
Use IT for Increase Product and Service Values	1	5	3.241	0.910	Moderately

According to Table 4.5, the results of statistical analysis of giving importance to IT investment are:

Giving importance to IT Infrastructure. Purchasing Computer to Support Business Operation was Important Level(x = 4.00) with an S.D. of 0.770, Purchasing Communication Devices to Use in Business Firm was Important Level (x=3.967) with an S.D. of 0.792, Purchasing Software to Support Business Operation was Important Level (x=3.928) with an S.D. of 0.811, and Employ IT Staff also was Important Level (x=3.429) with an S.D. of 0.949**.**

Giving importance to IT in production. Use IT in Production Planning was Important Level (x=3.790) with an S.D. of 0.994, Use IT in Product and Service Delivery Management was Important Level(x=3.766) with an S.D. of 0.342, Use IT in Raw Material Management was Important Level(x=3.689) with an S.D. of 0.955, and Use IT in Production Process was Important Level(x=3.560) with an S.D. of 1.002.

Giving importance to Information Systems. Storing information to Support Planning was Important Level (x=4.00) with an S.D. of 0.803, Storing Information for Future Use was Important Level (x= 3.965) with an S.D. of 0.849, Storing

Information to Support Decision Making was Important Level (x= 3.876) with an S.D. of 0.874, and Storing Information of Each Business Operation was Important Level (x= 3.849) with an S.D. of 0.860.

Giving importance to Strategic IT. Using IT to Retain Competitive Advantage was important Level(x=3.466) with an S.D. of 0.884, Defining IT in Strategic Planning was Moderately Level (x=3.345) with an S.D. of 0.904, Using IT to Increase Product and Service Values was Moderately Level (x=3.241) with an S.D. of 0.310, using IT to Make Uniqueness of Production and Service was Moderately Level (x=3.176) with an S.D. of 0.956.

IT Investment with Sufficiency Economy Philosophy

The IT management with the context of Sufficiency Economy Philosophy are mediator variable that is divided into three concepts which are IT Moderation, IT Reasonableness, and IT Self-Immunity as shown in table 4.6

Table 4.6: The descriptive statistic of mediator variable

Variable	Min	Max	Mean	S.D.	Result
Giving importance to Chief Information Officer					
CEO has IT Skill	1	5	3.466	0.865	Important
CIO Understand Business Process	1	5	3.764	0.815	Important
CIO Consider Firm Suitable before Invest IT	1	5	3.758	0.874	Important
CIO has Strategic Orientations	1	5	3.487	0.875	Important
Giving importance to IT Governance					
Business Firm Give Important for Suitable Work to IT Staff	1	5	3.546	0.883	Important

Variable	Min	Max	Mean	S.D.	Result
Can Transparency Verification of Executive	1	5	3.710	0.948	Important
Can Transparency Verification of All Department	1	5	3.675	0.909	Important
Comply with the Law	1	5	4.045	0.849	Important
Giving importance to IT Chargeback					
Monitor IT Usage	1	5	3.520	0.853	Important
Manage IT Budget	1	5	3.592	0.892	Important
Worthwhile Use of IT	1	5	3.922	0.856	Important
Report IT Investment to be Use Next Time	1	5	3.311	1.013	Moderately
Giving importance to Knowledge Management					
Study New IT Knowledge,	1	5	3.359	0.994	Moderately
Exchange and Disseminate IT Knowledge	1	5	3.185	0.942	Moderately
Record IT Knowledge	1	5	3.302	0.937	Moderately
Bring IT Investment Knowledge to be Use Next Time	1	5	3.222	0.948	Moderately

According to table 4.6, the statistic result of IT moderation use CIO and IT Governance as a proxy of measurement, IT Reasonableness use IT Chargeback as a proxy of measurement, and IT Self-Immunity use Knowledge Management as a proxy of measurement are:

Giving importance to Chief Information Officer. CIO Understand Business Process was Important Level (x= 3.764) with an S.D. of 0.815, CIO Consider Firm Suitable before Invest IT was Important Level(x= 3.758) with an S.D. of 0.874, CIO has Strategic Orientations was Important Level (x= 3.487) with an S.D. of 0.875, and CEO has IT Skill was Important Level(x= 3.466) with an S.D. of 0.865.

Giving importance to IT Governance. Comply with the Law was Important Level (x= 4.045) with an S.D. of 0.849, Can Transparency Verification of Executive was Important Level(x= 3.710) with an S.D. of 0.948, Can Transparency Verification of All Department was Important Level (x= 3.675) with an S.D. of 0.909, and Business Firm Give Important for Suitable Work to IT Staff was Important Level(x= 3.546) with an S.D. of 0.883.

Giving importance to IT Chargeback. Worthwhile Use of IT was Important Level (x=3.922) with an S.D. of 0.856, Manage IT Budget was Important Level (x= 3.592) with an S.D. of 0.892, Monitor IT Usage was Important Level(x= 3.520) with an S.D. of 0.853, and Report IT Investment to be Use Next Time. was Moderately Level(x=3.311) with an S.D. of 1.103.

Giving importance to Knowledge Management. Study New IT Knowledge was Moderately Level (x= 3.359) with an S.D. of 0.994, Record IT Knowledge was Moderately Level (x= 3.302) with an S.D. of 0.937, Bring IT Investment Knowledge to be Use Next Time was Moderately Level (x= 3.222) with an S.D. of 0.948, and Exchange and Disseminate IT Knowledge was Moderately Level (x= 3.185) with an S.D. of 0.942.

Firm's Performance

The firm's performance is dependent variable that is divided into two aspects which are intangible firm's performance that use IT Convenience and IT Competitive Advantage as proxy of measurement and tangible firm's performance that use ROA as a proxy of measurement as shown in table 4.7.

Table 4.7: The descriptive statistic of dependent variable

Variable	Min	Max	Mean	S.D.	Result
IT Convenience Benefit					
Work Convenience	1	5	4.155	0.727	Satisfied
Management Convenience	2	5	4.053	0.745	Satisfied
Communication Convenience	1	5	4.246	0.746	Very Satisfied
Customer Service Convenience	1	5	3.954	0.779	Satisfied
IT Competitive Advantage					
Readiness for Future Change	1	5	3.600	0.854	Satisfied
Increase Business Capability	1	5	3.453	0.868	Satisfied
Customer Service is better than Competitor	1	5	3.388	0.856	Moderate Satisfied
Quality of Product is Better than Competitor	1	5	3.260	0.903	Moderate Satisfied
Profitability ratio					
Return on Asset	0	1.09	0.070	0.090	-

According to table 4.7, the statistic result of Intangible firm's performance that measure from IT convenience and IT Competitive Advantage are:

Convenience Benefit. Communication Convenience was Very Satisfied Level(x= 4.246) with an S.D. of 0.746, Work Convenience was Satisfied Level (x= 4.155) with an S.D. of 0.727, Management Convenience was Satisfied Level (x= 4.053) with an S.D. of 0.745, and Customer Service Convenience was Satisfied Level (x= 3.954) with an S.D. of 0.779.

IT Competitive Advantage. Readiness for Future Change was Satisfied Level (x= 3.600) with an S.D. of 0.854, Increase Business Capability was Satisfied Level (x= 3.453) with an S.D. of 0.868, Customer Service is better than Competitor was Moderate Satisfied Level (x= 3.388) with an S.D. of 0.856, and Quality of Product is Better than Competitor was Moderate Satisfied Level (x= 3.260) with an S.D. of 0.903.

Control Variables

Due to ROA that used as a proxy of tangible firm's performance may not only come from IT investment, but also it may come from other reasons. Therefore, this study used three variables: namely firm age, number of employee, and sale growth to control variables as presented in table 4.8.

Table 4.8: The descriptive statistic of control variable

Variable	Min	Max	Mean
Firm age	2.00	79.00	19.70
Number of Employee	7.00	30,000.00	945.00
Sale Growth (THB)	-26,070,870,578.00	5,311,503,823.00	-413,688,936.21

According to statistic result of control variable showed that the lowest of firm age was 2 years olds, whereas the maximum was 79 years old. The average of firm age was 19.7 years old. The lowest of number of employee was 7, whereas the maximum was 30,000, and average was 945. The maximum of sale growth of year 2009 was 5,311,503,823 THB whereas the minimum was -26,070,870,578 THB.

Structural Equation Model

Normal Distribution Testing

The Structural Equation Model Analysis requires all variables should be normal distribution. The normality testing measured from skewness and kurtosis must be between -2 and +2(Division of Statistic Scientific Computation College of Natural Sciences The University of Texas at Austin, 2011; Stahl, 2011). After testing, the researcher realized that there are four variables did not follow normal distribution. The four variables were transformed to normal distribution by Box-Cox and Johnson transformation as shown in table 4.9.

Table 4.9 Data Transformation

Varibale	Problem	Transform	Equation
Year	Positive Skewness	Box-Cox	$Year^{0.5}$
Employee	Positive Skewness	Box-Cox	ln(*Employee*)
ROA	Positive Skewness	Box-Cox	$ROA^{0.25}$
SaleGrowth	Negative Skewness	Johnson	0.408081 + 0.536801 * Asinh((*SaleGrowth* - 1389667) / 79830641)

Reliability Testing

One of Structural Equation Model Analysis requirement is the observe variables should have reliability. The Cronbach's alpha above .7 is a criteria for accepted reliability. After testing, the reliability testing result is shown in table 4.10, the result each of questions is presented in appendix A.

Table 4.10 Reliability Statistic

Variable	Cronbach's Alpha
IT_Infrastructure	.830
IT_Production	.921
IT_Information_Systems	.911
IT_Strategies	.914
Chief_Information_Officer and IT Governance	.896
IT_Chargeback	.835
Knowledge_Management	.918
IT Convenience	.900
IT Competitive	.918

Table 4.10 is the analysis result of reliability testing have detail as following: IT Infrastructure has a Cronbach' alpha of .830, IT Production has Cronbach's alpha of .921, IT Information System has Cronbach's alph of .911, IT_Strategies has Cronbach's alpha of .914, Chief_Information_Officer and IT Governance has Cronbach's alpha of .896, IT Chargeback has Cronbach's alpha of 0.835, Knowledge Management has Cronbach's alpha of .918, Convenience has Cronbach's alph of .900, and Competitive has Cronbach's alph of .918. According to all variable, Cronbach's alpha scored more than .7, it indicated that they are reliability.

Multicollinearlity Testing

Due to the Structural Equation Model is the base on regression analysis, thus this research must go through Multicollinearity testing. The assumption of regression analysis has a limitation that each variable should not be highly correlate with others. The Tolerance and Variance Inflation Factor (VIF) measurement used for testing. The Tolerance should be more than 0.1 or VIF should be less than 10 (VIF = 1 / Tolerance) to accept that they have no Multicollinearity problems(Hair, Black, Babin, & Anderson, 2009). The result of Multicollinearity of IT_Prod1 testing with IT_Inf2, IT_Inf3, and IT_Inf4 has shown in Table 4.11. The rest of Multicollinearity testing of other variables has shown in appendix B.

Table 4.11 Multicollinearity statistics testing with IT_Inf1

	Collinearity Statistic	
Variable	**Tolerance**	**VIF**
IT_Inf2 (Purchase communication device and IT security for support operation)	0.422	2.372
IT_Inf3 (Purchase software for support operation)	0.482	2.073
IT_Inf4 (Employ IT staff)	0.374	2.671

Construct Validity

The next testing before creating model for Structural Equation Model Analysis are Convergent Validity Testing and Discriminant Validity Testing. The Convergent Validity Testing will verify that the indicators can represent into latent variable, whereas Discriminant Validity testing is performed to show that observe variable

represent on the same latent variable and not associated with observe variable of the other latent variables.

The researchers measured Convergent Validity with Confirm Factor Analysis. If observe variable is the best represent of latent variable, Factor Loading should be above .6. The result of independent variable testing is presented in Figure 4.1 and table 4.12, whereas the other results of mediator and dependent variables shown in appendix C.

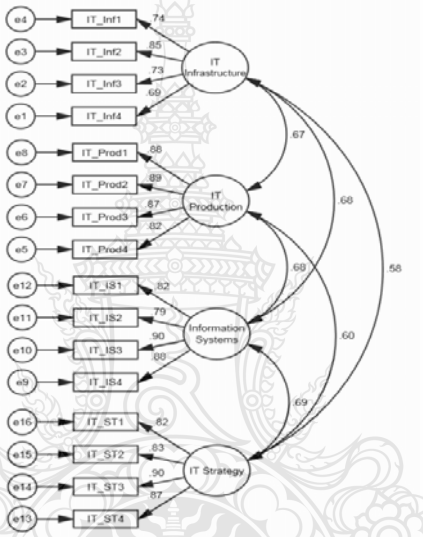

Figure 4-1 Factor loading of IT Investment

Table 4.12 Factor Loading of Independent variables

Variable	Factor Loading
IT_INF (IT_Infrastructure)	
IT_Inf1	0.740
IT_Inf2	0.846
IT_Inf3	0.731
IT_Inf4	0.694

Variable	Factor Loading
IT_PRO (IT_Production)	
IT_Prod1	0.877
IT_Prod2	0.894
IT_Prod3	0.870
IT_Prod4	0.815
IT_IS (IT_Information_Systems)	
IT_IS1	0.824
IT_IS2	0.793
IT_IS3	0.897
IT_IS4	0.884
IT_ST (IT_Strategies)	
IT_ST1	0.821
IT_ST2	0.825
IT_ST3	0.900
IT_ST4	0.867

After Convergent Validity Testing, ITG4 were not convergent. It was dropped and not brought to Structural Equation Model Analysis.

Discriminant Validity. Discriminant Validity Testing uses SEM Method (M. G. Kim & Kim, 2010) to test by constructing pair of models from latent variable. Defining variance of both latent variables to "1" and then observing the covariance between them should not be high value. If covariance is not high value, it shows that observed variable is separating accurately. A criterion of assessment is correlation. It should not be higher than 0.85. This model is accepted. The model fit testing will

confirm model consistency with data. The criteria for model fit testing are chi-square, p-value, GFI, AGFI, RMR, CFI, and NFI that mentioned in chapter three. If model fit testing is not accepted, one of observed variable will be dropped out until the test is accepted.

The next step of Discriminant Validity Testing is constrains covariance between latent variable to "1" for assume that both of them have correlation. If they do not have correlation, the model fit testing is not accepted. If model fit testing is accepted, it indicates that both latent do not have Dicriminant Validity.

Example of Discriminant Valdity Testing between IT Infrastructure and Information Systems that was detached some observed variables to three remaining per latent variable as shown in Figure 4-4 and 4-5. The model fit testing result is shown in table 4.13 whereas the other pair of testing is presented in appendix D.

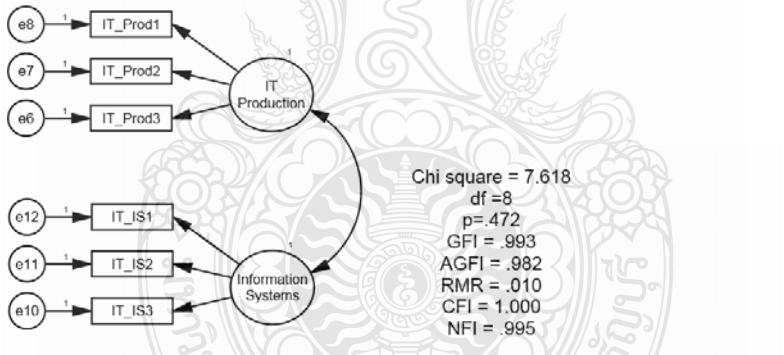

Figure 4-4 Fix Variance to 1 Free Covariance

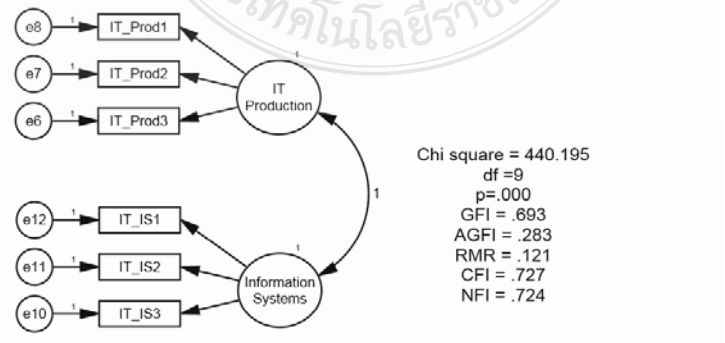

Figure 4-5 Fix Variance to 1 Fixed Covariance to 1

22Table 4.13 Discriminant validity test between IT infrastructure and Information Systems.

	Free covariance	Fixed covariance	Different Chi-square between Free and fix covariance
Chi-Square	12.641	217.32	204.679
p-value	0.125	.000	
correlation	0.65	1	

According to Figure 4-4 and Table 4.13, when variance was fixed to "1" , the result of correlation was 0.65 that lower than 0.85 and model fit testing was accepted. It indicated that model consistent with data, both latent variable were accurate.

According to Figure 4-5 and Table 4.13, when covariance was adding fixed to "1". The model fit testing was not accepted. It indicated that both latent variables were separated correctly.

After Discriminant Validity Testing, there were 19 observed variables remaining, as presented in Table 4.14.

Table 4.14: The rest of indicator after Discriminant Validity

Latent Variable	Indicator
IT Infrastructure	IT_Inf1
	IT_Inf2
	IT_Inf3
IT Production	IT_Prod1

Latent Variable	Indicator
	IT_Prod2
	IT_Prod3
IT Information System	IT_IS1
	IT_IS2
	IT_IS3
IT Moderation	CIO2
	CIO3
	CIO4
IT Reasonableness	ChB1
	ChB3
IT Self-Immunity	KM2
	KM4
Convenience	Con1
	Con3
	Con4

Research Sample Assumption

To analyze Structure Equation Model, the data have to be enough and suitable with indicator in the model. The minimum of data can be computed from formula p(p+1)/2; where p is an indicator in the model.

The returned back of 373 questionnaires can reverse equation, thus (p+1) equal 27, indicate that the indicator of the model should not be more than 26.

Construct Research Model

The research constructed five model for hypothesis testing and for answer research questions are as following: 1) Model of the relationship between IT investment and intangible firm's performance with the context of Sufficiency Economy Philosophy 2) Model of the relationship between IT investment and tangible firm's performance with the context of Sufficiency Economy Philosophy 3) Model of the relationship between IT investment and firm's performance with the context of Sufficiency Economy Philosophy 4) Model for describe relation between IT investment and firm's performance with the context of Sufficiency Economy Philosophy 5) Model for Relation between IT Sufficiency Economy Philosophy and firm's performance with IT Investment.

Model One: the relationship between IT investment and intangible firm's performance with the context of Sufficiency Economy Philosophy

The objective of creating model one is to develop the relationship between IT investment with the context of Sufficiency Economy Philosophy and intangible firm's performance that used IT convenience as a proxy of intangible firm's performance.

After crating the model, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter three.

The result of model fit testing showed as follow: Chi-Square=165.296, df=139, p-value= .063 , GFI=0.956, AGFI=0.940 ,RMSR=0.025, RMSE= 0.023(PCLOSE=1.00) , NFI=0.963, CFI=0.994 and Hoelter=407(0.01), see in Table 4.15.

Table 4.15 Measuring of Model Fit of Model I

Model fit criteria	Value	Acceptable Level value
Chi-Square	165.296	-
Degree of freedom	139	-
Chi-Square/Degree of freedom	1.189	Less than 2
p-value	.063	P > .05
GFI	0.956	>= 0.90
AGFI	0.940	>=0.80
RMSR	0.025	Next to zero
RMSE	0.023	< 0.10
NFI	0.963	> 0.90
CFI	0.994	> 0.90
Holelter	407	> 200

According to table 4.15, the result of model fit testing is shown that they were consistent with data. The diagram of model one was depicted as Figure 4-6.

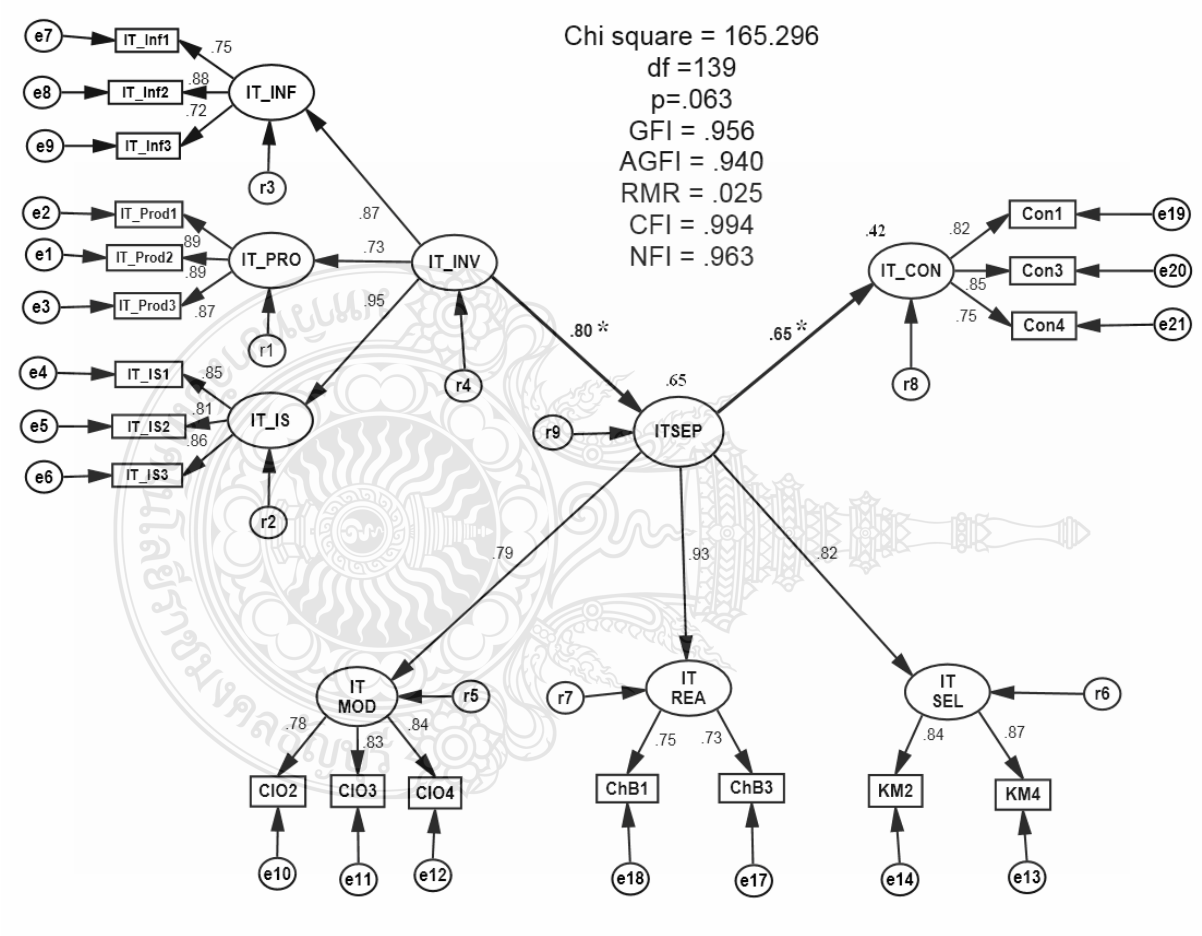

Figure 4-6 Model One Convenience as dependent variable

According to Figure 4-6, Factor Loading presented observed variable are the member of latent variable. The Factor Loading of IT Infrastructure is presented as below, whereas the rest of other latent variables are shown in appendix E.

IT Infrastructure Exogenous Latent Variable. IT Infrastructure variables comprise of observed variables which are Purchase Computer has factor loading of 0.75, Purchase Communication Device and IT Security has factor loading of 0.88, Purchase Software has factor loading of 0.72, as shown in Table 4.16.

Table 4.16 Factor loading of indicator of The IT Infrastructure Latent variable

Latent Variable	Observe Variable	Factor Loading
IT_INF	Purchase Computer for Support Business Operation (IT_Inf1)	0.75
	Purchase Communication Devices to Use in Business Firm (IT_Inf2)	0.88
	Purchase Software for Support Business Operation (IT_Inf3)	0.72

After analyzing the model one, it is found that IT Investment (IT_Inv) has positive direct effect on IT Sufficiency Economy Philosophy(IT_SEP) (β=0.80), IT Sufficiency Economy Philosophy(IT_SEP) has positive direct effect on IT Convenience (IT_Con) (β=0.65). IT Investment (IT_Inv) has positive indirect effect on IT Convenience (β =0.519). It is indicated that IT investment with the context of Sufficiency Economy Philosophy has positive effect on intangible firm's benefit.

Table 4.17 shows the direct and indirect effect of Model One.

Table 4.17 The standard indirect, direct, and total effect of model I

Dependent Variable	R^2	Direct Effect			Indirect Effect			Total Effect	
		IT_INV	IT_SEP		IT_INV	IT_SEP		IT_INV	IT_SEP
IT_SEP	.65	.80						.80	
IT_CON	.42		.65		.519			.519	.65

According to table 4.17 can be expressed by equation as below:

$IT\_SEP = 0.80\ IT\_INV;\ R^2 = 0.65$

$IT\_CON = 0.519*IT\_INV + 0.65*IT\_SEP;\ R^2 = 0.42$

Where :

IT_CON = IT Convenience

IT_INV = IT Investment

IT_SEP = IT with the context of Sufficiency Economy Philosophy

The coefficient of determinant (R^2) shown that, IT investment has effect on IT with Sufficiency Economy Philosophy with the accuracy of 65 %. The IT with Sufficiency Economy has effect on IT convenience, as a proxy of intangible firm's performance with the accuracy of 43 %.

Model Two: the relationship between IT investment and tangible firm's performance with the context of Sufficiency Economy Philosophy

The objective of model two is to develop the relationship between IT investment with firm's performance with the Sufficiency Economy Philosophy. The ROA was used as a proxy of tangible firm's performance.

However, the successful of ROA may come from other reasons, thus this study used three control variables which are Firm's age, Number of Employee, and SaleGrowth to analyze with the model.

After crating the model, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter 3.

The result of model fit testing are Chi-Square=240.660, df=163, p-value= .00 , GFI=0.940, AGFI=0.923 ,RMSR=0.057, RMSE= 0.036(PCLOSE=0.995) , NFI=0.938, CFI=0.979 and Hoelter=332(0.01), as shown in Table 4.18.

Table 4.18 Measuring of Model Fit of Model Two

Model fit criteria	Value	Acceptable Level value
Chi-Square	240.660	-
Degree of freedom	163	-
Chi-Square/Degree of freedom	1.47	Less than 2
p-value	.00	P > .05
GFI	0.940	>= 0.90
AGFI	0.923	>=0.80
RMSR	0.057	Next to zero
RMSE	0.036	< 0.10
NFI	0.938	> 0.90
CFI	0.979	> 0.90
Holelter	332	> 200

According to table 4.18, p-value was less than .05, it indicated that model significant differ with data and no consistency. The modification indices was

adjusted a model by adding covariance between residual error as follow: e7 and e2, e8 and e4, e9 and e5, r3 and r2, e24 and e23, e23 and r1, e22 and e3, e22 and e1, e25 and e1. After model was modified, the result of the model fit are: Chi-Square=176.214, df=153, p-value=0.096 , GFI=0.956, AGFI=0.939 ,RMSR=0.047, RMSE= 0.02(PCLOSE=1.00) , NFI=0.955, CFI=0.994 and Hoelter=416(0.01), as shown in table 4.19.

Table 4.19 Measuring of Model Fit of Model Two after Modification Indices

Model fit criteria	Value	Acceptable Level value
Chi-Square	176.214	-
Degree of freedom	153	-
Chi-Square/Degree of freedom	1.151	Less than 2
p-value	0.096	P > .05
GFI	0.956	>= 0.90
AGFI	0.939	>=0.80
RMSR	0.047	Next to zero
RMSE	0.02	< 0.10
NFI	0.955	> 0.90
CFI	0.994	> 0.90
Holelter	416	> 200

According to table 4.19, the result of model fit testing is consistent with data. The diagram of the model one is presented in Figure 4-7.

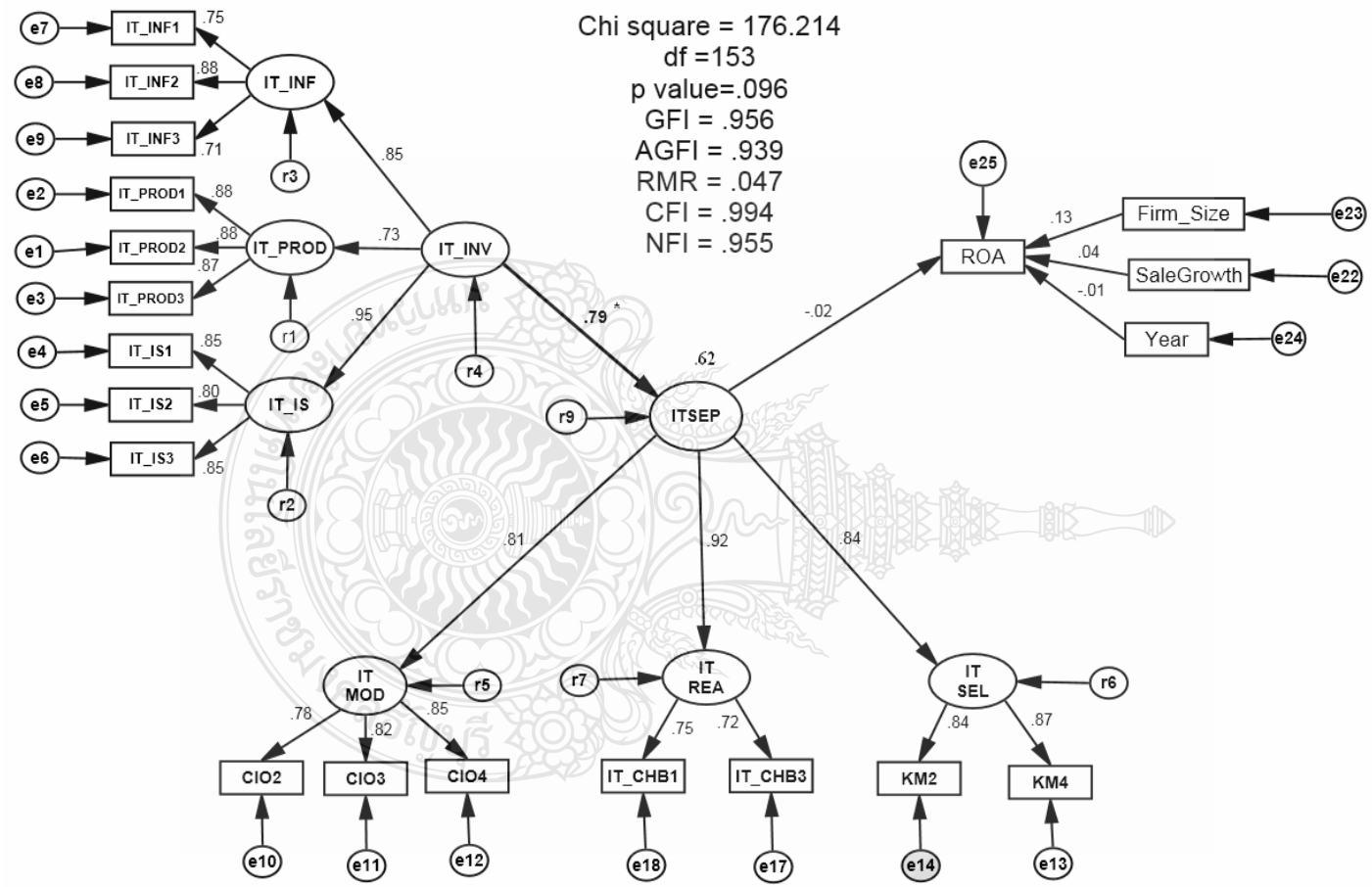

Figure 4-7 .Model Two ROA as dependent variable

According to Figure 4-7, Factor Loading presented observed variable are the member of latent variable. The Factor Loading of all latent variables is shown in appendix E.

After analyzing the model two, it is found that IT Investment (IT_Inv) has positive direct effect on IT Sufficiency Economy Philosophy(IT_SEP) (β=0.79), IT Sufficiency Economy Philosophy(IT_SEP) has positive direct effect on ROA (β= -.02). IT Investment (IT_Inv) has positive indirect effect on ROA(β = -.013), It indicated that IT investment with the context of Sufficiency Economy Philosophy does not have positive effect on ROA, as a proxy of tangible firm's benefit.

Table 4.17 shows the direct and indirect effect of the Model Two.

Table 4.20 The standard indirect, direct, and total effect of model Two

Dependent Variable	R^2	Direct Effect		Indirect Effect		Total Effect	
		IT_INV	IT_SEP	IT_INV	IT_SEP	IT_INV	IT_SEP
IT_SEP	.62	.79				.79	
ROA	.02		-.02	-.013		-.013	-.02

According to table 4.20, it can be expressd by equation as below:

IT_SEP = 0.79 IT_INV; R^2 = 0.62

ROA = -0.013*IT_INV – 0.02*IT_SEP; R^2 = 0.02

Where :

IT_CON = IT Convenience

ROA = Return on Asset

IT_INV = IT Investment

The coefficient of determinant (R^2) shown that, IT investment has effect on IT with Sufficiency Economy Philosophy with the accuracy of 62 %. The IT investment and IT with Sufficiency Economy does not have effect on tangible firm's performance.

Model Three: the relationship between IT investment and firm's performance with the context of Sufficiency Economy Philosophy

The objective of this model three is to develop the relationship between IT investment with firm's performance, both intangible and tangible, with the Sufficiency Economy Philosophy. This model study Model One and Model Two together to find that intangible has effect on tangible firm's performance.

After crating the model, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter 3.

The result of model fit testing are Chi-Square=600.159, df=223, p-value= .00 , GFI=0.891, AGFI=0.865 ,RMSR=0.144, RMSE= 0.068(PCLOSE=0.995) , NFI=0.911, CFI=0.911 and Hoelter=169(0.01), as shown in Table 4.21

Table 4.21 Measuring of Model Fit of Model Three

Model fit criteria	Value	Acceptable Level value
Chi-Square	600.159	-
Degree of freedom	223	-
Chi-Square/Degree of freedom	2.691	Less than 2
p-value	.00	P > .05
GFI	0.891	>= 0.90
AGFI	0.865	>=0.80
RMSR	0.144	Next to zero

RMSE	0.068	< 0.10
NFI	0.911	> 0.90
CFI	0.911	> 0.90
Holelter	169	> 200

According to table 4.21, p-value is less than .05, it indicated that model significant differ with data and no consistency. The modification indices were adjusted the model by adding covariance between residual error as follow: e7 and e2, e8 and e4, e9 and e5, r3 and r2, e24 and e23, e23 and r1, e22 and e3, e22 and e1, e25 and e1. After model was modified the result of model fit are: Chi-Square=241.9, df=211, p-value=0.071 , GFI=0.947, AGFI=0.931 ,RMSR=0.039, RMSE= 0.02(PCLOSE=1.00) , NFI=0.947, CFI=0.993 and Hoelter=403(0.01), as shown in table 4.22.

Table 4.22 Measuring of Model Fit of Model Three after Modification Indices

Model fit criteria	Value	Acceptable Level value
Chi-Square	241.9	-
Degree of freedom	211	-
Chi-Square/Degree of freedom	1.146	Less than 2
p-value	0.071	P > .05
GFI	0.947	>= 0.90
AGFI	0.931	>=0.80
RMSR	0.039	Next to zero
RMSE	0.02	< 0.10
NFI	0.947	> 0.90

CFI	0.993	> 0.90
Holelter	403	> 200

According to table 4.22, the result of model fit testing shows that they are consistent with data. The diagram of model one is presented in Figure 4-8.

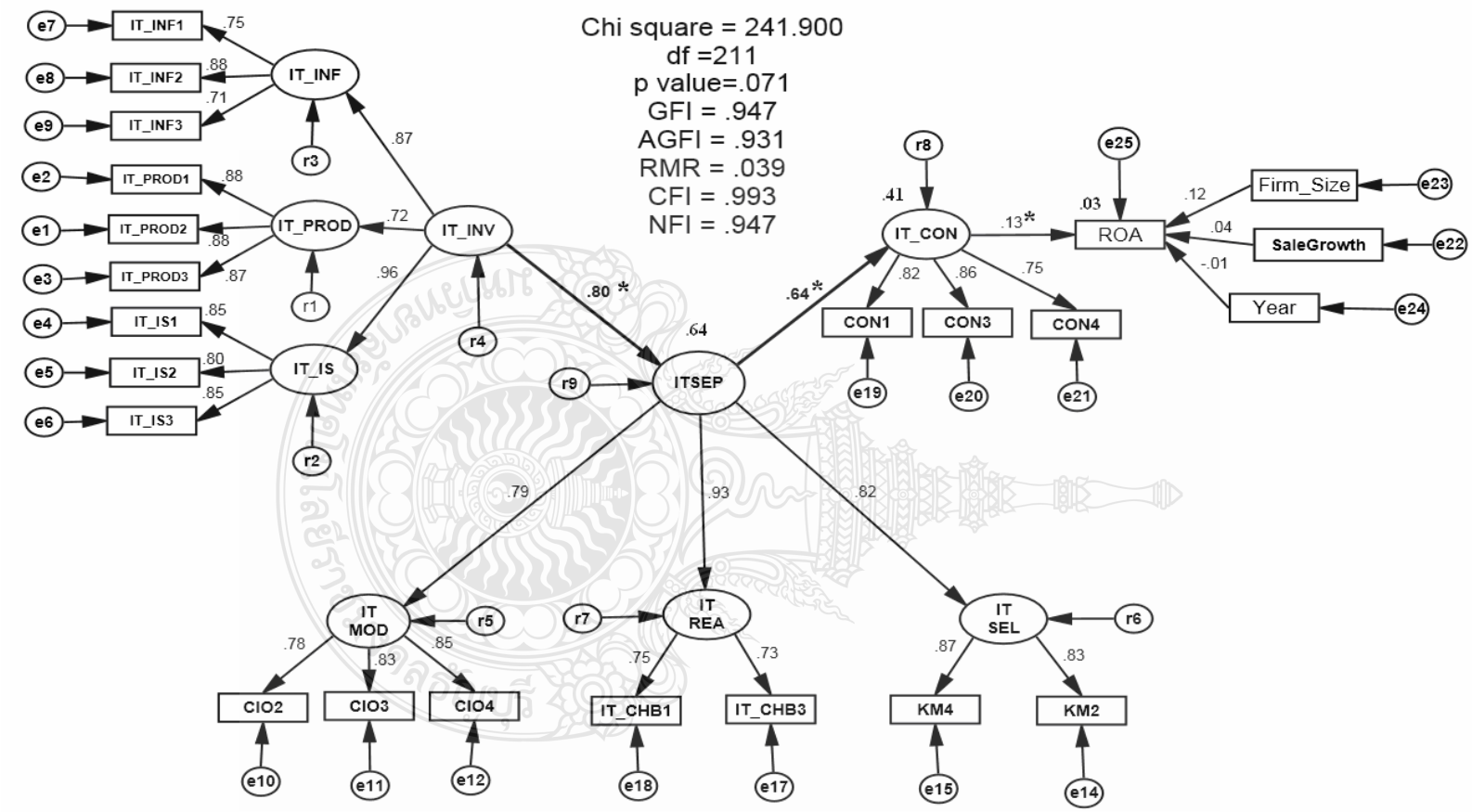

Figure 4-8 Model Three both convenience and ROA as dependent variable

According to Figure 4-8, Factor Loading presented observed variable are the member of latent variable. The Factor Loading of each latent variable is shown in appendix E.

After analyzing the model three, it is found that IT Investment(IT_Inv) has positive direct effect to IT Sufficiency Economy Philosophy(IT_SEP) (β=0.80), IT Sufficiency Economy Philosophy(IT_SEP) has positive direct effect to IT Convenience (IT_CON) (β= .64), IT Convenience (IT_CON) has positive direct effect to ROA (β = 0.13), IT Investment (IT_INV) has positive indirect effect to IT Convenience (IT_CON)(β = 0.53), IT Investment (IT_INV) has positive indirect effect to ROA (β = 0.067), IT Sufficiency Economy Philosophy (IT_SEP) has positive indirect effect to ROA (β = 0.083). It indicated that IT investment with the context of Sufficiency Economy Philosophy has positive effect on intangible firm's benefit, and then intangible has positive effect on tangible firm's performance.

Table 4.23 shows the direct, indirect, and total effect of the Model Three.

Table 4.23 The standard indirect, direct, and total effect of model Three

Dependent Variable	R^2	Direct Effect				Indirect Effect				Total Effect		
		IT_INV	IT_SEP	IT_CON		IT_INV	IT_SEP	IT_CON		IT_INV	IT_SEP	IT_CON
IT_SEP		.80								.80		
IT_CON			.64			.53				.53	.64	
ROA				.13		.067	.083			.067	.083	.13

According to table 4.23, it can be expressd by equation as below:

$IT\_SEP = 0.80\ IT\_INV;\ R^2 = 0.64$

$IT\_CON = 0.53*IT\_INV + 0.64*IT\_SEP;\ R^2 = 0.41$

$ROA = 0.067*IT\_INV + 0.083*IT\_SEP + 0.13*IT\_CON;\ R^2 = 0.03$

Where :

ROA = Return on Asset

IT_INV = IT Investment

IT_SEP = IT with the context of Sufficiency Economy Philosophy

IT_CON = IT Convenience

The coefficient of determinant (R^2) shown that, IT investment has effect on IT with Sufficiency Economy Philosophy with the accuracy of 64 %, The IT with Sufficiency Economy has effect on IT convenience, as a proxy of intangible firm's performance with the accuracy of 41 %, Intangible has effect on ROA, as a proxy of tangible firm's performance with the accuracy of 3 %.

Model Four: the describe relation between IT investment and firm's performance with the context of Sufficiency Economy Philosophy.

The objective of model four is to find the order concept of IT with Sufficiency Economy Philosophy.

After crating the model, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter 3.

The result of model fit testing are Chi-Square=317.788, df=218, p-value=0.00 , GFI=0.931, AGFI=0.912 ,RMSR=0.052, RMSE= 0.035(PCLOSE=0.999) , NFI=0.931, CFI=0.977 and Hoelter=316(0.01), as shown in Table 4.24.

Table 4.24 Measuring of Model Fit of Model Four

Model fit criteria	Value	Acceptable Level value
Chi-Square	317.788	-
Degree of freedom	218	-
Chi-Square/Degree of freedom	1.45	Less than 2
p-value	0.00	P > .05
GFI	0.931	>= 0.90
AGFI	0.912	>=0.80
RMSR	0.052	Next to zero
RMSE	0.035	< 0.10
NFI	0.931	> 0.90
CFI	0.977	> 0.90
Holelter	316	> 200

According to table 4.18, p-value is less than .05, it indicated that model significant differ with data and no consistency. The modification indices was adjusted a model by adding covariance between residual error as follow: e7 and e2, e8 and e4, e9 and e5, r3 and r2, e24 and e23, e23 and r1, e22 and e3, e22 and e1, e25 and e1. After model was modified, the result of model fit are: Chi-Square=225.095,

df=203, p-value=0.137, GFI=0.950, AGFI=0.932, RMSR=0.025, RMSE= 0.017(PCLOSE=1.00) , NFI=0.951, CFI=0.995 and Hoelter=418(0.01), as shown in table 4.25.

Table 4.25 Measuring of Model Fit of Model Four after Modification Indices

Model fit criteria	Value	Acceptable Level value
Chi-Square	225.095	-
Degree of freedom	203	-
Chi-Square/Degree of freedom		Less than 2
p-value	0.137	P > .05
GFI	0.950	>= 0.90
AGFI	0.932	>=0.80
RMSR	0.025	Next to zero
RMSE	0.017	< 0.10
NFI	0.951	> 0.90
CFI	0.995	> 0.90
Holelter	418	> 200

According to table 4.25, the result of model fit testing shows that they are consistent with data. The diagram of model one is presented in Figure 4-9.

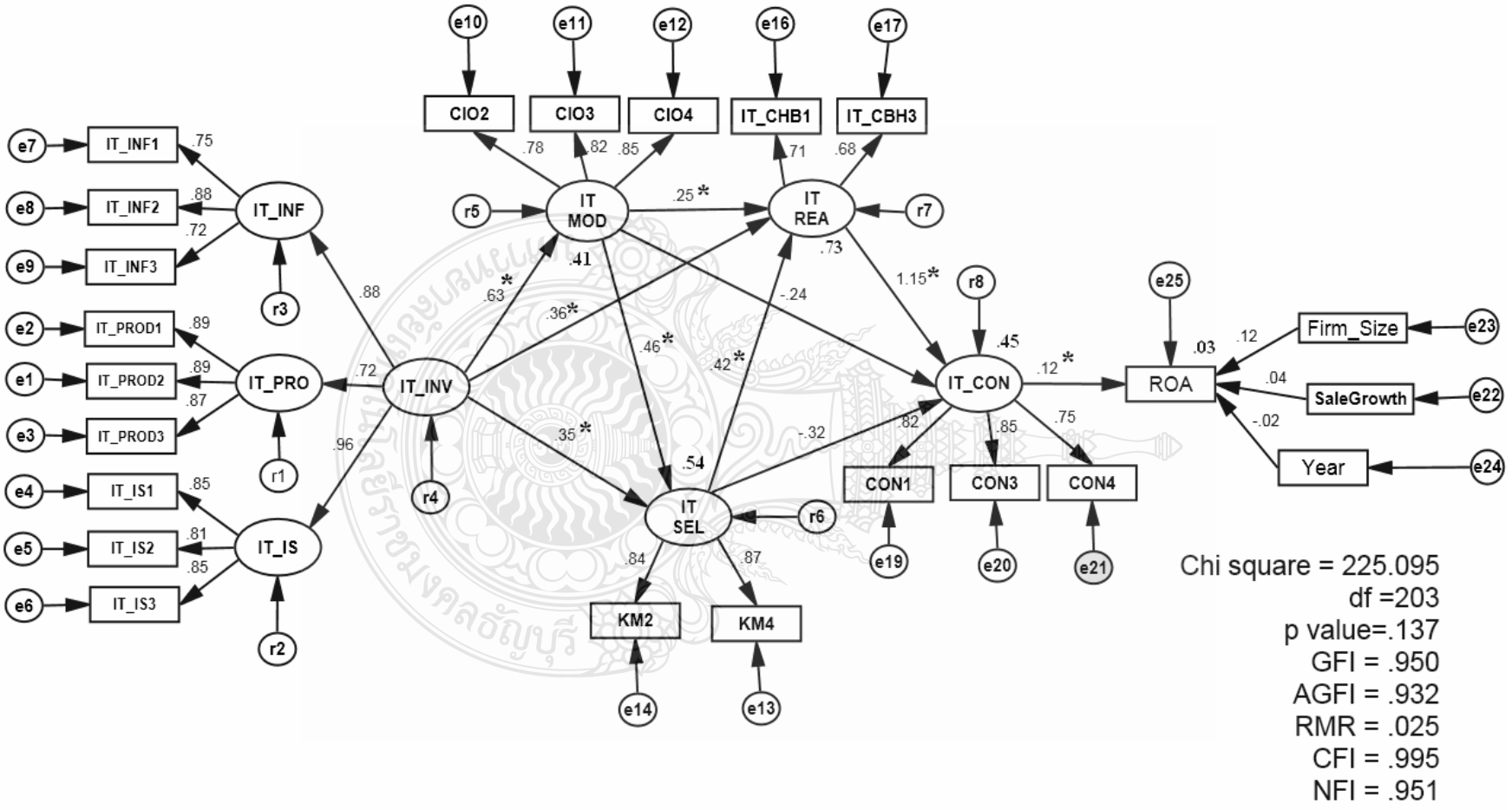

Figure 4-9 Model Four both convenience and ROA as dependent variable and show detailed directed

Table 4.26 The standard indirect, direct, and total effect of model Four

Dependent Variable	R^2	Direct Effect					Indirect Effect					Total Effect				
		IT_INV	IT_MOD	IT_SEL	IT_REA	IT_CON	IT_INV	IT_MOD	IT_SEL	IT_REA	IT_CON	IT_INV	IT_MOD	IT_SEL	IT_REA	IT_CON
IT_MOD		.633										.633				
IT_SEL		.354	.456				.289					.643	.456			
IT_REA		.359	.248	.425			.430	.194				.789	.442	.425		
IT_CON			-.237	-.318	1.154		.556	.365	.490			.556	.127	.172	1.154	
ROA						.122	.068	.015	.021	.140		.068	.015	.021	.140	.122

According to Figure 4-9, Factor Loading presented observed variable are the member of latent variable. The Factor Loading of all latent variables is shown in appendix E.

Table 4.26 shows the direct and indirect effect of Model four. After analyzing the model four, it is found that Investment(IT_Inv) has positive direct effect on IT Moderation (IT_MOD) (β=0.633), IT Investment(IT_Inv) has positive direct effect on IT Self-Immunity (IT_SEL)(β=0.354), IT Investment(IT_Inv) has positive direct effect on IT Reasonableness (IT_REA) (β=0.359), IT Moderation (IT_MOD) has positive direct effect on IT Self-Immunity (IT_SEL) (β=0.456), IT Moderation (IT_MOD) has positive direct effect on IT Reasonableness (IT_REA) (β=0.248), IT Moderation (IT_MOD) has positive direct effect on IT Convenience (IT_CON) (β=-.237), IT Self-Immunity (IT_SEL) has positive direct effect on IT Reasonableness (IT_REA) (β=0.425), IT Self-Immunity (IT_SEL) has positive direct effect on IT Convenience (IT_CON) (β=-.318), IT Reasonableness (IT_REA) has positive direct effect on IT Convenience (IT_CON)) (β=1.154), IT Convenience (IT CON) has positive direct effect on ROA (β=.122), IT Investment (IT_INV) has positive indirect effect on IT Self-Immunity (IT_SEL) (β=.289), IT Investment (IT_INV) has positive indirect effect on IT Reasonableness (IT_REA) (β=.430), IT Investment (IT_INV) has positive indirect effect on IT Convenience (IT_CON) (β=.556), IT Investment (IT_INV) has positive indirect effect on ROA (β=.068), IT Moderation (IT_MOD) has positive indirect effect on IT Reasonableness (IT_REA) (β=.194), IT Moderation (IT_MOD) has positive indirect effect on IT Convenience (IT_CON) (β=.365), IT Moderation (IT_MOD) has positive indirect effect on ROA (β=.015), IT Self-Immunity (IT_SEL) has positive indirect effect on IT Convenience (IT_CON)

(β=.490), IT Self-Immunity (IT_SEL) has positive indirect effect on ROA (β=.021), IT Reasonableness (IT_REA) has positive indirect effect on ROA (β=.140),

According to table 4.20, it can be expressd by equation as below:

IT_CON = 0.556*IT_INV + 0.127*IT_MOD + 0.172*IT_SEL +

1.154*IT_REA ; R^2 = 0.45

ROA = 0.068*IT_INV + 0.015*IT_MOD + 0.021*IT_SEL +

1.40*IT_REA + 0.122*IT_CON; R^2 = 0.03

Where :

IT_INV = IT Investment

IT_MOD = IT Moderation

IT_REA = IT Reasonableness

IT_SEL= IT Self-Immunity

IT_CON = IT Convenience

ROA = Return on Asset

The coefficient of determinant (R^2) shown that, the IT investment with Sufficiency Economy has effect on IT convenience, as a proxy of intangible firm's performance with the accuracy of 45%, the IT investment with Sufficiency Economy and IT convenience has effect on ROA, as a proxy of tangible firm's performance with the accuracy of 3 %.

Model Five : Relation between IT Sufficiency Economy Philosophy and firm's performance with IT Investment.

The objective of creating the model five is to test that if business firm already adopt IT with Sufficiency Economy Philosophy and then invest new IT, do they affect firm's performance. This model was developed from model three by changed path to, IT_SEP to IT_INV and from IT_INV to IT_CON.

After crating the model, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter 3.

The result of model fit testing are: Chi-Square=243.733, df=211, p-value= .061 , GFI=0.947, AGFI=0.931 ,RMSR=0.039, RMSE= 0.020(PCLOSE=1.000) , NFI=0.992, CFI=0.947 and Hoelter=400(0.01), as shown in Table 4.27.

Table 4.27 Measuring of Model Fit of Model Five

Model fit criteria	Value	Acceptable Level value
Chi-Square	243.733	-
Degree of freedom	211	-
Chi-Square/Degree of freedom	1.155	Less than 2
p-value	061	P > .05
GFI	0.947	>= 0.90
AGFI	0.931	>=0.80
RMSR	0.039	Next to zero
RMSE	0.020	< 0.10
NFI	0.992	> 0.90
CFI	0.947	> 0.90
Holelter	400	> 200

According to table 4.27, the result of model fit testing shows that they are consistent with data. The diagram of the model five is presented in Figure 4-10.

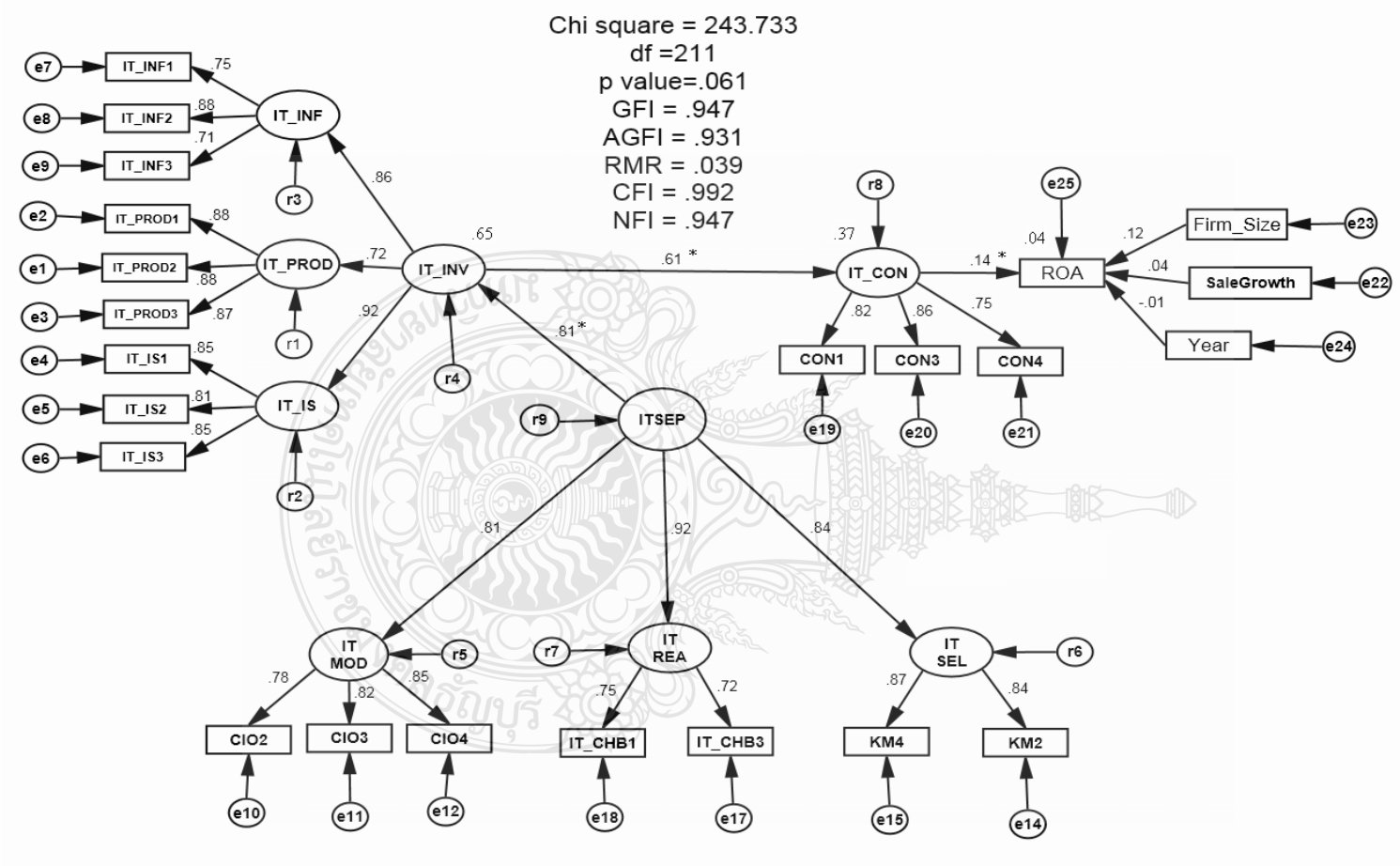

Figure 4-10 Model Five Relationship between ITSEP and IT_CON with IT_INV

After analyzing the model five, it is found that IT Sufficiency Economy Philosophy(IT_SEP) has positive direct affect on Investment(IT_Inv) (β=0.81), Investment(IT_Inv) has positive direct affect on IT Convenience (IT_CON)(β = 0.61), IT Convenience(IT_CON) has positive direct affect on Return on Asset(ROA)(β = 0.14).

Table 4.28 shows the direct and indirect effect of Model Five.

Table 4.28 The standard indirect, direct, and total effect of model Five

Dependent Variable	R^2	Direct Effect				Indirect Effect				Total Effect		
		IT_SEP	IT_INV	IT_CON		IT_SEP	IT_INV	IT_CON		IT_SEP	IT_INV	IT_CON
IT_INV		.806								.806		
IT_CON			.612			.493				.493	.612	
ROA				.141		.070	.086			.070	.086	.141

According to table 4.23, it can be expressed by equation as below:

$IT\_INV = 0.806\ IT\_SEP;\ R^2 = 0.65$

$IT\_CON = 0.493*IT\_SEP + 0.612*IT\_INV;\ R^2 = 0.37$

$ROA = 0.07*IT\_SEP + 0.086*IT\_INV + 0.141*IT\_CON;\ R^2 = 0.04$

Where :

ROA = Return on Asset

IT_INV = IT Investment

IT_SEP = IT with the context of Sufficiency Economy Philosophy

IT_CON = IT Convenience

The coefficient of determinant (R^2) shown that, IT with Sufficiency Economy Philosophy has effect on IT investment with the accuracy of 65 %, The IT investment has effect on intangible firm's performance with the accuracy of 37 %, Intangible has effect on tangible firm's performance with the accuracy of 4 %.

According to Figure 4-10, it is concluded that if business firm adopted IT Sufficiency Economy Philosophy and then invest new IT, they have positive effect on firm's performance as well.

Summary of model analysis

According to Model IV, the research finding of the relationship between IT investment and firm's performance with the context of Sufficiency Economy Philosophy shown as following: IT investment has positive effect on IT Moderation, IT Reasonableness, and IT Self-Immunity. There is only IT Reasonableness has positive direct effect on IT Convenience but IT Moderation and IT Self-Immunity does not have. Both of IT Moderation and IT Self-Immunity have positive indirect effect on IT Convenience through IT Reasonableness, see Figure 4.11.

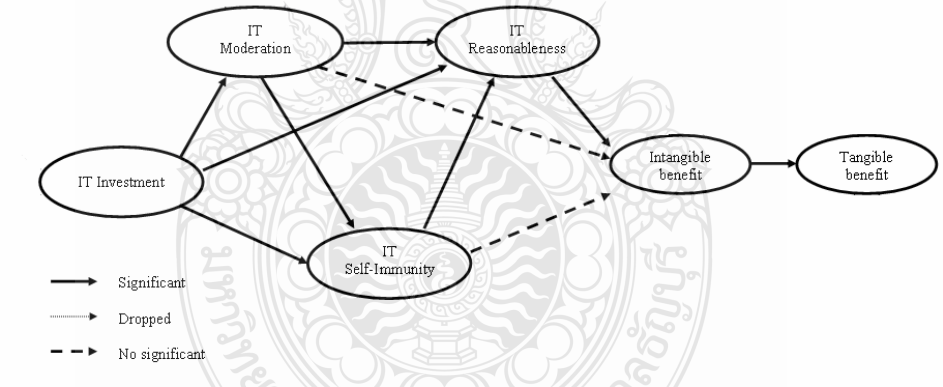

Figure 4-11 Model of Research Finding

Non Response Bias Test

To present Response Bias Problem, data was tested by divided into two groups order by the time of returning back. This study assumes that, group one is early whereas group two is the last response. This test is assumed that group two has

response bias because it returned back very late. This was because CIO did not have an intention to do the questionnaire or they did not have free time to do it.

This test used model four to analyze a problem. The first two hundred rows of data were tested with model four, and then one hundred and seventy three rows were tested again. The results of them were comparing. If the results did not different, it indicated that there is no Response Bias Problem.

After testing, the result of standard regression weight in group one and group two were not different. In addition, when combining group one and group two together, it is found that the result has a significant better than separate testing, it showed that this sample did not have Response Bias Problem, as shown in table 4.29.

Table 4.29 The result of non response bias testing

Test between	Standard regression weight		
	Group one n=200	Group two n=173	All sample n=373
IT_INV and IT_MOD	.53 ***	.70 ***	.64 ***
IT_INV and IT_REA	.38 ***	.35 ***	.38 ***
IT_INV and IT_SEL	.33 ***	.35 ***	.37 ***
IT_MOD and IT_REA	.21 *	.25 *	.21 **
IT_MOD and IT_SEL	.38 ***	.52 ***	.45 ***
IT_SEL and IT_REA	.37 ***	.39 ***	.38 ***
IT_REA and IT_CON	.73 ***	.59 ***	.67 ***
IT_CON and ROA	.13	.11	.12 *

p < .05, ** p< .01, *** p< .001

Hypothesis Testing

According to the three research questions which are:1) Does the Sufficiency Economy philosophy associates with IT investment affect firm's performance? 2) Does the intangible and tangible firm's performance related? 3.) How does organization manage the IT investment to affect firm's performance? The hypotheses were created to answer the research questions, as shown below:

H1 : The IT investment has positive affect IT Sufficiency Economy Philosophy.

H2 : The IT Sufficiency Economy Philosophy has positive affect firm's Performance

H2.1 The IT Sufficiency Economy Philosophy has positive effect on intangible firm's Performance

H2.2 The IT Sufficiency Economy Philosophy has positive effect tangible Firm's Performance

H2.3 The IT Investment has positive effect on IT Moderation

H2.4 The IT investment has positive effect on IT Reasonableness

H2.5 The IT investment has positive effect on IT Self-immunity

H2.6 IT Moderation has positive effect on IT Reasonableness

H2.7 IT Moderation has positive effect on IT Convenience

H2.8 IT Moderation has positive effect on IT Self-immunity

H2.9 IT Self-immunity has positive effect on IT Reasonableness

H2.10 IT Self-Immunity has positive effect on IT Convenience

H2.11 IT Reasonableness has positive effect on intangible firm's Performance

H3 : The intangible benefit have positive effect on tangible benefit performance.

H1 : The IT investment have positive affect to IT Sufficiency Economy Philosophy.

An analysis of the relationship between IT_INV and IT_SEP, found that model one has $\beta = 0.80(p<.05)$, Model two has $\beta = 0.79(p<.05)$, and Model three has $\beta = 0.80(p<.05)$. It indicated that IT investment has positive effect on IT Sufficiency Economy Philosophy, thus hypothesis H1 was accepted.

According to the relationship above, it indicated that, business firm give importance to Purchase Computer for Support Business Operation (IT_Inf1), Purchase Communication Devices to Use in Business Firm (IT_Inf2), Purchase Software for Support Business Operation (IT_Inf3), Use IT in Production Planning (ITProd1), Use IT in Raw Material Management (IT_Prod2), Use IT in Production Process (IT_Prod3), Store information for Support Planning (IT_IS1), Store Information of Each Business Operation (IT_IS2), Store Information Support Decision Making (IT_IS3) have influence on IT with Sufficiency Economy Philosophy.

H2 : The IT Sufficiency Economy Philosophy will have positive affect to firm Performance

H2.1 The IT Sufficiency Economy Philosophy will have positive effect on ***intangible firm's Performance***. An analysis of the relationship between IT_SEP and IT_CON in model one has $\beta = 0.65(p<.05)$, thus hypothesis H2.1 was accepted.

According to the relationship above, business firm that CIO Understand Business Process (CIO2), CIO Consider Firm Suitable before Invest IT (CIO3), CIO has Strategic Orientations (CIO4). Monitor IT Usage (IT_CHB1), Worthwhile Use of IT (IT_CHB3), Exchange and Disseminate IT Knowledge (KM2), Bring IT

Investment Knowledge to be Use Next Time (KM4) have positive effect on IT Convenience that use as a proxy of Intangible firm's performance.

H2.2 The IT Sufficiency Economy Philosophy will have positive effect on ***tangible firm's Performance***. An analysis of the relationship between IT_SEP and ROA in model two has β = -0.2, thus hypothesis H2.2 was not accepted.

According to the relationship above, business firm that CIO Understand Business Process (CIO2), CIO Consider Firm Suitable before Invest IT (CIO3), CIO has Strategic Orientations (CIO4). Monitor IT Usage (IT_CHB1), Worthwhile Use of IT (IT_CHB3), Exchange and Disseminate IT Knowledge (KM2), Bring IT Investment Knowledge to be Use Next Time (KM4) do not have positive effect on ROA that use as a proxy of tangible firm's performance.

H2.3 The IT Investment will have positive effect on IT Moderation. An analysis of the relationship between IT_INV and IT_MOD in model four has β = 0.63($p<.05$), thus hypothesis H2.3 was accepted.

According to the relationship above, business firm give importance to Purchase Computer for Support Business Operation (IT_Inf1), Purchase Communication Devices to Use in Business Firm (IT_Inf2), Purchase Software for Support Business Operation (IT_Inf3), Use IT in Production Planning (ITProd1), Use IT in Raw Material Management (IT_Prod2), Use IT in Production Process (IT_Prod3), Store information for Support Planning (IT_IS1), Store Information of Each Business Operation (IT_IS2), Store Information Support Decision Making (IT_IS3) have influence on IT Moderation.

H2.4 The IT investment will have positive effect on IT Reasonableness. An analysis of the relationship between IT_INV and IT_REA in model four has β = 0.36($p<.05$), thus hypothesis H2.4 was accepted.

According to the relationship above, business firm give importance to Purchase Computer for Support Business Operation (IT_Inf1), Purchase Communication Devices to Use in Business Firm (IT_Inf2), Purchase Software for Support Business Operation (IT_Inf3), Use IT in Production Planning (ITProd1), Use IT in Raw Material Management (IT_Prod2), Use IT in Production Process (IT_Prod3), Store information for Support Planning (IT_IS1), Store Information of Each Business Operation (IT_IS2), Store Information Support Decision Making (IT_IS3) have influence on IT Reasonableness

H2.5 The IT investment will have positive effect on IT Self-immunity. An analysis of the relationship between IT_INV and IT_SEL in model four has $\beta = 0.35(p<.05)$, thus hypothesis H2.5 was accepted.

According to the relationship above, business firm give importance to Purchase Computer for Support Business Operation (IT_Inf1), Purchase Communication Devices to Use in Business Firm (IT_Inf2), Purchase Software for Support Business Operation (IT_Inf3), Use IT in Production Planning (ITProd1), Use IT in Raw Material Management (IT_Prod2), Use IT in Production Process (IT_Prod3), Store information for Support Planning (IT_IS1), Store Information of Each Business Operation (IT_IS2), Store Information Support Decision Making (IT_IS3) have influence on IT Self-Immunity.

H2.6 IT Moderation will have positive effect on IT Reasonableness. An analysis of the relationship between IT_MOD and IT_REA in model four has $\beta = 0.25(p<.05)$, thus hypothesis H2.6 was accepted.

According to the relationship above, business firm that give important to CIO Understand Business Process (CIO2), CIO Consider Firm Suitable before Invest IT (CIO3), CIO has Strategic Orientations (CIO4) have influence on give importance to IT Reasonableness.

H2.7 IT Moderation will have positive effect on IT Convenience. An analysis of the relationship between IT_MOD and IT_CON in model four has β = -0.24, thus hypothesis H2.7 was not accepted.

According to the relationship above, business firm that give important to CIO Understand Business Process (CIO2), CIO Consider Firm Suitable before Invest IT (CIO3), CIO has Strategic Orientations (CIO4) have no effect on IT Convenience (IT_CON).

H2.8 IT Moderation will have positive effect on IT Self-immunity. An analysis of the relationship between IT_MOD and IT_SEL in model four has β = 0.46($p<.05$), thus hypothesis H2.8 was accepted.

According to the relationship above, business firm that give important to CIO Understand Business Process (CIO2), CIO Consider Firm Suitable before Invest IT (CIO3), CIO has Strategic Orientations (CIO4) have influence on give importance to IT Self-Immunity.

H2.9 IT Self-immunity will have positive effect on IT Reasonableness. An analysis of the relationship between IT_SEL and IT_REA in model four has β = 0.42($p<.05$), thus hypothesis H2.9 was accepted.

According to the relationship above, business firm that give important to Exchange and Disseminate IT Knowledge (KM2), Bring IT Investment Knowledge to be Use Next Time (KM4) have influence on give importance to IT Reasonableness.

H2.10 IT Self-Immunity will have positive effect on IT Convenience. An analysis of the relationship between IT_SEL and IT_CON in model four has β = -0.32, thus hypothesis H2.10 was not accepted.

According to the relationship above, business firm that give important to Exchange and Disseminate IT Knowledge (KM2), Bring IT Investment Knowledge to be Use Next Time (KM4) do not have influence on IT Convenience (IT_CON).

H2.11 IT Reasonableness will have positive effect on intangible firm Performance. An analysis of the relationship between IT_REA and IT_CON in model four has $\beta = 1.154 (p<.05)$, thus hypothesis H2.11 was accepted.

According to the relationship above, business firm that give important to Monitor IT Usage (IT_CHB1), Worthwhile Use of IT (IT_CHB3) have influence on IT Convenience (IT_CON).

H3 : The intangible have positive effect on tangible benefit performance.

An analysis of the relationship between IT_CON and ROA in model three $\beta = .13 (p<.05)$, thus hypothesis H3 was accepted.

According to the relationship above, business firm that has IT Convenience (IT_CON) has effect on receive ROA.

The summary of hypothesis testing is presented in table 4.30.

Table 4.30: Summary of hypothesis testing.

Hypothesis	**Result**
H1 : The IT investment have positive affect to IT with Sufficiency Economy Philosophy.	Accepted
H2 : The IT Sufficiency Economy have positive effect on firm's Performance	
H2.1 The IT Sufficiency Economy Philosophy have positive effect on intangible firm's Performance	Accepted
H2.2 The IT ufficiency Economy Philosophy have positive effect on tangible firm's Performance	Unaccepted
H2.3 The IT Investment have positive effect on IT Moderation	Accepted
H2.4 The IT investment have positive effect on IT	Accepted

Hypothesis	Result
Reasonableness	
H2.5 The IT investment have positive effect on IT Self-immunity	Accepted
H2.6 IT Moderation have positive effect on IT Reasonableness	Accepted
H2.7 IT Moderation have positive effect on IT Convenience	Unaccepted
H2.8 IT Moderation have positive effect on IT Self-immunity	Accepted
H2.9 IT Self-immunity have positive effect on IT Reasonableness	Accepted
H2.10 IT Self-Immunity have positive effect on IT Convenience	Unaccepted
H2.11 IT Reasonableness have positive effect on intangible firm's Performance	Accepted
H3 : The intangible have positive effect on tangible benefit.	Accepted

The Qualitative Result

This section is qualitative research result that used deep-interview.The result was brought to confirm the result of quantitative research.

Research sample of the interview were Chief Information Officer that responsible as business firm. There were nine questions as following:

1. Currently, where is the place that your business firms applied IT to use?

2. Which is strategies your business firm giving importance?

3. How do IT is importance to executive?

4. What kind of benefit receives from IT strategies?

5. How do you consider about existing resource and IT staff compose to IT strategic planning?

6. How do you think about purchasing IT follow strategic planning, as necessary, and suitable time?

7. How do you monitor IT as worthwhile use?

8. To study new IT Knowledge and implement knowledge management - how does it benefit to business firm?

9. To create strategies of next year IT investment – how do you use existing knowledge?

The grounded theory method(Coleman & O' Connor, 2007; Douglas, 2003) use to analyze the result from the interview. After interviewing the fist CIO, the result was used to create working hypothesis. The result of the next interview was used to test the working hypothesis. This study interviewed three CIOs. The result of all interviews is shown in appendix F.

After interviewing the first CIO, the working hypothesis was created as shown below:

Working Hypothesis: Business firm invest IT into business unit to archive firm's performance. The working Hypothesis 1 analyzed from the answer of; 1) question number one, business firm responses that they invest IT to Human Resource, purchase CCTV for security systems, purchase IT for service data center, and purchase email services 2) question number two, business firm give importance to IT convenience for response to employees and customers.

Working Hypothesis 2: Business firm give importance to IT Moderation. This working hypothesis analyzed from the answer of question number five: business firm purchase only necessary IT and give importance to existing IT resource before reinvesting. They aligned suitable work to IT staff.

Working Hypothesis 3: Business firm give importance to IT Reasonableness. This working hypothesis analyzed from the answer of : 1) question

number three, executive can use IT to monitor business operation 2) question number four, firm can use internal information to decide for reinvesting in the future 3) question number six, business firm purchase IT meet requirement and response to problem. 4) question number seven, business firm compare a benefit which one is maximize return on investment and monitoring for it accurate with requirement.

Working Hypothesis 4 : Business firm give importance to IT Self-Immunity. This working hypothesis analyzed from the answer of; 1) question number four, firm can use internal information to decide to reinvest in the future 2) question number eight, secretary response for study new knowledge and disseminate to executive and other staff 3) question number nine, business firm has a meeting and sharing knowledge of success and failure of previous year to exchange with others before reinvestment IT.

Then, the result from the second CIO was brought to test with working hypothesis, found that all hypotheses were accepted. The third CIO also confirms with working hypothesis testing. It indicated that the result of the interviewing was justified. The conclusion of hypothesis testing is presented in table 4.31.

Table 4.31 Working hypotheses testing

Working Hypothesis	**Hypothesis testing with the interview result of the second CIO**	**Hypothesis testing with the interview result of the third CIO**
Business firm invest IT into business unit to archive firm performance.	Supported	Supported

Working Hypothesis	Hypothesis testing with the interview result of the second CIO	Hypothesis testing with the interview result of the third CIO
Business firm give importance to IT Moderation	Supported	Supported
Business firm give importance to IT Reasonableness	Supported	Supported
Business firm give importance to IT Self-Immunity.	Supported	Supported

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This chapter is divided into three parts. The first part is a summary of methodology and research finding. The second part is discussion which is discussed follow research questions. The last section is implication of practical that presents benefit from finding and guideline to business firm operation and suggestion for future research.

This research aims to study the relationship between IT investment and firm's performance with the context of Sufficiency Economy Philosophy. The research proposes the assumption of success of IT investment may come from the management IT with the Sufficiency Economy Philosophy. The IT with Sufficiency Economy Philosophy comprise of three concepts including IT Moderation, IT Reasonableness, and IT Self-Immunity. IT Moderation is an IT management, by considering with suitable environment work and suitable define job to IT staff, can transparency verification executive. IT Reasonableness is an IT management as rationality and monitoring IT to worthwhile use. IT Self-Immunity is an IT management as sustainable which business firm has ready for future change.

There are three research questions which are 1) Does the Sufficiency Economy philosophy associates with IT investment affect to firm's performance? 2) Does the intangible and tangible firm's performance related? 3) How does organization manage the IT investment to affect firm's performance?

The methodology use both quantitative and qualitative research. Quantitative research use questionnaire as a tool for surveying from Chief Information Officer that represent the business firm. The questions have been asked about giving importance of IT investment, IT with Sufficiency Economy Philosophy, and current benefit from

IT. Research finding shows that IT investment has positive effect on firm's performance through IT with Sufficiency Economy Philosophy. Qualitative research use deep-interview interviewing Chief Information Officer. The inductive descriptions analyze the interview to confirm result of quantitative research.

Independent variable is IT investment whereas firm's performance is dependent variable. The mediator is IT with the Sufficiency Economy Philosophy. Firm's performance has divided into two types which are intangible and tangible firm's performance. Questionnaire has been asked about current benefit from IT that use as a proxy of intangible firm's performance whereas ROA use as a proxy of tangible firm's performance.

There are three hypotheses which are H1 : The IT Investment have positive effect to IT with Sufficiency Economy Philosophy, H2: The IT with Sufficiency Economy Philosophy have positive effect on firm's performance, and H3: The intangible have positive effect on tangible firm's performance. The hypothesis H2 was divided into eleven sub hypotheses which are H2.1: The IT Sufficiency Economy Philosophy have positive effect on intangible firm's Performance, H2.2: The IT Sufficiency Economy Philosophy have positive effect on tangible firm's Performance, H2.3: The IT Investment have positive effect on IT Moderation, H2.4: The IT investment have positive effect on IT Reasonableness, H2.5: The IT investment have positive effect on IT Self-immunity, H2.6: IT Moderation have positive effect on IT Reasonableness, H2.7: IT Moderation have positive effect on IT Convenience H2.8 IT Moderation have positive effect on IT Self-immunity, H2.9: IT Self-immunity have positive effect on IT Reasonableness, H2.10: IT Self-Immunity have positive effect on IT Convenience, H2.11: IT Reasonableness have positive effect on intangible firm's performance.

The research populations were the large business firm with total asset more than 200 Million THB that listed on the Department of Business Development of the Ministry of Commerce of Thailand. The 4,092 firms list was calculated to 365 firms of research sample. There are 23 groups of sub industries, thus the sample size was defined to ratio of each group. However, to prevent less of return, the research distributed 1,600 questionnaires that there were four times of research sample size.

The questionnaire was assessed content validity by five IT expertises and was tested reliability before mailing to research sample. The questionnaires were returned back from 373 firms constituting 23.31% of 1,600 firms.

The hypothesis testing follow research questions are presented as table 5.1

Table 5.1 Hypothesis testing result for research question

Research Question	**Hypothesis**	**Statistic Technique**	**Result**
1. Does the Sufficiency Economy philosophy associates with IT investment effect on firm's performance?	H1 : The IT investment have positive effect on IT Sufficiency Economy Philosophy.	SEM	Supported
	H2.1 The IT Sufficiency Economy Philosophy have positive effect on intangible firm's performance	SEM	Supported
	H2.2 The IT Sufficiency Economy Philosophy have positive effect on tangible firm's performance	SEM	Not supported
	H2.3 The IT Investment have positive effect on IT Moderation	SEM	Supported

Research Question	Hypothesis	Statistic Technique	Result
	H2.4 The IT investment have positive effect on IT Reasonableness	SEM	Supported
	H2.5 The IT investment have positive effect on IT Self-immunity	SEM	Supported
2. Does the intangible and tangible firm's performance related?	H3 : The intangible will have positive effect on tangible benefit performance	SEM	Supported
3. How does organization manage the IT investment to affect firm's performance?	H2.6 IT Moderation have positive effect on IT Reasonableness	SEM	Supported
	H2.7 IT Moderation have positive effect on IT Convenience	SEM	Not supported
	H2.8 IT Moderation have positive effect on IT Self-immunity	SEM	Supported
	H2.9 IT Self-immunity have positive effect on IT Reasonableness	SEM	Supported
	H2.10 IT Self-Immunity have positive effect on IT Convenience	SEM	Not supported
	H2.11 IT Reasonableness have positive effect on intangible firm's performance	SEM	Supported

The results of interviewing from CIO have been analyzed to four working hypothesis which are: H1: Firm invest IT into business unit to archive firm's

performance, H2 : Firm give importance to IT Moderation, H3 : Firm give importance to IT Reasonableness H4 : Firm give importance to IT Self-Immunity. The working hypothesis testing was tested with the interview of the second and third CIO were accepted all hypotheses. The result confirmed that the relationship between IT investment and firm's performance with the context of Sufficiency Economy Philosophy was supported.

Discussion of Finding

This section is research discussions which is discussed follow with research questions presented in chapter one.

Discussion of Research Question number 1

According to model one in Figure 4-6, model two in Figure 4-7, and result of hypothesis testing of H1, business firm invest IT for IT Infrastructure, use IT in production, and use IT in Information Systems have positive effect on IT with Sufficiency Economy Philosophy that comprise of IT Moderation, IT Reasonableness, and IT Self-Immunity.

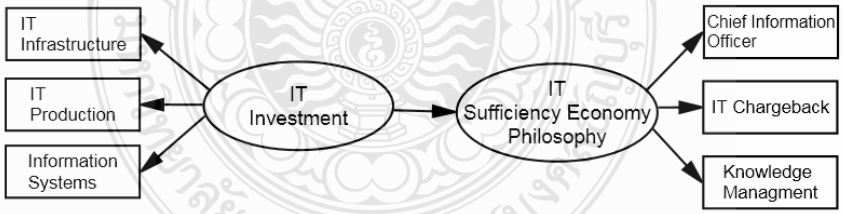

Figure 5-1 IT investment has influence to IT Sufficiency Economy Philosophy

According to Figure 5-1, business firm give importance to IT investment including purchasing computer to increase business processes and work automatically. They purchase communication devices to use in infrastructure supported to send data among computer or department. They purchase IT to use in

production from planning, raw material control, and use IT to increate productivity and reduce production failure. It can also reduce cost and manage material efficiency. They purchase IT to use in Information system that helps them access to data quickly and more accuracy. Information Systems can use as decision support system for efficient management. It shows that IT investment to use in business firm cover Supply Chain that starts from raw material until delivery products or services to customers.

The hypothesis testing of H2, H2.1, and H2.2 have showed that business firm give importance to IT with Sufficiency Economy Philosophy has effect on convenience to work.

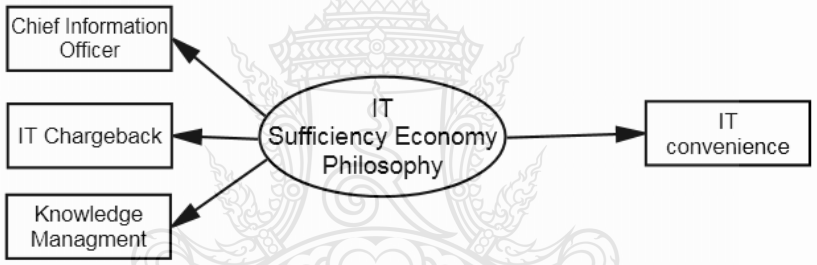

Figure 5-2 IT Sufficiency Economy Philosophy has influence to IT convenience

According to Figure 5-2, business firm adopt and manage IT with Sufficiency Economy Philosophy. They consider a suitable job for IT staff. Executive, who responsible for IT management, must have both IT skill and business skill. After business firm invested in IT, they monitor IT to meet requirements and worthwhile used. In addition, they study new IT knowledge and bring experience both success or failure disseminate to share with others. Their knowledge was used for decision making to reinvest IT as efficiency.

The research finding supported with Curtis and Sambamurthy who study the influence of senior leader and found that executive should have IT skill, understand

business process, and suitably adapted to be an advantage for enterprise, which is supported by Rose and Beath(2006) who suggest that IT chargeback fulfills the fairs and reasonable financial report. It can monitor which departments have used IT, and lead to the better decision to IT investment. The finding also supported by Díaz-Díaz, Aguiar-Díaz, and DeSaá-Pérez (2008) who found that knowledge management indirectly effected on firm's performance, and Li, Huang and Tsai (2009), examined the Taiwan firms, also found that knowledge management is a mediator that has influence on the achievement of firm's performance.

In addition, the response from deep interview, Chief Information Office also confirms that they invest IT into business unit including Human Resource, Manufacturing, Information Sharing, Sale Department, and Office. Firm give importance to worthwhile use by considering old IT resources before purchasing a new for replacement because they need the best benefit for them and some IT was reused in another department. After business firm invested in IT to meet the requirements, they was monitoring, tracking and charging services from IT department to department that used it. They also give importance to study new IT knowledge and exchange with others, bring a problem or success cases of previous year to discuss for planning the next year budget. Business firm invest in IT because they require to archive and get convenience for servicing customers and support employees to have a good performance on production working as well. Thus their opinion have supported H1 and H2.1.

However, in H2.2, IT Sufficiency Economy Philosophy did not have effect on ROA that use as the proxy of tangible firm's performance as shown in Figure 5-3. This finding is supported by Thouin, Hoffman, and Ford (2008), who found that firms had invested in IT personal of heath care industries did not associated with increasing the profitability.

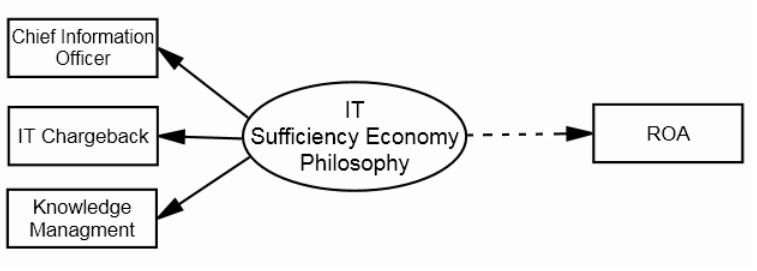

Figure 5-3 IT Sufficiency Economy Philosophy did not has influence on ROA

Discussion of Research Question number 2

According to Model three in Figure 4-8 and Model four in Figure 4-9 and hypothesis H3 that concluded in Figure 5-4, found that intangible firm's performance has retaliation against tangible firm's performance. It showed that, when business firm invested in IT, they have IT convenience to manage business operation. The IT convenience affected profitability. This research finding is supported by Huang, Ou, and Lin (2006), who found that IT infrastructure transformed into intangible asset then finally relate to ROA

Figure 5-4 IT Convenience has influence to ROA

The response of deep interview from Chief Information Office also confirms that they give importance of IT to convenience service to users and customers, and expect to have competitive advantage and finally increase sales and return on investment.

Discussion Research Question number 3

According to model four in Figure 4-9 and hypothesis testing of H2.3, H2.4, H2.5, H2.6, H2.7, H2.8, H2.9, H2.10 and H2.11, that shown detail path of IT

management with Sufficiency Economy Philosophy into order of three concepts, IT Moderation, IT Reasonableness, and IT Self-Immunity. CIO (Chief Information Officer) has responsible for managing IT to have efficiency of use, and strategic oriented. They also know both IT skill and business operation because these can support knowledge in order to make a decision on investing in suitable IT to meet business requirement. In addition, business firm have been monitoring and tracking IT to worthwhile used. They know which department used IT and the real cost of IT that lead to accurate decision making for budget management. Moreover, business firms are proactive management. They promoted Knowledge Management to support knowledge exchange in organization that can be used for managing the best decision in future.

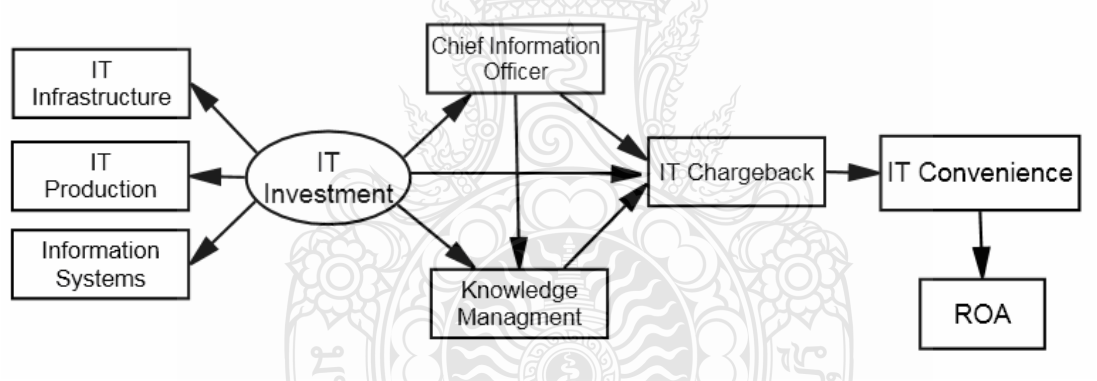

Figure 5-5: The direction of IT Investment with the Sufficiency Economy Philosophy affect firm's performance.

IT management with the context of Sufficiency Economy including IT Moderation, IT Reasonableness, and IT Self-Immunity did not direct affect firm's performance. There is only IT Reasonableness direct affected firm's performance. It shows that even though firm give importance to IT Moderation and IT Self-Immunity but finally they have to make a reasonable decision that lead to the best firm's performance.

The result of deep interview from Chief Information Officer in the order of IT management, create strategic planning, schedule and teams, implement and operate IT, and conclusion. According to above, it can answer research question that CIO is response to create strategic planning, define schedule, and team work to implement, operate IT to continuous respond strategic planning. At the same time, IT staff have learnt about success or failure of IT operation. Business firm have assessed IT to be worthwhile used. They follow the orders that mention above. Thus IT has positive effect on firm's performance.

Limitation of the Study

There are some constrains in this research. First, the research samples were only large business firm because it was assumed that large business firm had been implemented knowledge management. However, some business firms may not implement knowledge management.

Second, population was divided to 23 groups. Each group gave importance to IT investment differently, thus the average of IT investment was very different.

Finally, this study used three control variables which are Firm Size, Firm Age, and Sale Growth. Because the reasons that effect on profitability did not only come from IT investment, but also from other factors.

Implication for Practice and Future Research

Implication

This study has a suggestion for benefit in two areas which are theoretical advantage and guideline to firm operation.

Theoretical Advantage: This research studied three theories together to present IT with Sufficiency Economy Philosophy. The research used CIO as the proxy of IT Moderation, IT Chargeback as the proxy of IT Reasonableness, and Knowledge Management as the proxy of IT Self-Immunity.

The previous researches have presented that each theory has effect on firm's performance. This study found that if business firm implement all theory, however, there is only IT Chargeback has direct effect on firm's performance. The CIO and Knowledge Management have indirect effect through IT chargeback to firm's performance.

Guideline to Firm Operation: It can be a guideline for business firm in manufacturing to manage IT investment to gain effectively use in IT as following:

1. Business firm should purchase IT to entire infrastructure. IT purchasing is not only buy computers but also including communication devices and software that already been installed into each computer. If software meet a requirement, it will increase efficiency of work to operate computer and worthwhile used.

2. Business firm should associate every step in the process, from raw material management until delivery products to customers. Currently, computer network can communicate entire world. Business firm can use them to be tools to find raw material, announce procurement, compare price that are part of production planning. Some material price depends on market and season. IT can be used to estimate and control raw material to production as suitable. IT also uses to control machine to automatic process. If machine is failed, business firm can quickly repair from alerting. It can reduce loss time and reach to target. In addition, IT can record and report problem from business process to executive. They can use report to improve business process.

3. Business firm should have information systems that systematically record all process transaction into database. Executive can use information systems for decision making, planning, and accurate investment in the future.

4. CIO is an executive that has an important role for business firm. CIO has to know both IT skill and business process in order to manage business. CIO has to

work as strategic orientation and consider the suitable environment before investing in IT. Some existing IT may still use in other departments. CIO should promote knowledge management into firm to use IT more effectively.

5. While business firm use IT, they should monitor which department use it and how much did IT has been used. This information will allow the executive know the real cost of each department. It also allow the executive know that IT has been used worthwhile in the firm and this can be the information for planning reinvestment in IT in the future.

6. Business firm should encourage their IT staff to study new knowledge. Firm will know new information lead to be ready for future change. The knowledge should be exchanged or shared with others as a knowledge sharing. The knowledge will have value for business firm. Knowledge Management System is a tool for supporting knowledge learning.

7.The order of IT investment to be successful show as following: 1) giving importance to CIO because CIO is an executive who will management IT to achievement 2) giving important to knowledge learning 3) giving importance to monitoring IT to worthwhile used 4) business firm will receive benefit from IT convenience 5) IT convenience will result of profitability.

Future Research

1. Since this research was to study the specific research population in the manufacturing industry, that is Cross-Sectional research. The future research may use population in other groups or study the longitudinal for study that does IT investment affect firm's performance on next year.

2. Sufficiency Economy Philosophy has condition necessary for operation is knowledge and morality. This study included knowledge into IT self-immunity and morality into IT Governance but IT Governance was drop from the research model.

Thus this result also lack of morality condition in model. The future research may concentrate on study only or try to include morality into next research model.

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Appendix A

The Reliability Testing

Variable	Mean	S.D.	Cronbach's Alpha
IT Infrastructure			.830
IT_Inf1 (Purchase Computer for Support Business Operation)	4.008	0.771	
IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	3.968	0.792	
IT_Inf3 (Purchase Software for Support Business Operation)	3.928	0.812	
IT_Inf4 (Employ IT staff)	3.429	0.949	
IT Production			.921
IT_Prod1 (Use IT in Production Planning)	3.791	0.994	
IT_Prod2 (Use IT in Raw Material Management)	3.689	0.956	
IT_Prod3 (Use IT in Production Process)	3.56	1.003	
IT_Prod4 (Use IT in Product and Service Delivery Management)	3.767	0.943	
Information Systems			.911
IT_IS1 (Store information for Support Planning)	4	0.803	
IT_IS2 (Store Information of Each Business Operation)	3.85	0.861	
IT_IS3 (Store Information Support Decision Making)	3.877	0.874	
IT_IS4 (Store Information for Future Use.)	3.965	0.85	
IT_Strategies			.914
IT_ST1 (Define IT in Strategic Planning)	3.346	0.905	
IT_ST2 (Use IT for Retain Competitive Advantage)	3.467	0.884	
IT_ST3 (Use IT for Make Uniqueness of Production and Service)	3.177	0.956	
IT_ST4 (Use IT for Increase Product and	3.241	0.91	

Variable	Mean	S.D.	Cronbach's Alpha
Service Values)			
Chief_Information_Officer and IT Governance			.896
CIO1 (CEO has IT Skill)	3.467	0.866	
CIO2 (CIO Understand Business Process)	3.764	0.815	
CIO3 (CIO Consider Firm Suitable before Invest IT)	3.759	0.874	
CIO4 (CIO has Strategic Orientations)	3.488	0.876	
ITG1 (Business Firm Give Important for Suitable Work to IT Staff)	3.547	0.884	
ITG2 (Can Transparency Verification of Executive)	3.711	0.949	
ITG3 (Can Transparency Verification of All Department)	3.676	0.91	
ITG4 (Comply with the Law)	4.046	0.849	
IT_Chargeback			.835
ChB1 (Monitor IT Usage)	3.359	0.994	
ChB2 (Manage IT Budget)	3.185	0.942	
ChB3 (Worthwhile Use of IT)	3.303	0.937	
ChB4 (Report IT Investment to be Use Next Time)	3.223	0.948	
Knowledge_Management			.918
KM1 (Study New IT Knowledge)	3.52	0.854	
KM2 (Exchange and Disseminate IT Knowledge)	3.593	0.892	
KM3 (Record IT Knowledge)	3.922	0.856	
KM4 (Bring IT Investment Knowledge to be Use Next Time)	3.311	1.013	
IT Conveniences			.900
Con1 (Work Convenience)	4.156	0.728	
Con2 (Management Convenience)	4.054	0.746	
Con3 (Communication Convenience)	4.247	0.747	

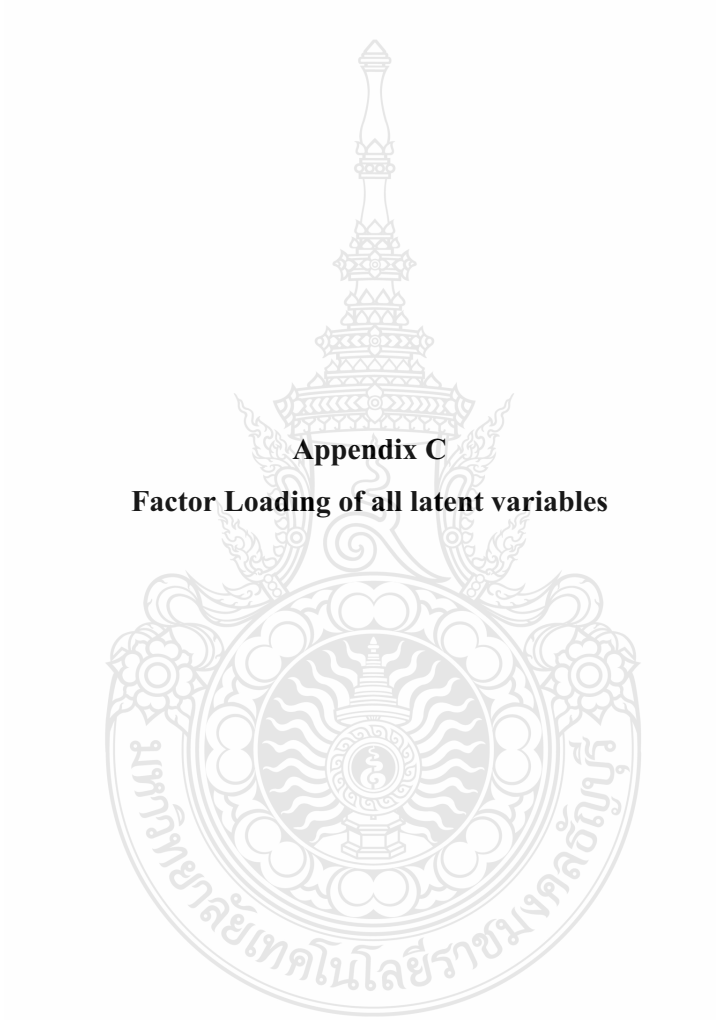
Variable	Mean	S.D.	Cronbach's Alpha
Con4 (Customer Service Convenience)	3.954	0.78	
IT Competitive			.918
Com1 (Readiness for Future Change)	3.601	0.854	
Com2 (Increase Business Capability)	3.453	0.868	
Com3 (Customer Service is better than Competitor)	3.389	0.856	
Com4 (Quality of Product is Better than Competitor)	3.26	0.904	

Appendix B
Multicollinearity Testing

Variable	Collinearity Statistic	
	Tolerance	**VIF**
IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	0.422	2.372
IT_Inf3 (Purchase Software for Support Business Operation)	0.482	2.073
IT_Inf4 (Employ IT staff)	0.374	2.671
IT_Prod1 (Use IT in Production Planning)	0.248	4.028
IT_Prod2 (Use IT in Raw Material Management)	0.238	4.199
IT_Prod3 (Use IT in Production Process)	0.26	3.853
IT_Prod4 (Use IT in Product and Service Delivery Management)	0.323	3.097
IT_IS1 (Store information for Support Planning)	0.329	3.041
IT_IS2 (Store Information of Each Business Operation)	0.365	2.738
IT_IS3 (Store Information Support Decision Making)	0.244	4.097
IT_IS4 (Store Information for Future Use.)	0.236	4.239
IT_ST1 (Define IT in Strategic Planning)	0.251	3.991
IT_ST2 (Use IT for Retain Competitive Advantage)	0.24	4.169
IT_ST3 (Use IT for Make Uniqueness of Production and Service)	0.19	5.255
IT_ST4 (Use IT for Increase Product and Service Values)	0.227	4.398
CIO1 (CEO has IT Skill)	0.46	2.176
CIO2 (CIO Understand Business Process)	0.387	2.584
CIO3 (CIO Consider Firm Suitable before Invest IT)	0.351	2.852
CIO4 (CIO has Strategic Orientations)	0.321	3.117

Variable	Collinearity Statistic	
	Tolerance	VIF
ITG1 (Business Firm Give Important for Suitable Work to IT Staff)	0.339	2.951
ITG2 (Can Transparency Verification of Executive)	0.318	3.147
ITG3 (Can Transparency Verification of All Department)	0.413	2.424
ITG4 (Comply with the Law)	0.485	2.061
ChB1 (Monitor IT Usage)	0.401	2.495
ChB2 (Manage IT Budget)	0.369	2.709
ChB3 (Worthwhile Use of IT)	0.408	2.452
ChB4 (Report IT Investment to be Use Next Time)	0.428	2.339
KM1 (Study New IT Knowledge)	0.241	4.142
KM2 (Exchange and Disseminate IT Knowledge)	0.203	4.926
KM3 (Record IT Knowledge)	0.311	3.212
KM4 (Bring IT Investment Knowledge to be Use Next Time)	0.266	3.759
Con1 (Work Convenience)	0.263	3.809
Con2 (Management Convenience)	0.221	4.517
Con3 (Communication Convenience)	0.343	2.92
Con4 (Customer Service Convenience)	0.404	2.476
Com1 (Readiness for Future Change)	0.315	3.178
Com2 (Increase Business Capability)	0.228	4.393
Com3 (Customer Service is better than Competitor)	0.21	4.752
Com4 (Quality of Product is Better than Competitor)	0.277	3.611
ROA (Return on Asset)	0.799	1.252
Year (Firm's year)	0.912	1.096
Firm_Size (Number of Employee)	0.829	1.206

Variable	Collinearity Statistic	
	Tolerance	VIF
SaleGrowth	0.845	1.183



Appendix C

Factor Loading of all latent variables

Variable	Factor Loading
IT_INF (IT_Infrastructure)	
IT_Inf1 (Purchase Computer for Support Business Operation)	0.740
IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	0.846
IT_Inf3 (Purchase Software for Support Business Operation)	0.731
IT_Inf4 (Employ IT staff)	0.694
IT_PRO (IT_Production)	
IT_Prod1 (Use IT in Production Planning)	0.877
IT_Prod2 (Use IT in Raw Material Management)	0.894
IT_Prod3 (Use IT in Production Process)	0.870
IT_Prod4 (Use IT in Product and Service Delivery Management)	0.815
IT_IS (IT_Information_Systems)	
IT_IS1 (Store information for Support Planning)	0.824
IT_IS2 (Store Information of Each Business Operation)	0.793
IT_IS3 (Store Information Support Decision Making)	0.897
IT_IS4 (Store Information for Future Use.)	0.884
IT_ST (IT_Strategies)	
IT_ST1 (Define IT in Strategic Planning)	0.821
IT_ST2 (Use IT for Retain Competitive Advantage)	0.825
IT_ST3 (Use IT for Make Uniqueness of Production and Service)	0.900
IT_ST4 (Use IT for Increase Product and Service Values)	0.867
CIO (Chief_Information_Officer and IT Governance) and ITG (IT Governance)	
CIO1 (CEO has IT Skill)	0.633
CIO2 (CIO Understand Business Process)	0.745
CIO3 (CIO Consider Firm Suitable before Invest IT)	0.768
CIO4 (CIO has Strategic Orientations)	0.797
ITG1 (Business Firm Give Important for Suitable Work to IT Staff)	0.757

Variable	Factor Loading
ITG2 (Can Transparency Verification of Executive)	0.775
ITG3 (Can Transparency Verification of All Department)	0.738
ITG4 (Comply with the Law)	0.564
ChB (IT_Chargeback)	
ChB1 (Monitor IT Usage)	0.759
ChB2 (Manage IT Budget)	0.809
ChB3 (Worthwhile Use of IT)	0.743
ChB4 (Report IT Investment to be Use Next Time)	0.705
KM (Knowledge Management)	
KM1 (Study New IT Knowledge)	0.873
KM2 (Exchange and Disseminate IT Knowledge)	0.911
KM3 (Record IT Knowledge)	0.828
KM4 (Bring IT Investment Knowledge to be Use Next Time)	0.828
IT Conveniences	
Con1 (Work Convenience)	0.857
Con2 (Management Convenience)	0.954
Con3 (Communication Convenience)	0.972
Con4 (Customer Service Convenience)	0.715
IT Competitive	
Com1 (Readiness for Future Change)	0.821
Com2 (Increase Business Capability)	0.897
Com3 (Customer Service is better than Competitor)	0.910
Com4 (Quality of Product is Better than Competitor)	0.816

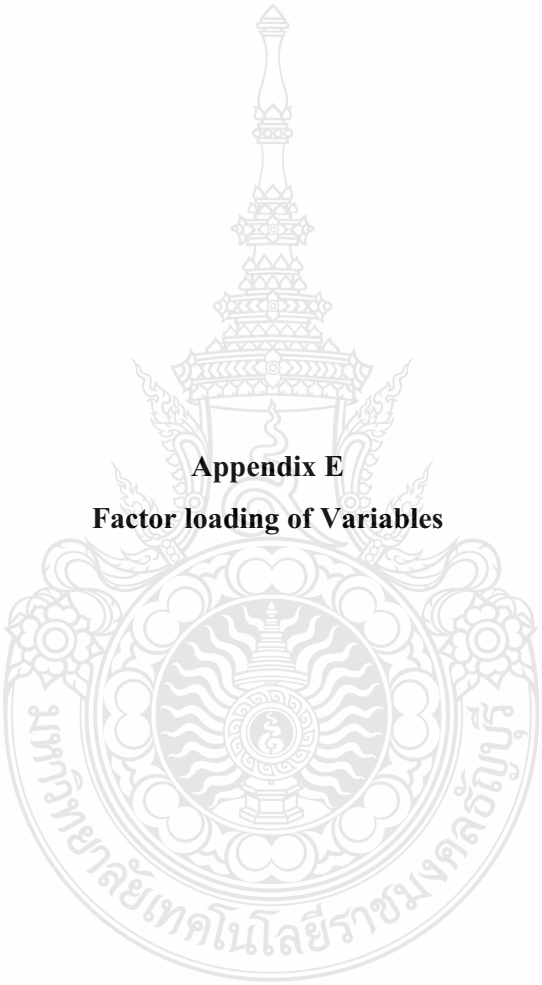
Appendix D

The Discriminant Validity

The Discriminant Validity

Construct	Construct	Free Covariance	Fixed Covariance	Chi-Square (Different)
IT Infrastructure	IT Production	14.742 (.064) 0.63	245.417 (.000) 1	230.675
IT Infrastructure	IT Information Systems	12.641 (0.125) 0.65	217.32 (.000) 1	204.679
IT Infrastructure	IT Strategies	9.880 (.274) 0.56	281.979 (.000) 1	272.099
IT Infrastructure	IT Moderation	5.442 (.709) 0.54	280.937 (.000) 1	275.495
IT Infrastructure	IT Reasonableness	7.317 (.120) 0.64	71.283 (.000) 1	63.966
IT Infrastructure	IT Self-Immunity	4.697 (.320) 0.57	189.983 (.000) 1	185.286
IT Infrastructure	IT Convenience	9.055 (.338) 0.57	252.957 (.000) 1	243.902
IT Infrastructure	IT Competitive	3.671 (.886) 0.55	285.271 (.000) 1	281.6
IT Production	IT Information Systems	7.459 (.488) 0.70	273.884 (.000) 1	266.425
IT Production	IT Strategies	21.624 **(.006)** 0.61	442.241 (.000) 1	400.617
IT Production	IT Moderation	12.163 (.144) 0.48	394.117 (.000) 1	381.954
IT Production	IT Reasonableness	4.571 (.334) 0.48	100.491 (.000) 1	95.92
IT Production	IT Self-Immunity	3.530 (.473) 0.53	211.914 (.000) 1	208.384
IT Production	IT Convenience	8.462 (.390) 0.38	426.109 (.000) 1	417.647
IT Production	IT Competitive	7.754 (.458) 0.47	611.415 (.000) 1	598.73
IT Information Systems	IT Strategies	3.674 (.885) 0.72	243.916 (.000) 1	240.242
IT Information Systems	IT Moderation	9.278 (.319) 0.62	284.773 (.000) 1	275.495
IT Information Systems	IT Reasonableness	0.820 (.936) 0.67	60.487 (.000) 1	59.667

Construct	Construct	Free Covariance	Fixed Covariance	Chi-Square (Different)
IT Information Systems	IT Self-Immunity	3.548 (.471) 0.60	183.912 (.000) 1	180.364
IT Information Systems	IT Convenience	9.747 (.283) 0.54	330.075 (.000) 1	320.328
IT Information Systems	IT Competitive	11.011 (.201) 0.58	383.751 (.000) 1	372.74
IT Strategies	IT Moderation	20.974 **(.007)** 0.67	270.174 (.000) 1	249.2
IT Strategies	IT Reasonableness	6.777 (.148) .68	66.800 (.000) 1	60.03
IT Strategies	IT Self-Immunity	9.270 (.055) 0.75	125.830 (.000) 1	116.56
IT Strategies	IT Convenience	26.032 **(.001)** 0.43	413.101 (.000) 1	387.069
IT Strategies	IT Competitive	21.815 **(.005)** 0.64	398.103 (.000) 1	376.288
IT Moderation	IT Reasonableness	2.920 (.571) 0.74	46.519 (.000) 1	43.599
IT Moderation	IT Self-Immunity	2.044 (.728) 0.68	144.243 (.000) 1	142.199
IT Moderation	IT Convenience	11.624 (.169) 0.43	367.956 (.000) 1	356.332
IT Moderation	IT Competitive	6.036 (.643) 0.46	394.902 (.000) 1	388.866
IT Reasonableness	IT Self-Immunity	0.648 (.421) 0.77	36.715 (.000) 1	36.067
IT Reasonableness	IT Convenience	4.946 (.293) .66	69.619 (.000) 1	64.673
IT Reasonableness	IT Competitive	4.606 (.330) 0.64	72.050 (.000) 1	67.444
IT Self-Immunity	IT Convenience	7.882 (.096) 0.46	232.678 (.000) 1	224.796
IT Self-Immunity	IT Competitive	5.692 (.223) 0.54	201.165 (.000) 1	195.473
IT Convenience	IT Competitive	33.393 **(.000)** 0.66	284.570 (.000) 1	254.177
Note: (1) Chi-Square (2) p-value (3) Correlation				



Appendix E
Factor loading of Variables

Factor loading of Variables of Model One

Latent Variable	Observe Variable	Factor Loading
IT_INF	IT_Inf1 (Purchase Computer for Support Business Operation)	0.75
	IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	0.88
	IT_Inf3 (Purchase Software for Support Business Operation)	0.72
IT_PRO	IT_Prod1 (Use IT in Production Planning)	0.89
	IT_Prod2 (Use IT in Raw Material Management)	0.89
	IT_Prod3 (Use IT in Production Process)	0.87
IT_IS	IS1 (Store information for Support Planning)	0.85
	IS2 (Store Information of Each Business Operation)	0.81
	IS3 (Store Information Support Decision Making)	0.86
IT_MOD	CIO2 (CIO Understand Business Process)	0.78
	CIO3 (CIO Consider Firm Suitable before Invest IT)	0.83
	CIO4 (CIO has Strategic Orientations)	0.84
IT_REA	ChB1 (Monitor IT Usage))	0.75
	ChB3 (Worthwhile Use of IT)	0.73
IT_SEL	KM2 (Exchange and Disseminate IT Knowledge)	0.84
	KM4 (Bring IT Investment Knowledge to be Use Next Time)	0.87
IT_CON	Con1 (Work Convenience)	0.82
	Con3 (Communication Convenience)	0.85
	Con4 (Customer Service Convenience)	0.75
IT_INV	IT_INF (IT Infrastructure)	0.87
	IT_PRO (IT in Production)	0.73
	IT_IS (Information Systems)	0.95
IT_SEP	IT_REA (IT Reasonableness)	0.93
	IT_SEL (IT Self-Immunity)	0.82
	IT_MOD (IT Moderation)	0.79

Factor loading of Variables of Model Two

Latent Variable	Observe Variable	Factor Loading
IT_INF	IT_Inf1 (Purchase Computer for Support Business Operation)	0.75
	IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	0.88
	IT_Inf3 (Purchase Software for Support Business Operation)	0.71
IT_PRO	IT_Prod1 (Use IT in Production Planning)	0.88
	IT_Prod2 (Use IT in Raw Material Management)	0.88
	IT_Prod3 (Use IT in Production Process)	0.87
IT_IS	IS1 (Store information for Support Planning)	0.85
	IS2 (Store Information of Each Business Operation)	0.80
	IS3 (Store Information Support Decision Making)	0.85
IT_MOD	CIO2 (CIO Understand Business Process)	0.78
	CIO3 (CIO Consider Firm Suitable before Invest IT)	0.82
	CIO4 (CIO has Strategic Orientations)	0.85
IT_REA	ChB1 (Monitor IT Usage))	0.75
	ChB3 (Worthwhile Use of IT)	0.72
IT_SEL	KM2 (Exchange and Disseminate IT Knowledge)	0.84
	KM4 (Bring IT Investment Knowledge to be Use Next Time)	0.87
IT_INV	IT_INF (IT Infrastructure)	0.85
	IT_PRO (IT in Production)	0.73
	IT_IS (Information Systems)	0.95
IT_SEP	IT_REA (IT Reasonableness)	0.81
	IT_SEL (IT Self-Immunity)	0.92
	IT_MOD (IT Moderation)	0.84

Factor loading of Variables of Model Three

Latent Variable	Observe Variable	Factor Loading
IT_INF	IT_Inf1 (Purchase Computer for Support Business Operation)	0.75
	IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	0.88
	IT_Inf3 (Purchase Software for Support Business Operation)	0.71
IT_PRO	IT_Prod1 (Use IT in Production Planning)	0.88
	IT_Prod2 (Use IT in Raw Material Management)	0.88
	IT_Prod3 (Use IT in Production Process)	0.87
IT_IS	IS1 (Store information for Support Planning)	0.85
	IS2 (Store Information of Each Business Operation)	0.80
	IS3 (Store Information Support Decision Making)	0.85
IT_MOD	CIO2 (CIO Understand Business Process)	0.78
	CIO3 (CIO Consider Firm Suitable before Invest IT)	0.83
	CIO4 (CIO has Strategic Orientations)	0.85
IT_REA	ChB1 (Monitor IT Usage))	0.75
	ChB3 (Worthwhile Use of IT)	0.73
IT_SEL	KM2 (Exchange and Disseminate IT Knowledge)	0.87
	KM4 (Bring IT Investment Knowledge to be Use Next Time)	0.83
IT_CON	Con1 (Work Convenience)	0.82
	Con3 (Communication Convenience)	0.86
	Con4 (Customer Service Convenience)	0.75
IT_INV	IT_INF (IT Infrastructure)	0.87
	IT_PRO (IT in Production)	0.72
	IT_IS (Information Systems)	0.96
IT_SEP	IT_REA (IT Reasonableness)	0.79
	IT_SEL (IT Self-Immunity)	0.93
	IT_MOD (IT Moderation)	0.82

Factor loading of Variables of Model Four

Latent Variable	Observe Variable	Factor Loading
IT_INF	IT_Inf1 (Purchase Computer for Support Business Operation)	0.75
	IT_Inf2 (Purchase Communication Devices to Use in Business Firm)	0.88
	IT_Inf3 (Purchase Software for Support Business Operation)	0.72
IT_PRO	IT_Prod1 (Use IT in Production Planning)	0.89
	IT_Prod2 (Use IT in Raw Material Management)	0.89
	IT_Prod3 (Use IT in Production Process)	0.87
IT_IS	IS1 (Store information for Support Planning)	0.85
	IS2 (Store Information of Each Business Operation)	0.81
	IS3 (Store Information Support Decision Making)	0.85
IT_MOD	CIO2 (CIO Understand Business Process)	0.78
	CIO3 (CIO Consider Firm Suitable before Invest IT)	0.82
	CIO4 (CIO has Strategic Orientations)	0.85
IT_REA	ChB1 (Monitor IT Usage))	0.71
	ChB3 (Worthwhile Use of IT)	0.68
IT_SEL	KM2 (Exchange and Disseminate IT Knowledge)	0.84
	KM4 (Bring IT Investment Knowledge to be Use Next Time)	0.87
IT_CON	Con1 (Work Convenience)	0.82
	Con3 (Communication Convenience)	0.85
	Con4 (Customer Service Convenience)	0.75
IT_INV	IT_INF (IT Infrastructure)	0.88
	IT_PRO (IT in Production)	0.72
	IT_IS (Information Systems)	0.96

Appendix F

The deep interview result of CIO

The CIO in-dept interview results

Question	Interview result (first CIO)	Interview result (second CIO)	Interview result (third CIO)
1.Currently, what areas that your business firms applied IT ?	1) Firm invests IT in Human Resource, Security, Software, Data Center, and Email Services.	1) Firm invests IT in Manufacturing, Sale, Accounting Systems, and Human Resource departments.	1) Applied IT into all units that support mass production with high quality achievement, easy to work, and safe time. If some parts have problems, engineer can quickly maintenance for avoid loss time.
2.Which are strategies your business firm strongly focus on?	2) Firm focuses on IT convenience for employees.	2) Give importance to sale process and production, because IT services affect customer directly.	2) Give importance to how to manage and balance IT cost and working efficiency.
3.What are importance of IT to your firm executives?	3) The executive can use IT to monitoring business operation.	3) Firm has a business intelligent. They use IT for budget monitoring.	3) Executive can apply IT to keep information, create communication and monitoring business operation.
4.What kind of benefit receive from IT strategies?	4) Firm can use internal information for decision making to invest or develop IT systems in the future.	4) After setting IT strategies into corporate strategies, IT investment can be done to increase user satisfaction,	4) Firm is be able to reduce time and cost, improve speed, and reduce defected parts in production because IT systems

Question	Interview result (first CIO)	Interview result (second CIO)	Interview result (third CIO)
		convenience and production.	make it easy to manage and quickly know root cause of the problems.
5.How the existing resources and IT staff influencing your IT strategic planning?	5) Firm give importance to existing IT resources and put the right man to the right job before purchase new IT	5) We manage our IT staff by put the right man to the right job or IT system first when gaps are identified and need new IT system, then purchase new IT for departments that really need. Also Some old IT systems can be reused by the other department.	5) We focus on value and function of IT systems. Moreover, good alignment with the existing process is a must, not price. Quantity and quality of IT staff should appropriate with work load. They must have knowledge and quickly reach to area of problem.
6.How do you think about IT follow strategic planning, as necessary, and suitable time?	6) IT investment must meet business requirements.	6) Suitable IT systems must meet user requirements, give user a convenience, support production and gain competitive advantage.	6) Before purchase a new IT, we consider that it is importance or not. Do we have another solutions or/ and more economic than purchasing new one?
7.How do you monitor IT usage in term of worthwhile	7) Considering benefits and what will be the best of ROI, then	7) Firm has a monitor scheme that can track a service log of	7) We have systems that monitor the CPUs, Memories,

Question	Interview result (first CIO)	Interview result (second CIO)	Interview result (third CIO)
investment?	closely monitor IT usage against user requirements.	ERP and charge a real IT used.	Transactions, and process time.
8 How do your firm conduct a knowledge management ?	8) Administrative staff have a daily duty to search new knowledge and sent to others. Firm also has a Sharing Server for exchanging and keep the knowledge.	8) IT staff search news and knowledge related to organization then submit to colleagues via email. Firm also provide blog service to share knowledge to staff.	8) Knowledge is considered importance to our firm. For example, previously we stopped working before reconfiguring IT system, but now we use our knowledge developing a reconfiguration method without stop a machine. Thus knowledge gives our benefit so much.
9. How do you bring existing knowledge to develop IT strategies next year?	9) Firm has a weekly meeting, discuss all problems from previous problems and solutions, and share with the other staff.	9) Firm always analyzes the problem and success cases of previous years; the successful cases will be develop becoming documents and failure cases must be analyzed and find a solution.	9) We consider the trend, customer requirement, and the exist resources before reinvest in IT systems.

BIOGRAPHY

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