INNOVATION IMPLEMENTATION EFFECTIVENESS: A MULTIORGANIZATIONAL TEST OF KLEIN CONN AND SORRA'S MODEL

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The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institute. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

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ABSTRACT

Implementing innovations is a challenging, high-risk task for many organizations. Previous research on technological implementation primarily relied on qualitative case studies A notable exception is Klein, Conn and Sorra (2001) who consolidated emerging trends in the growing body of case studies and developed a model of implementation effectiveness which they empirically tested using a qualitative, multi organizational sample. However, sample and analytical limitations in their empirical research suggest further testing of their model is needed. On a theoretical level, the model is amenable to reasonable enhancement and extension using additional theoretically relevant constructs, namely human resources availability and organizational attitude toward future innovation adoption. This thesis (1) examines whether Klein et al.'s (2001) original model of implementation effectiveness can be applied to Australian and Thai samples; (2) develops an enhanced model of implementation effectiveness; and (3) tests the enhanced model using Australian and Thai samples.

The research examines the implementation of various innovations in manufacturing and non-manufacturing contexts. This research uses current best practice in structural equation modelling techniques to generate and test measurement and structural models from questionnaire response data supplied by innovation managers in 135 Australian and 122 Thai companies. The measurement models in both samples demonstrated good validity and reliability. Klien et al.'s (2001) original model is supported with modifications, which mainly suggest contextual effects. The enhanced model significantly improved on the original model in both samples, but, as with the

original model, each sample supported modifications that point to contextual effects that limit the generalizability of the model.

This research contributes a more comprehensive model of implementation effectiveness than was previously available and provides evidence of the limitations of the original and the enhanced models when applied to different contexts.

Keywords: Organizational innovation, Innovation and implementation management, Innovation implementation, Structural Equation Modelling, Innovation effectiveness

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TABLE OF CONTENTS

ABSTRACT ..... ERROR! BOOKMARK NOT DEFINED.

PUBLICATION FROM THIS THESIS ..... ERROR! BOOKMARK NOT DEFINED.

ACKNOWLEDGEMENT..... ERROR! BOOKMARK NOT DEFINED.

TABLE OF CONTENTS ..... **- 0 -**

LIST OF TABLES..... **- 5 -**

LIST OF FIGURES..... **- 7 -**

CHAPTER 1 INTRODUCTION ..... ERROR! BOOKMARK NOT DEFINED.

1.1 RESEARCH BACKGROUND ..... **ERROR! BOOKMARK NOT DEFINED.**

1.2 PROBLEM STATEMENT AND RESEARCH QUESTION..... **ERROR! BOOKMARK NOT DEFINED.**

1.3 JUSTIFICATION OF POPULATIONS..... **ERROR! BOOKMARK NOT DEFINED.**

1.4 SIGNIFICANCE AND AIMS OF THE STUDY ..... **ERROR! BOOKMARK NOT DEFINED.**

1.5 ORGANIZATION OF THIS THESIS..... **ERROR! BOOKMARK NOT DEFINED.**

CHAPTER 2 : LITERATURE REVIEW AND HYPOTHESES ..... ERROR! BOOKMARK NOT DEFINED.

2.1 CONCEPTUALIZING INNOVATION ..... **ERROR! BOOKMARK NOT DEFINED.**

2.2 CLASSIFYING INNOVATION ..... **ERROR! BOOKMARK NOT DEFINED.**

2.3 INNOVATION ADOPTION AS AN ORGANIZATIONAL CHANGE..... **ERROR! BOOKMARK NOT DEFINED.**

2.4 STAGE MODELS OF ORGANIZATIONAL INNOVATION ADOPTION .... **ERROR! BOOKMARK NOT DEFINED.**

2.5 INNOVATION IMPLEMENTATION : THE FOCUS ..... **ERROR! BOOKMARK NOT DEFINED.**

2.5.1 Strengths and limitations of past empirical research...***Error! Bookmark not defined.***

2.6 THE IMPLEMENTATION EFFECTIVENESS MODEL ..... **ERROR! BOOKMARK NOT DEFINED.**

2.6.1 Klein et al.'s theoretical model development ..... ***Error! Bookmark not defined.***

2.6.2 Klein et al.'s study results ..... ***Error! Bookmark not defined.***

2.7 EVALUATING THE IMPLEMENTATION EFFECTIVENESS MODEL ..... **ERROR! BOOKMARK NOT**

DEFINED.

2.7.1 Dealing with major limitations in Klein et al.'s (2001) study ....***Error! Bookmark not defined.***

2.7.2 Subsequent studies employing the Klein et al.'s (2001) model...***Error! Bookmark not defined.***

2.8 HYPOTHESES FOR STUDY ONE: EXAMINING THE ORIGINAL MODEL OF IMPLEMENTATION EFFECTIVENESS..... **ERROR! BOOKMARK NOT DEFINED.**

2.8.1 Financial resources availability and implementation policies and practices .... ***Error! Bookmark not defined.***

2.8.2 Top management support and implementation policies and practices..... ***Error! Bookmark not defined.***

2.8.3 Implementation policies and practices and implementation climate ***Error! Bookmark not defined.***

2.8.4 Implementation climate and implementation effectiveness .....***Error! Bookmark not defined.***

2.8.5 Implementation effectiveness and innovation effectiveness.....***Error! Bookmark not defined.***

2.9 HYPOTHESES DEVELOPMENT FOR STUDY TWO: EXTENDING THE MODEL OF IMPLEMENTATION EFFECTIVENESS ..... **ERROR! BOOKMARK NOT DEFINED.**

2.9.1 Human resources availability and implementation effectiveness.....***Error! Bookmark not defined.***

2.9.2 Innovation effectiveness and attitudes toward future innovation adoption..... ***Error! Bookmark not defined.***

2.9.3 Generalizing the extended model of implementation effectiveness ..***Error! Bookmark not defined.***

2.10 SUMMARY..... **ERROR! BOOKMARK NOT DEFINED.**

CHAPTER 3 : RESEARCH METHODOLOGY..... ERROR! BOOKMARK NOT DEFINED.

3.1 POPULATION AND SAMPLING FRAME..... **ERROR! BOOKMARK NOT DEFINED.**

3.1.1 Participants.....***Error! Bookmark not defined.***

3.2 THE SURVEY INSTRUMENT ..... **ERROR! BOOKMARK NOT DEFINED.**

3.3 DATA COLLECTION PROCEDURE ..... **ERROR! BOOKMARK NOT DEFINED.**

3.3.1 Instrument development ..... ***Error! Bookmark not defined.***

3.3.2 Data collection process in Australia and Thailand ..... ***Error! Bookmark not defined.***

3.4 SUMMARY ..... **ERROR! BOOKMARK NOT DEFINED.**

CHAPTER 4 : ANALYSIS OF DATA AND RESULTS ..... ERROR! BOOKMARK NOT DEFINED.

4.1 ORGANIZATIONAL CHARACTERISTICS ..... **ERROR! BOOKMARK NOT DEFINED.**

4.2 DESCRIPTIVE ANALYSIS ..... **ERROR! BOOKMARK NOT DEFINED.**

4.2.1 Data screening ..... ***Error! Bookmark not defined.***

4.2.2 Normality and collinearity testing ..... ***Error! Bookmark not defined.***

4.2.3 Organizational size as a control variable ..... ***Error! Bookmark not defined.***

4.3 THE USE OF GOODNESS OF FIT MEASURES AS CRITERIA FOR SEM **ERROR! BOOKMARK NOT DEFINED.**

4.4 CONSTRUCT VALIDITY AND RELIABILITY IN MEASUREMENT MODEL .... **ERROR! BOOKMARK NOT DEFINED.**

4.5 RESULTS OF CONFIRMATORY FACTOR ANALYSIS ..... **ERROR! BOOKMARK NOT DEFINED.**

4.5.1 Results of measurement model invariance test ..... ***Error! Bookmark not defined.***

4.5.2 Construct reliability of composite measurements ..... ***Error! Bookmark not defined.***

4.6 ANALYSIS PROCEDURES FOR STUDY ONE AND TWO ..... **ERROR! BOOKMARK NOT DEFINED.**

4.7 RESULTS OF STUDY ONE ..... **ERROR! BOOKMARK NOT DEFINED.**

4.8 RESULTS OF STUDY TWO ..... **ERROR! BOOKMARK NOT DEFINED.**

4.8.1 Post hoc development the extended model of implementation effectiveness ..... ***Error! Bookmark not defined.***

4.8.2 Hypotheses assessments ..... ***Error! Bookmark not defined.***

4.9 SUMMARY ..... **ERROR! BOOKMARK NOT DEFINED.**

CHAPTER 5 : DISCUSSION AND CONCLUSION ..... ERROR! BOOKMARK NOT DEFINED.

5.1 REPLICATION OF KLEIN ET AL.'S (2001) ORIGINAL MODEL OF IMPLEMENTATION EFFECTIVENESS ..... **ERROR! BOOKMARK NOT DEFINED.**

5.1.1 Top management support (TMS) → implementation policies and practices (IPP) ..... ***Error! Bookmark not defined.***

5.1.2 Top management support (TMS) → implementation climate (IC) ... ***Error! Bookmark not defined.***

5.1.3 Financial resources availability (FRA) → implementation policies and practices (IPP) ..... ***Error! Bookmark not defined.***

5.1.4 Implementation policies & practices (IPP) → the implementation climate (IC) ***Error! Bookmark not defined.***

5.1.5 Implementation effectiveness (IME) → innovation effectiveness (INE) ..... ***Error! Bookmark not defined.***

5.2 IMPROVEMENT OF KLEIN ET AL.'S (2001) ORIGINAL MODEL OF IMPLEMENTATION EFFECTIVENESS ..... **ERROR! BOOKMARK NOT DEFINED.**

5.2.1 Human resources availability (HRA) → Implementation effectiveness (IME) .... ***Error! Bookmark not defined.***

5.2.2 Innovation effectiveness (INE) → Attitude toward future innovation adoption (ATI) ..... ***Error! Bookmark not defined.***

5.2.3 Top management support (TMS) → Innovation effectiveness (INE) ***Error! Bookmark not defined.***

5.2.4 Possible justifications of non-equivalent model of implementation effectiveness between Australia and Thailand ..... ***Error! Bookmark not defined.***

5.3 LIMITATIONS AND FUTURE RESEARCH DIRECTIONS ..... **ERROR! BOOKMARK NOT DEFINED.**

5.4 THEORETICAL IMPLICATIONS ..... **ERROR! BOOKMARK NOT DEFINED.**

5.5 PRACTICAL IMPLICATIONS ..... **ERROR! BOOKMARK NOT DEFINED.**

5.6 CONCLUSION ..... **ERROR! BOOKMARK NOT DEFINED.**

APPENDIX A..... ERROR! BOOKMARK NOT DEFINED.**37**

APPENDIX B..... ERROR! BOOKMARK NOT DEFINED.

APEENDIX C..... ERROR! BOOKMARK NOT DEFINED.**56**

APPENDIX D..... ERROR! BOOKMARK NOT DEFINED.**4**

LIST OF TABLES

Table 1-1: A comparison between Australian and Thailand .....**Error! Bookmark not defined.**

Table 2-1: A summary of definitions of innovation .... **Error! Bookmark not defined.**

Table 2-2: Stage models of organizational innovation **Error! Bookmark not defined.**

Table 2-3: A summary of major contextual characteristics that influence innovation implementation outcome..... **Error! Bookmark not defined.**

Table 2-4: A summary of empirical studies that applied aspects of the original model of implementation effectiveness from Klein et al.'s (2001) study.....**Error! Bookmark not defined.**

Table 4-1: A summary of organizational characteristics .....**Error! Bookmark not defined.**

Table 4-2: A summary of skewness, kurtosis, and its standard errors.....**Error! Bookmark not defined.**

Table 4-3: Correlation matrix, mean, and standard deviation among hypothesized variables ..... **Error! Bookmark not defined.**

Table 4-4: A summary of goodness of fit statistics criteria .....**Error! Bookmark not defined.**

Table 4-5: CFA results before (model 1) and after (model 2) removing the three problematic items..... **Error! Bookmark not defined.**

Table 4-6: Average variance extracted (AVE) and factor score weights for Australian and Thai samples..... **Error! Bookmark not defined.**

Table 4-7: A test of partial measurement invariance of overall CFA model.....**Error! Bookmark not defined.**

Table 4-8: Composite reliability and standard error for each construct .....**Error!**

Bookmark not defined.

Table 4-9: Goodness of fit results of the original model examination between Australian and Thai samples..... **Error! Bookmark not defined.**

Table 4-10: Summarized findings of Study one (testing the full original model of implementation effectiveness..... **Error! Bookmark not defined.**

Table 4-11: Goodness of fit results of the original model (with the additional path from TMS to IC) examination between Australian and Thai samples .....**Error! Bookmark not defined.**

Table 4-12: Comparative results of the Goodness of fit measures between the original model and extended model for Australian sample.....**Error! Bookmark not defined.**

Table 4-13: Comparative results of the Goodness of fit measures between the original model and extended model for Thai sample..... **Error! Bookmark not defined.**

Table 4-14: Direct and indirect effects in Australian and Thai samples.....**Error! Bookmark not defined.**

Table 4-15: A summary of hypotheses testing based on the final extended model of implementation effectiveness..... **Error! Bookmark not defined.**

Table 5-1: Organizational perception of radicalness from their implemented innovations..... **Error! Bookmark not defined.**

Table 5-2: The distinctions between Klein et al.'s (2001) original study and this thesis ..... **Error! Bookmark not defined.**

LIST OF FIGURES

Figure 2-1: The original model of implementation effectiveness (Klein et al., 2001) ..... **Error! Bookmark not defined.**

Figure 2-2: Final model derived from Klein et al.'s study (2001).... **Error! Bookmark not defined.**

Figure 2-3: The extended model of implementation effectiveness... **Error! Bookmark not defined.**

Figure 4-1: Overall CFA model of seven constructs ... **Error! Bookmark not defined.**

Figure 4-2: An example of single indicator of latent variable .... **Error! Bookmark not defined.**

Figure 4-3: The original model of implementation effectiveness with the additional path from TMS to IC..... **Error! Bookmark not defined.**

Figure 4-4: A revision of the extended model of implementation effectiveness .. **Error! Bookmark not defined.**

Figure 4-5a: A final extended model of implementation effective for Australian sample ..... **Error! Bookmark not defined.**

Figure 4-6b: A final extended model of implementation effective for Thai sample ..... **Error! Bookmark not defined.**

Figure 5-1: A summary of the results of the replication of Klein et al.'s(2001) original model of implementation effectiveness ..... **Error! Bookmark not defined.**

Figure 5-2: A summary of results of the extended model of implementation effectiveness..... **Error! Bookmark not defined.**

CHAPTER 1 INTRODUCTION

> "Doing the things we do now and doing them better, cheaper and faster will take us so far. But it will not take us far enough. We're going to have to do new things in new ways."
> Peter Bonfield, C.E.O. of British Telecom (13/01/1999)

"Innovate or die" is one of the mantras of today's economy (Getz & Robinson, 2003). Therefore, it is not surprising that being innovative is generally considered to be one of the key drivers of organizational success (Schillewaert, Ahearne, Frambach, & Moenaert, 2005). Many organizations experience problems in the gap between making a decision to introduce a new idea or technology and putting the decision into practice. Before the potential benefits of implementing the new idea, practice or technology can be realized, management faces the challenge of ensuring organizational members accept the innovation. This thesis looks at factors affecting successful innovation implementation; specifically top management support, financial resources availability, human resources availability, policies and practices and positive innovation outcomes. This chapter outlines the research background, identifies the research question, discusses the significance and aim for this thesis, and concludes with a brief description of the purpose of the remaining chapters.

1.1 Research background

Research on innovation within organizations has focused predominantly on the adoption phase of innovation(Holahan, Aronson, Jurkat, & Schoorman, 2004), the decision by an organization to make use of an innovation (Rogers, 1995). However, the adoption decision is only the beginning of the innovation process. The process

can only be considered a success when the innovation is accepted and implemented by organization members and the organization perceives benefits or some improvement as a result (Bhattacherjee, 1998; Klein, Conn, & Sorra, 2001). Researchers have repeatedly commented that no real evidence has emerged that allows us to understand which factors help to successfully implement an innovation (Klein et al., 2001). Holahan, Aroson, Jurkat and Schoorman (2004) commented in their article that the implementation stage is important and that there have been few attempts to study it. In response, research attention needs to shift away from the question "When do organizations adopt innovations?" and towards questions such as "What factors increase the effectiveness of innovation implementation?"

1.2 Problem statement and research question

One consequence of a limited understanding about how to manage innovation implementation is that many companies abandon some adopted innovations during the implementation stage. About 15% of the adoptions of the technological innovations are cancelled before completion, with devastating consequences for some companies (Iacovoc & Dexter, 2005). These include loss of sunk and opportunity costs, loss of potential benefits of successful innovation, disruption of operational systems, unwelcome publicity and associated negative impacts on company image and reputation, and loss of managers' creditability. Additional negative consequences include reluctance to adopt further innovation projects. These risks will only be reduced by increased understanding of how to effectively manage innovation implementation.

While the number of published innovation implementation research reports is growing, they are dispersed across multiple disciplines and one consequence of this scattering is a lack of coherence in the research effort. Additionally, as will be

discussed in detail in Chapter 2, in common with many emerging research fields, the research is dominated by single-case studies. While individual case studies is an appropriate research technique where case specific outcomes are sought, large numbers of studies are required before the validity of the individual conclusions can be assessed. Consequently, available research provides no satisfactory response to this thesis's key research question "What specific factors affect the successful implementation in most firms?" The present study partly responds to the limitations of existing research into innovation implementation by collection of data from a range of industries as well as various types of innovations. Furthermore, this thesis collects data from two nations, Australia and Thailand, for a comparative study (sample details will be discussed in chapter 3).

1.3 Justification of populations

To increase the generalizability of the findings, I chose two dissimilar contexts for this study. This thesis is designed to compare the proposed models in two different countries. These two countries should be different in culture and economy development. Due to the existing collaboration between the industry partners and universities, I have chosen Australian and Thailand.

Hofstede's framework (1980) has gained substantial attention from business scholars in recent years, and consists of five dimensions (Hofstede, 1999): power distance index; uncertainty avoidance index; individualism index; masculinity index; and long-term orientation. Hofstede undertook research in 72 countries and demonstrated cultural differences on the basis of these five dimensions. The cultural scores for Australia and Thailand are relatively different, supporting the suggestion that Australia is culturally different from Thailand. For instance, Australia has the second highest score of individualism, but the power distance was relative lower than

Thailand. This means Australia perceives a greater equality between government, organizations and within families.

According the World Bank country classification 2007 report (Table 1-1), Australia is classified as a developed country, which means Australia has a high income per capita and a high Human Development Index (e.g. life expectancy, literacy, and gross domestic product per capita). The country was ranked third in the United Nations' 2007 Human Development Index and sixth in The Economist's 2005 worldwide quality-of-life index. The service sector of the economy, including tourism, education and financial services, constitutes 69% of GDP (DFAT, 2003). Substantial exports are agriculture and natural resources.

On the other hand, Thailand is classified as a developing country, which has a relatively low standard of living, an undeveloped industrial base, and a moderate to low Human Development Index score and per capita income, but is in a phase of rapid economic development. Major exports include rice, textiles and footwear, fishery products, rubber, jewelry, automobiles, computers and electrical appliances. Thailand is the world's number one exporter of rice, exporting 6.5 million tons of milled rice annually.

Australia and Thailand are clearly different in term of economical development, thus it is useful to employ both sample to test the generalizability and develop a robust model of innovation implementation effectiveness.

The recent Free Trade Agreement (FTA) between Australia and Thailand, Australian businesses are therefore urged to closely consider new opportunities created by this FTA. Opportunities are also opening in Thailand for Australian service providers, investors, and manufacturers and processors. Understanding how Thai organizations manage their businesses, particularly in terms of implementing new

ideas and adopting new technologies or practices would assist Australian organizations to enter into business with Thai organizations more confidently. Similarly, Thailand could possibly learn good practices of innovation implementation and benchmark the implementation process with Australian firms.

Table 1-1: A comparison between Australian and Thailand

Index	Australia	Thailand
GDP (current US$) (billions)	780.5	206.3
GNI per capita, Atlas method (current US$)	35,860	3,050
Life expectancy at birth, total (years)	81	70
Population, total (millions)	20.7	63.4
Population growth (annual %)	1.5	0.7
School enrollment, primary (% net)	96.5	94.2
Surface area (sq. km) (thousands)	7,741.20	513.1

1.4 Significance and aims of the study

Innovation can have many positive outcomes for a company (Gray, 2002). In general it is believed that innovation in itself will be beneficial and useful. For instance, Komulainen, Mainela, Tahtinen and Ulkuiemi (2007) studied the implementation of the mobile advertising service within the retail industry. They found the retailers perceived that mobile advertising technology is beneficial to their business, such as commercial effectiveness. Even though the retailers realized the benefits of the mobile advertising technology, some of them failed to implement it successfully due to lack of technical knowledge, experiences, and financial resources. Lin and Chen (2007) conducted the telephone interviews of 877 small to medium sized companies. Their study confirmed the hypothesis that successful implementation of innovation leads to organizational improvement such as sales, return on equity, assets, investments (ROE, ROA, ROI), and profit.

Based on research such as Gray(2002), Komulainen et.al (2007), Lin and Chen

(2007), this thesis is founded on the assumption that innovation in general will be beneficial and useful. Although this assumption may not always hold true in each and every case, evidence by Gray(2002), Komulainen et.al (2007), Lin and Chen (2007) suggests that, in general, it holds. On the basis of this commonly-held assumption, therefore, my focus is on the way in which the implementation of that innovation affects the actual gain of organizational benefits.

A basic question that needs to be answered is how innovations can be successfully implemented. One of the underlying issues is to determine how the implemented innovation will benefit the organizations as a whole. Historically, research has considered innovation implementation a success when organizations complete the implementation process. This presumes that innovation (e.g. a new technology or system) is useful and will inevitably be of benefit to any organizations that implements it. However, organizations that implement the same innovation may perceive or gain different benefits. After the completion of an implementation process, an organization might not perceive any organizational improvement from an innovation for various reasons. Therefore, the current thesis not only studies implementation success, it also examines post implementation outcomes to access the perceived benefits gained from innovation implementation.

Generally, published research has developed specific conclusions or models explaining a particular innovation within a single-organizational type. For instance, collective learning (such as learning about others' role, improvising, and adjustability) was a critical predictor of the introduction of minimally invasive cardiac surgery in academic and community hospitals (Edmondson, Bohmer, & Pisano, 2001). In a different innovation, just-in-time production, managerial commitment was found to be a key predictor of successful implementation within a manufacturing company

(Chong, White, & Prybutok, 2001). Without comparative research in various types of organizations and innovations, we can only speculate the generalizability of basics. Without a comprehensive model, it is difficult for managers to design their implementation plan. A model that can be applied to most innovations and contexts is needed to frame new innovation initiatives. The current thesis is designed to examine existing theory and integrate key concepts in order to advance understanding of innovation implementation effectiveness.

In sum, the three specific aims for this thesis are:

Aim 1: Review the theoretical model of Implementation Effectiveness (Klein, Conn and Sorra, 2001) and re-examine the model.

Aim 2: Develop or enhance an existing theoretical model of implementation effectiveness.

Aim 3: Test the generalizability of the proposed model across Australia and Thailand.

1.5 Organization of this thesis

Following this introduction, chapter 2 outlines the theoretical framework and proposed models for this thesis. Chapter 3 describes the research methodology in detail: the data collection method and procedures employed to investigate the innovation implementation process within samples. Chapter 4 justifies the choice of statistical methods and provides results of the analyses. Discussion and implications are found in chapter 5.

CHAPTER 2 : LITERATURE REVIEW AND HYPOTHESES

This chapter begins by conceptualizing and classifying innovation and then reviews innovation process and organizational change. Further this chapter reviews some prominent stage models of organizational innovation process. Additionally, it discusses current research on innovation adoption and implementation and identifies the need for large sample implementation research. Next, Klein et al.'s (2001) model of implementation effectiveness, which is suited to large sample research, is presented and evaluated and potential enhancements to Klein et al.'s model are proposed. The theoretical analyses and extension of Klein et al.'s model includes development of hypotheses, which are tested in two studies of this thesis. The first study examines the original model of implementation effectiveness. The second study tests an enhanced model. Because cost and logistic imperatives necessitated collection of the data for both studies in one survey, the hypotheses development for the first two studies are presented before the discussion of the survey development in Chapter 3.

2.1 Conceptualizing Innovation

Zaltman, Duncan, and Holbex's (1973) frequently cited definition of innovation gives some insight into the possible meaning of the 'something' and 'new' in innovation: "An innovation is an idea, practice, or material artifact perceived to be new by the relevant adoption unit". In their view, an innovation can be an intangible idea, an activity or a material object and its 'newness' is subjectively perceived by the persons in the organizational unit exposed to the innovation. Table 2-1 provides a number of similar popular definitions of innovation.

Table 2-1: A summary of definitions of innovation

Innovation definitions	Authors (year)
Innovation is when an organization learns to do something it did not know how to do before	Shepard (1967)
An innovation is an idea, practice, or material artifact perceived to be new by the relevant adoption unit	Zaltman, Duncan and Holbeck (1973)
An internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization	Damanpour (1991a)
Any policy, structure, method or process, product or market opportunity that the manager of the innovating unit perceived to be new	Nohria and Gulati (1996)
A technology or practice that an organization is using for the first time, regardless of whether other organizations have previously used the technology or practice	Klein, Conn and Sorra (2001)

All the definitions in Table 2.1 treat innovation broadly. The main differences between the definitions are the use of the word innovation either as an event or as an engagement in an activity and the varied levels of organization to which the newness of the innovation applies. Zaltman, Duncan and Holbeck's (1973) focus on the organizational sub-unit, others define innovation at the organizational level or are silent as to whom the newness of the innovation applies. This thesis integrated above definitions and defined *innovation* as a broad conceptualization ranging from new ideas, systems, technologies, products, processes, services, or policies that is new to the innovating organization.

2.2 Classifying Innovation

Damanpour's (1991a) innovation classification has gained considerable attention among scholars and practitioners. Damanpour (1991) classified two dimensions of innovations, i.e. administrative versus technical; and product versus process. Administrative innovations include organizational structure and

administrative processes, while technical innovations include products, services and production processes or technology. In contrast, product innovations are new products or services introduced to meet a customer or market need, and process innovations are new elements, materials, task specifications, work and information flow mechanisms, or equipment used to produce a product or render a service.

Innovation may be classified according to the degree of newness. For example, Zhuang, Williamson and Carter (1999) classified innovation as: 1) an invention (i.e. the creation of something new to the world); 2) an improvement on an existing product or process; or 3) the diffusion or adoption of a change developed elsewhere. Innovation by invention undoubtedly plays a significant role in gaining competitive advantage through differentiation (Porter, 1980). However, most innovation falls into the second and third categories. The third category, though often excluded by narrow treatments of innovation, accounts for a large proportion of innovative activities in many business organizations (Zhuang et al., 1999) and is consistent with treatments of innovation as something new to an organizational sub-unit.

This thesis focuses on innovation as an improvement on an existing product or process or the diffusion of something pre-existing elsewhere.

2.3 Innovation adoption as an organizational change

Innovation is a widely discussed topic, especially in business, information technology, engineering and policy development contexts. Obviously, an innovation adoption involves a change in an organization, but not every change is an innovation, even if the organization has not done it before. For example, replacing human operators with an automated machine is considered as an innovative change, but an employee lay-off (although it has not been done before by that particular organization) is not considered to be an innovative change. Clearly, innovation

process implies a lack of precedent, but also implies additional change characteristics which need to be identified.

Organizational change can be seen as arising from two fundamental processes. One is formal, proactive, planned; the other is informal, ad hoc, emergent (Weldon, 2000). An example of formal planned change is the introduction of e-learning in universities responding to opportunities and expectations generated by knowledge based, globalised learning environments (Hutchinson, 2007). In contrast, Tieto-X, Finland's leading contract work solutions company, experienced emergent change arising from unplanned increasing turnover in its top management team, and consequential acquisition of new competencies (Wikström, 2004). Furthermore, organizational change can be episodic or continuous (Weick & Quinn, 1999). Episodic change is infrequent, discontinuous and intentional, sometimes termed radical change, and involves replacement of one organizational strategy or technology with another. For example, in the 1980s BMW automobiles focused on engineering and quality of vehicles. However, by the mid 2000s, quality was less of a concern in the automobile industry because most models were well built and reliable. Therefore, BMW shifted its strategic orientation towards design and brand appeal (Dawson & Kerwin, 2004). On the other hand, continuous change is an ongoing, evolving and cumulative process, sometimes termed incremental change. Continuous change often involves incremental upgrading of operational procedures or systems in response to ongoing changes in the organization's external environment. In this thesis, the term innovation adoption is seen as a *planned, episodic* change that involves doing something new.

2.4 Stage models of organizational innovation adoption

Innovation adoption can also be viewed as a process consisting of several stages. Describing diffusion of innovation theory, Rogers (1983) proposed a five-stage model of innovation adoption and implementation: Knowledge (a person becomes aware of an innovation and has some idea of how it functions); Persuasion (the person forms a favorable or unfavorable attitude toward the innovation); Decision (the person engages in activities that lead to a choice to adopt or reject the innovation); Implementation (the person puts an innovation into use); and Confirmation (the person evaluates the results of an innovation decision).

Three main models of innovation stage been proposed. Their specific stages can be grouped into four main stages: pre-adoption, adoption, implementation and post-implementation (see Table 2-2). The pre-adoption stage involves factors that help organizations identify and consider adopting an innovation. The adoption stage is the process where the senior managers decide to adopt an innovation. The implementation stage is when the innovation is introduced into an organization and includes activities such as training and support programs for organizational members expected to use the innovation. The post-implementation is a stage where organizations realize the benefits (or other consequences) arising from implementing the innovation.

Table 2-2: Stage models of organizational innovation

Models	Stages			
Four Stage Model	**Pre-adoption**	**Adoption**	**Implementation**	**Post Implementation**
Rogers (1983)	Knowledge Persuasion	Decision	Implementation	Confirmation
Cooper and Zmud (1990)	Initiation	Adoption	Adaption Acceptance Routinization	Infusion
Klein and Sorra (1996)	Awareness Selection	Adoption	Implementation Routinization	Evaluation

The main focus of innovation research has been the pre-adoption and adoption stages. Empirical studies have identified a number of key factors that influence adoption decisions, including innovation characteristics (Ndubisi & Chukwunonso, 2005), organizational size (Damanpour, 1992), organization structural complexity (Damanpour, 1996), innovation champions (Beath, 1991), and competitive pressure (Premkumar & Ramamurthy, 1995). The decision to adopt an innovation is usually seen as strategic and has received considerable researcher attention.

For example, Ndubisi and Chukwunonso (2005) studied organizational landscaping adoption among 94 Malaysian organization and 64 Nigerian organizations. They found that relative advantage (the degree to which an innovation can bring benefits to an organization) and compatibility (the degree to which an innovation is consistent with existing business processes, practices and value systems) were positively related to organizational adoption across the two samples. Complexity (the degree to which an innovation is difficult to use) was found to be negatively related to organizational adoption.

Damanpour (1992) reported meta-analysis results from 72 studies. He found a positive relationship between organization size and organization adoption. Furthermore, he found that organization size positively influenced organization

structural complexity. Subsequently, Damanpour (1996) examined 26 empirical studies and found that organization structural complexity positively related to organizational adoption: more complex organizations adopted more innovation because they have a sufficient variety of specialists and more differentiated units.

During pre-adoption and adoption stages, existing 'champions' for specific innovations can influence the organizational adoption decision. Beath (1991) interviewed 15 nominated information technology champions at 10 organizations and found that champions performed a critical role in the introduction of innovations in organizations. Furthermore, Premkumar and Ramamurthy's (1995) study of electronic data interchange (EDI) adoption indicated that in addition to champions, competitive pressure influenced organizational adoption: companies subjected to higher competitive pressure for EDI were more likely to be reactive in their decision to adopt EDI.

Studies of organizational innovation adoption have produced a substantial body of literature and generated valuable insights and theory. However they essentially are limited to a dichotomous option ("to adopt" or "not to adopt") and shed little light on innovation implementation, the research area of this thesis. What happens during the implementation stage determines the success or otherwise of a sound innovation adoption. While strategizing activities such as decisions to adopt an innovation may appeal to managerial egos, "implementation is not romantic; it is nuts and bolts, details, and mundane problems"(Sproull & Hofmeister, 1986). Implementation is a process that takes time, effort and planning that may be overlooked or misunderstood by senior managers.

2.5 Innovation implementation : The focus

Researchers have made only moderate progress toward a comprehensive understanding how to implement innovation successfully and many adopted innovations fail during implementation stage (Gallivan, 2001). Peslak, Subramanian and Clayton (2007) reviewed information system implementation literature and found that 30% of information technology projects failed to implement successfully. For example, Ebank, one of Europe's largest investors in IT with branches in 70 countries worldwide, launched an intranet project to integrate all the services in the bank in 1996 but the innovation was abandoned during the implementation stage. Harry (2003) found that the intranet implementation project failed to convince target users of the benefits and importance of the project's success and failed to change users' attitude and behavior, resulting in avoidance of the intranet system. Similarly, senior managers of International Resources (IR), a large European company, adopted but failed to successfully implement a knowledge management (KM) initiative designed to achieve cost effectiveness and better risk management practices. Storey and Barnett's (2000) analysis based on interviews with the senior managers of IR concluded that a major reason for the failure of KM initiative implementation was a lack of commitment from top management team members.

Implementation failure can be costly to organizations and it may harm a company's reputation. Thus, it is useful for top management to understand the factors which can enhance the successful implementation. A number of Information System (IS) studies have examined various technological implementations in organizations (e.g. Davis, 1989; Izak & Henri, 2007; Latting et al., 2004; Legris, Ingham, & Collerette, 2003; Susan & John, 2007; Szajna, 1996; Venkatesh & Davis, 1996). These studies explained the IS implementation success using the Technology

Acceptance Model (TAM) perspective (Davis, 1986), which focused on the IS innovation characteristics such as compatibility and complexity influencing users 'attitude. However, more factors, rather than the innovation characteristics itself, can influence the implementation success. This thesis thus attempts to review the key success factors that influence the implementation process and its outcome. Table 2-3 lists the most influential and recent studies that focuses in common factors affecting innovation implementation in organizations. Most research in the area has focused on technical innovation but that at least one work has looked at non-technical (Kennedy, Kelleher and Quigley (2006)

Table 2-3: A summary of major contextual characteristics that influence innovation implementation outcome

Authors	Implementation success factors	Studied innovation *[methodology]*	Study aims
Jensen and Aanestad (2007)	User support	Electronic patient record (EPR) *[A case study from two surgical wards in Danish hospitals]*	To identify the aspects relating to implementation process of EPR among healthcare professionals
Letaifa and Perrien (2007)	Organizational culture	Electronic customer relationship management (e-CRM) *[In-depth interview with financial advisors from a Canadian Bank]*	To examine the current weaknesses or deficits in the implementation of e-CRM
Kennedy, Kelleher and Quigley (2006)	Top management commitment and leadership	Customer relationship management (CRM) initiative *[In-depth interview with senior managers from an engineering consultancy]*	To examine the criteria underpinning the successful implementation of CRM initiative
Jones and Kochtanek (2004)	Top management commitment and leadership	Computer-supported collaborative work (CSCW) system *[A case study from a small service company]*	To identify and understand success factors that influence the continued and effective use of a CSCW system

Authors	***Implementation success factors***	***Studied innovation* [methodology]**	***Study aims***
Mehrtens,Cragg and Mills (2001)	Organizational readiness	Internet *[Multiple case studies in IT industry*]	To explain why organizations use the internet
Suchan (2001)	Reward system	Videoteleducation (VTE) system *[Individual and group interviews with senior administrators and faculty groups at a graduate professional school]*	Why senior administrators and faculty groups at Far West, a pseudonym for a graduate professional school, interpreted and used VTE in fundamentally different ways.
Orlikowski (1993)	Managerial attitude	Computer-aided software engineering (CASE) *[A case study of a multinational software consulting firm]*	To examine the critical elements that shape the organizational changes associated with the adoption and use of CASE tools

According to Table 2-3, top management commitment and leadership are important to the successful implementation. For instance, Kennedy, Kelleher and Quigley (2006) interviewed senior managers at ESB International, one of the world's leading multi-disciplinary engineering firms based in Ireland, which had successfully introduced a customer relationship management (CRM) initiative. They concluded that the managerial commitment influenced a successful implementation of CRM. Likewise, Jones and Kochtanek's (2004) study found that the chief executive officer influenced employees to use Computer-supported collaborative work (CSCW) system. Analysis of interviews with eight managers, four quality-assurance/compliance, and eight data entry staff found a typical response of the question who influenced interviewee to use CSCW was "…absolutely our CEO, he initiated that CSCW is what we would use" (Jones & Kochtanek, 2004).

The frequently cited work by Orlikowski (1993) indicated the positive relationship between managerial attitude toward Computer-aided software

engineering (CASE) tools and their usage. Interviews with 119 managers of a large consulting firm and 40 managers from a petro-chemical firm showed that managers believed that the CASE tools had led to greater productivity and created competitive advantage. The two companies reported success in adopting and using CASE tools.

Organizational culture and supportive system were also identified as key success factors for implementation. Letaifa and Perrien's (2007) study of an electronic customer relationship management (e-CRM) in a leading Canadian bank showed that the pro-innovation and customer-driven culture of this bank pushed it toward usage of e-CRM technology. This study was conducted through ten interviews with financial advisors from different branches.

Introducing a new technology or system always requires some supportive mechanism for organizational members to use it. Jensen and Aanestad (2007) found that providing a super-user [an advanced knowledge user who helped other users to use Electronic Patient Record (EPR)] facilitated doctors and nurses to use EPR. The primary data source for this study came from 24 semi-structured interviews and a focus group from a cardio-thoracic surgery ward and an orthopedic surgery ward at two different Danish hospitals. Likewise, Suchan's (2001) study of the videoteleducation (VTE) system in a graduate professional school reported that senior administrators and faculties realized public recognition as a form of reward for using the VTE system.

Mehrtens, Cragg and Mills (2001) suggested that organizational readiness played a major role among organizational members using an innovation. They conducted seven case studies and found that a level of internet knowledge and adequate computer system influenced the internet usage within organization.

2.5.1 Strengths and limitations of past empirical research

Past research seeking to identify the factors that affected successful implementation is typified by qualitative case studies. Case studies are useful for gaining insight into the complexities and dynamics of action in particular contexts. However, their design places limits on their contribution to generalizable knowledge. Because of the nature of the case study, the analysis uses a relative small and selective sample from a selected institution, which limits population validity. Letaifa and Perrien (2007) stated clearly in their study that "these results are not transferable to other banking institutions". Furthermore, it is relatively difficult to assess the reliability of a case study because data interpretation relies on the observer's justification. Jones and Kochtanek (2004) suggested in their study that "it would be helpful to establish quantitative measures to validate and confirm our results" .

Each of previous case studies illustrated parts of the implementation story. Taken collectively they suggest the potential for integrative models that include and clarify the roles of major determinants of innovation implementation. Klein et al. (2001) adopted this approach and developed an integrative model of implementation effectiveness which they empirically tested using a sample from multiple organizations. Since Klein et al.'s (2001) approach is central to the current research; the following section describes details of the implementation effectiveness model and the theoretical relationships among its variables.

2.6 The implementation effectiveness model

Klein et al.'s (2001) implementation effectiveness model (see Figure 2.1) is based on the premise that organizational differences in *innovation* effectiveness (perceived benefits from innovation) is related to *implementation* effectiveness; and

that implementation effectiveness is significantly related to organizational support, financial resource availability, policies and practices, and climate. The model represents a significant advance over the case study approach of earlier innovation research and consolidates the underlying theoretical implications of the substantial body of earlier case studies (Weiner, Helfrich, Savitz, & Swiger, 2007b).

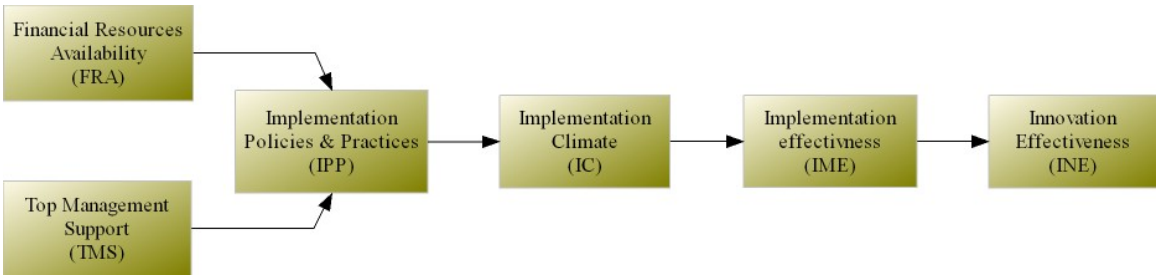

Figure 2-1: The original model of implementation effectiveness (Klein et al., 2001)

2.6.1 Klein et al.'s theoretical model development

Klein et al. (2001) built the integrative model of implementation effectiveness based on previous case studies. The model distinguishes between implementation effectiveness and innovation effectiveness. The construct of implementation effectiveness helps to focus researchers' attention on collective behavioral phenomenon of how an innovation has been implemented or used within organization. In contrast, the construct of innovation effectiveness directs researchers' attention to the benefits that may accrue to an organization because of successful implementation. Klein et al. (2001) argued that the distinction between implementation effectiveness and innovation effectiveness is critical for implementation research and theory. It cannot be assumed that an organization that successfully implemented an innovation will always gain the intended benefits from the implemented innovation.

Klein et al. (2001) developed their implementation climate construct based on previous conceptual and empirical analyses of climate (Hofmann & Stetzer, 1996;

Kozlowski & Hults, 1987; Schneider, 1975; Schneider, White, & Paul, 1998). The previous findings identified that an organizational climate for a specific outcome influenced organizational members' behavior regarding related outcomes. For example, safety climate is related to actual accidents within a chemical processing plant (Hofmann & Stetzer, 1996), climate for technical updating is related to engineers' performance (Kozlowski & Hults, 1987) and service climate is related to quality service behavior among employees among 134 branches of a bank (Schneider et al., 1998). Building on these empirical studies, Klein et al. (2001) described implementation climate as organizational members' shared perceptions of the importance of innovation implementation within the organization and included a positive relationship between the implementation climate and implementation effectiveness in their model.

Schneider (1975) wrote a theoretical article on organizational climate and conceptualized climate perceptions as "…psychological meaningful molar [environmental] descriptions that people can agree characterize system practices and procedures. By its practices and procedures a system may create many climates…" . Using this conceptualization of climate, Klein et al. (2001) suggested implementation policies and practices influenced implementation climate. Previous case studies of innovation implementation identified various policies and practices, such as training, reward, and user support as important influences on innovation (Chua & Lam, 2005; Klein & Ralls, 1995; Roberts, 1988). Klein et al. (2001) argued that "because each study of technology implementation describes a different subset of one or more of these implementation policies and practices, implementation literature as a whole paints a rich and varied, but somewhat jumbled, picture of determinants of innovation implementation" . Therefore, Klein et al. (2001) proposed implementation policies

and practices as a collective construct, rather than testing them individually. For example, an organization may have an absence or a low level of training, but provides technical support, personal assistance, and incentives to use an innovation. Thus, Klein et al. (2001) believed that the influence of implementation policies and practices is cumulative and compensatory.

Synthesizing from theoretical literature of organizational change, Klein et al. (2001) also included top management support and financial resources availability as antecedents of implementation policies and practices. Klein et al. (2001) noted that implementation policies and practices are expenses for an organization. Thus, in absence of slack financial resources, an organization may have difficulty supporting implementation policies and practices. Furthermore, implementation policies and practices require approval from top management. Kilman and Covin (1988) stated that "with top management behind the change effort, the necessary resources and commitment to conduct transformation will be available" (cited in Klein et al., 2001). Therefore, Klein et al. (2001) posited that top management support and financial resources availability were antecedents of implementation policies and practices.

2.6.2 Klein et al.'s study results

Klein et al. (2001) examined their proposed model using a quantitative approach. Their organizational sample consisted of 39 plants from 33 manufacturing companies across the United States. The average number of employees per plant was 280 employees. These plants had implemented the manufacturing resource planning system (MRP II) within the previous 24 months. MRP II is a method for the effective planning of all resources of a manufacturing company (Sillince & Sykes, 1993). Two waves of paper-based surveys were distributed to plant managers and MRP II team members and users. The first wave collected information of all studied constructs,

including financial resources availability, top management support, implementation policies and practices, implementation climate, implementation and innovation effectiveness (a total of 1219 respondents from 39 plants). Two years later, the second wave gathered data about the implementation effectiveness and innovation effectiveness constructs only (a total of 61 respondents from 28 plants).

As hypothesized, at the bivariate level both top management support ($r = .31$, $p < .05$) and financial resources availability ($r = .42$, $p < .05$) were significantly and positively related to implementation policies and practices. Furthermore, implementation policies and practices was significantly and positively related to implementation climate ($r = .40$, $p < .01$), which in turn was significantly related to implementation effectiveness ($r = .64$, $p < .01$). Moreover, implementation effectiveness (time one) was significantly and positively related to innovation effectiveness (time one) ($r = .37$, $p < .05$). Likewise, implementation effectiveness (time two) was significantly and positively related to innovation effectiveness (time two) ($r = .38$, $p < .05$). Klein et al. (2001) also used regression analysis to explore hypothesized relationships among variables.

The regression results from Klein et al.'s study (2001) indicated insignificant relationships between (a) financial resources availability and implementation policies and practices; (b) implementation policies and practices and implementation climate, and (c) implementation effectiveness and innovation effectiveness. Although, the bivariate correlation showed significant relationships between (1) top management support to implementation policies and practices and (2) implementation policies and practices to implementation climate, the regression paths between those two pairs were not significant, presumably due to the inclusion of the control variables. Further, they found an additional non-hypothesized relationship between top

management support and implementation climate as well as between implementation policies and practices to implementation effectiveness.

Based on these regression results, Klein et al. (2001) modified their original model, as shown in Figure 2-2. After the modification based on regression results, they used structural equation modeling (SEM) techniques to test the overall original model and revised model. They reported the fit of revised model was significantly better than the original model.

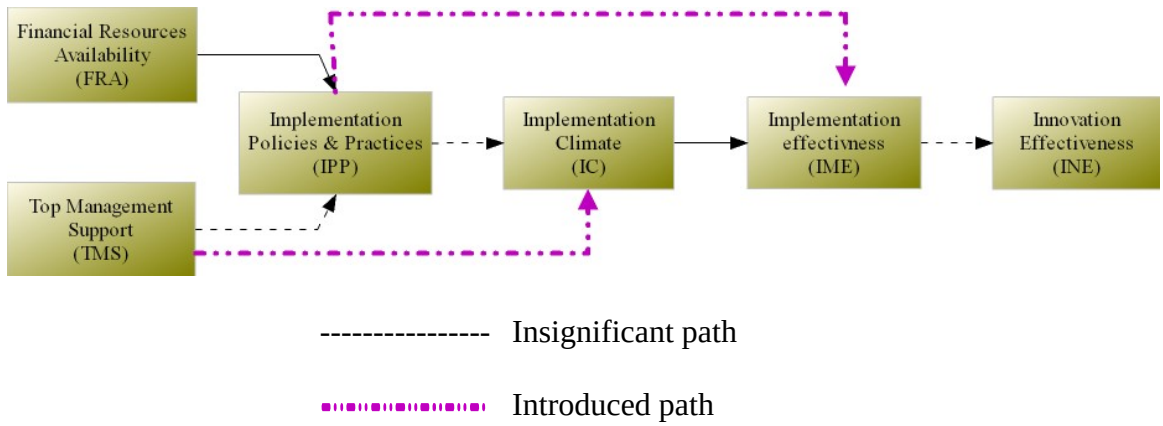

Figure 2-2: Final model derived from Klein et al.'s study (2001)

2.7 Evaluating the implementation effectiveness model

The findings from Klein et al.'s study (2001) highlighted key factors that influenced innovation implementation and contributed important information on a topic long neglected in the innovation implementation literature. However, some findings were inconsistent with previous theory.

Firstly, the insignificant path between top management support and implementation policies and practices contradicted their theory and prior empirical research, which suggested that level of management support has a positive affect on implementation policies and practices. Likewise, Klein et al.'s (2001) findings

indicated an insignificant relationship between implementation policies and practices and implementation climate. Theoretically, policies and practices (such as training, incentives) would create a positive psychological climate in among organizational members (Atuahene-Gima, 1996) and implementation policies and practices are therefore expected to influence implementation climate.

Furthermore, the study did not find a significant relationship between implementation effectiveness and innovation effectiveness. It suggested the perceived effectiveness of implementation process did not influence the perceived benefits gained from the implementation. This finding also disagreed with previous empirical results. This finding is rather surprising and it contradicted to Klein et al.'s (2001) original expectation.

The contrary findings from Klein et al.'s study (2001) could possibly be explained by the design of their research or the data analysis used. The next section addresses the major limitations of Klein et al.'s (2001) study and how my thesis deals with these limitations.

2.7.1 Dealing with major limitations in Klein et al.'s (2001) study

The main limitations were twofold; sampling design and analysis of data. Firstly, the sampled organizations in Klein et al.'s (2001) study were selected from only the manufacturing industry sector (e.g. pet food, chemicals, and animal serum). The lack of industry variation may perhaps have influenced their final results. Furthermore, Klein et al. (2001) developed the integrative model of implementation effectiveness based on a range of theoretical and empirical studies; however they tested their model based on a single innovation (i.e. MRP II, a process innovation). The limitation of innovation type could account for the insignificant relationships between some variables. To address these sampling design constraints, this thesis

uses a sampling frame which includes both manufacturing and non-manufacturing industry sectors. Furthermore, the current research examines organizations that implemented a range of innovation including new product/service, new operational process, new management system, new technology or machinery. Of course, with gaining data from multiple industries to increase generalisability, there is the potential for other, confounding differences to occur across industries. Therefore, before analyzing the hypotheses, I will test for industry differences.

A second limitation of Klein et al.'s (2001) study involved analysis of data. Firstly, the number of respondents in time one and time two was radically different (1219 vs 61). Klein et al. collected data of implementation effectiveness during the time one survey and collected data of innovation effectiveness during time two survey. The significant uneven sample sizes from two surveys could cause the insignificant relationship between these two constructs. Furthermore, the sample size for time two may be too small to demonstrate the predicted relationship between implementation effectiveness and innovation effectiveness. Klein et al. (2001) initially tested the proposed model of implementation effectiveness through regression analysis. Based on the results from the regression analysis, they removed insignificant paths and revised the model for the SEM examination. Regression analysis is extremely sensitive to the combination of variables included in the model (Tabachnick & Fidell, 1996). Klein et al. (2001) sequential analysis increased the chance of finding strong relationships between variables but it could ignore important, but less strong, influencing variables. This is one possible explanation why some of the proposed relationships in the implementation effectiveness model were not significant.

To address these data analysis weaknesses, I employed SEM to test both

measurement constructs *and* the full structural model of implementation effectiveness. SEM is recommended as a powerful alternative to multiple regression, path analysis, factor analysis, time series analysis, and analysis of covariance (Byrne, 2001; Klein, 2005). There are numbers of benefits of SEM compared to multiple regressions including more flexible assumptions, the ability to test models with multiple dependents, the ability to model mediating variables, and the ability to test coefficients across multiple between-subjects groups. Moreover, Garson (1998) commented that where regression is highly susceptible to error of interpretation by misspecification, the SEM strategy of comparing alternative models to assess relative model fit makes it more robust.

2.7.2 Subsequent studies employing the Klein et al.'s (2001) model

Klein et al.'s (2001) study has received considerable attention in academic circles (28 citations recorded in ISI Web of Science, accessed 14 January 2008) including seven empirical papers that applied or modified specific aspects of their final model. These empirical papers integrated and examined some of the posited relationships in the implementation effectiveness model but none re-examined the full model of implementation effectiveness (see Table 2-4). Two studies (Holahan et al., 2004; Naveh & Marcus, 2004) examined the path between implementation climate and implementation effectiveness. Similar to the findings of Klein et al. (2001), Holaha et al. (2004) found that implementation climate was positively related to implementation effectiveness of computer and telecommunication technologies among 164 K-12 schools in New Jersey, U.S.A. Naveh and Marcus's study (2004) used data from two general hospitals in U.S.A. They also found that implementation climate influenced effective implementation of patient safety practice.

Two other studies (Alexander, Weiner, & Griffith, 2006; Link & Naveh, 2006)

have examined the relationship between implementation effectiveness and innovation effectiveness. Alexander et al. (2006) conducted a survey among 1,784 community hospitals and, unlike Klein et al. (2001), found that successful implementation of quality improvement practice improved financial and cost performance. Link and Naveh (2006) surveyed 40 organizations that implemented ISO 14001 – a standard for environmental management. Similarly, they found that comprehensive implementation of ISO 14001 increased organizational performance and benefits.

Some studies selected the relationship between implementation policies and practices and implementation effectiveness as their research question. Weiner, Helfrich, Savitz, and Swiger (2007a) conducted multiple case studies among six primary care practices in North Carolina, U.S.A. They found that providing policies and practices, such as training, positively influenced the effective implementation of prevention efforts-diabetes management strategies among healthcare practitioners. Marler, Liang, and Dulebohn (2006) surveyed 94 administrative employees and confirmed the relationship. They concluded that implementation policies and practices facilitated the successful implementation of web-based enterprise-wide resource planning software system.

A study from Helfrich, Weiner, McKinney and Minasian (2007) tested a slightly trimmed version of Klein et al.'s (2001) original model of implementation effectiveness, They conducted interviews with four cancer clinical research networks. Their findings indicated that the original model of implementation effectiveness explained the effective implementation of new programs in cancer prevention and control very well. However, they did not find a significant relationship between implementation effectiveness and innovation effectiveness.

Table 2-4: A summary of empirical studies that applied aspects of the original model of implementation effectiveness from Klein et al.'s (2001) study

Authors	Studied innovation	Sample size	Study method	The findings related to Klein et.al.'s (2001) study
Holahan, Aronson, Jurkat, & Schoorman (2004)	Computer and telecommunication technologies	164 K-12 schools in New Jersey, the United States of America	survey	implementation climate --> implementation effectiveness
Naveh, Katz-Navon, & Stern (2005)	Patient safety practice	36 units from two general hospitals	survey	implementation climate --> implementation effectiveness
Alexander, Weiner, & Griffith (2006)	Quality improvement	1,784 community hospitals	survey	implementation effectiveness-->innovation effectiveness
Link & Naveh (2006)	ISO 14001	40 organizations (chemical, hi-technology, food and beverage, and service sectors)	survey	implementation effectiveness --> innovation effectiveness
Marler, Liang, & Dulebohn (2006)	Web-based enterprise-wide resource planning software system	94 administrative employees	survey	implementation policies and practices --> implementation effectiveness
Weiner, Helfrich, Savitz, & Swiger (2007)	prevention efforts-diabetes management strategies	Six primary care practices in North Carolina, United States of America	case studies	implementation policies and practices --> implementation effectiveness
Helfrich, Weiner, McKinney, & Minasian (2007)	New programs in cancer prevention and control (CP/C) research	Four cancer clinical research networks	case studies	top management support and financial resources availability --> implementation policies and practices-->implementation climate --> implementation effectiveness

This thesis tests both Klein et al.'s (2001) original model of implementation effectiveness and an enhanced model that includes additional constructs identified as potential significant influence on innovation implementation effectiveness in theoretical and empirical research. The intent of the current thesis is to test and enhance the original theoretical model from Klein et al.'s (2001) study. Although, a number of studies applied aspects of the original model of implementation effectiveness for their investigation, none of them tested the full original model. The first study in this thesis re-examines Klein et al.'s original theoretical model using data collected outside the U.S.A. After the analysis of the results if the first study, the enhanced model of implementation effectiveness is introduced and tested in the second study.

2.8 Hypotheses for study one: Examining the original model of implementation effectiveness

This section describes the hypothesized relationships among variables based on the original model of implementation effectiveness (Figure 2-1).

2.8.1 Financial resources availability and implementation policies and practices

The original model of implementation effectiveness proposed that to engage people in the implementation process and in using the innovation, organizations should provide implementation polices and practices. These policies and practices include training before and during the implementation, rewards or incentives using innovation, technical support, time to use the innovation, and communication about implementation process. Sachdeva (2006) found training was an important role in successful E-governance implementation. In another study, supportive factors for

elementary teachers' use of computers were identified such as technological accessibility and availability, incentives to use and personnel support (Cheryl, 2007). A quantitative finding in the Australian construction industry indicated that barriers to successful implementation of information communication technology were a lack of training and a difficulty of finding time to participate in implementation process (Vachara & Derek, 2006). In the implementation effectiveness model, these supportive schemes (e.g. training) were defined as implementation policies and practices.

A number of studies point the conclusion that organizations providing supportive policies and practices can incur substantial financial cost. In the absence of slack financial resources, an organization may have considerable difficulty in offering policies and practices for implementation. For example, in the banking industry, innovation implementation was most successful in banks that had sufficient financial resources to offer training, to hire consultants, and to lower organizational performance standards during the implementation effort (Nord & Tucker, 1987). The education sector also faces a similar problem. Schrum and Glassett (2006) reviewed research on the integration of computer technologies by teachers and other educational leaders in the P-12 school environment. They identified limited financial resources as barriers that mainly inhibited the successful implementation of technology into classroom instruction. Similarly, empirical findings from small to medium sized firms showed that one of the barriers to providing e-learning training for employees was financial resources (Sambrook, 2003). Helfrich et al. (2007) adapted Klein et al.'s (2001) hypothesized relationship between financial resources availability and implementation policies and practices as their research question. Interview results from top management in four cancer clinical research centers

indicated that all organizations had adequate funding resources for implementing new programs in cancer prevention and control (CP/C). Interviewees also reported that their clinics established a variety of policies and practices (such as organizing dedicated CP/C research committees) to encourage researchers to participate in CP/C implementation. Collectively, these finding suggest an adequate budget can improve implementation policies and practices. To examine the relationship of financial resources availability on implementation policies and practices, the following hypothesis will be tested:

Hypothesis 1: Financial resources availability will significantly and positively influence implementation policies and practices.

2.8.2 Top management support and implementation policies and practices

Financial resources availability may permit an organization to bear the cost of implementation and absorb failure (Rosner, 1968). However, financial resources availability alone may not be sufficient to support implementation policies and practices. Senior management can play a role as facilitators and endorse implementation activities. Support from senior management refers to the degree to which senior management views the implementation activities as a top priority and as critical to organizational effectiveness (Jarvenpaa & Ives, 1991). Helfrich et al.'s (2007) case studies concluded that senior management signaled their support for CP/C research through specific implementation policies and practices. Findings from a successful implementation of client/server computing at an insurance company in the United Kingdom revealed that senior management was highly supportive to the implementation activities (Ashok & Mary, 1997). They recognized that successful

implementation would enable the business transformation. Furthermore, the senior management has authority for implementation budget, training approval, and technology maintenance support. As such, top management support could influence implementation policies and practices. To examine the relationship of top management support on implementation policies and practices, the following hypothesis will be tested:

Hypothesis 2: Top management support will significantly and positively influence implementation policies and practices.

2.8.3 Implementation policies and practices and implementation climate

Climate was initially considered as the general situation that is experienced by individuals in terms of the values or characteristics of the environment (Tagiuri & Litwin, 1968) that influence individual behavior. In the 1980's, the concept of climate was transferred to large units such as organizations, rather than indicating individual emotional reaction. In this context, climate is described as arising from routine organizational practices that influence members' behavior and attitudes (Hoy & Miskel, 1991). Climate is therefore a surface-level indicator of the deeper, more embedded organizational culture.

It is possible for multiple climates to exist concurrently within an organization. Therefore, climate is best defined as a specific construct having a referent (Schneider et al., 1998). That is, a 'climate' is actually a climate *for* something, for example climate for creativity (Ekvall, 1996b), climate for workplace safety (Griffin & Neal, 2000a), or climate for service (Schneider et al., 1998). In the current thesis, I examined the climate for implementation. Climate for implementation refers to

managerial perceptions of the extent to which organizational members support the implementation activities. Given that senior managers deliver the importance of the implementation message to organizational members through the endorsement of various policies and practices, the members should perceive the implementation as a top priority.

The relationship between implementation policies and practices and implementation climate are indicated in a range of studies. For example, Palo and Padhi (2006) examined the implementation of Total Quality Management (TQM) program in a leading steel manufacturing company in India. They concluded that the implementation policies, such as training or incentives, influence the climate for TQM implementation. Likewise, Arezes and Miguel (2005) studied the implementation of hearing protection devices (HPDs) among 516 respondents at eight different companies from the textile, apparel, chemical, and food industries. They identified that HPDs training influenced the safety climate, which turned into the use of HPDs. It is also suggested that implementing policies such as providing training and development opportunities would influence employees' improvement in skills and knowledge which in turn would allow them to support an implementation of total quality management (Rayworth, 1993). Thus, I hypothesize:

Hypothesis 3: Implementation policies and practices will significantly and positively influence implementation climate.

2.8.4 Implementation climate and implementation effectiveness

Although there is no direct research for this link, evidence from cognate literatures suggest that such a relationship is viable. First, in the related field of organisational culture, Zammuto and O'Connor (1992) found that organizations with an organic culture, supporting flexibility rather than control, were more likely to experience successful implementation of advanced manufacturing technologies. There is similar evidence to suggest that participative and people oriented cultures are related to the successful implementation of manufacturing resources planning (Burnes & James, 1995), team-based selling (Eby, Adams, Russell, & Gaby, 2000), information technology (Harper & Utley, 2001), quality improvement (Shortell et al., 1995) and the end-user computing system (Jones, Jimmieson, & Griffiths, 2005). Thus, it appears as though participative and implementation-oriented organizational cultures are more likely to have successful implementation of innovations.

Second, related research suggests that organizations that view changes positively are more likely to make those changes smoothly Martin, Jones, and Callan (2005) conducted research in two large public organizations, and found that organizational members' positive perceptions of a restructuring process fostered effective implementation of that restructuring. This suggests that implementation climate may affect implementation. Similar outcomes were found in a study of a successful merger between two non-profit organizations. Giffords and Dina (2003) found that the success of the merger was influenced by organizational climate. On a different but related note, Griffin and Neal (2000b) studied the climate for safety in seven Australian manufacturing and mining organizations and found that safety climate was an important predictor of successful safety performance. Thus, I suggest that climate for implementation should promote the effective implementation of an

innovation.

Hypothesis 4: Implementation climate will significantly and positively influence implementation effectiveness.

2.8.5 Implementation effectiveness and innovation effectiveness

Some innovation research has defined the outcome of innovation implementation as a simple, unproblematic process with decrease resistance among organizational members. For example, Amoako-Gyampah and Salam (2004) defined the implementation outcome as acceptance of ERP among target users. They found that training and project communication influenced 571 employees to accept the use of ERP system. Similarly, Johnston and Linton's (2000) research in manufacturing industries defined the point of successful implementation of environmentally clean process technology as the time at which firms incorporated the environmental technology into their operations. They found that inter-firms networks facilitated a completed technology implementation.

However, several researchers have distinguished between implementation effectiveness and innovation effectiveness (Holahan et al., 2004; Klein et al., 2001; Klein & Knights, 2005; Klein & Sorra, 1996). Innovation effectiveness, or the return the organization realizes from adopting and implementing an innovation, can be seen as a function of a smooth process (e.g. few problems during implementation, or a less complicated implementation process) and organizational members' acceptance (thereafter called implementation effectiveness). Accordingly, the less complicated implementation process and the less resistance among organizational members, the greater the perceived benefits of innovation (innovation effectiveness) should be.

Although, Klein et al.'s (2001) study did not find the relationship between implementation effectiveness and innovation effectiveness, theoretically the relationship should be present. Hence hypothesis 5:

Hypothesis 5: Implementation effectiveness will significantly and positively influence innovation effectiveness.

2.9 Hypotheses development for study two: Extending the model of implementation effectiveness

This section discusses the variables that will be introduced to the implementation effectiveness model in the second study. These variables, namely human resources availability and attitude toward innovation, have been derived from the literature and theory of innovation implementation. This section outlines the relationships between these variables and the formation of hypotheses.

2.9.1Human resources availability and implementation effectiveness

The original model of implementation effectiveness proposed that financial resources availability could indirectly affect innovation implementation effectiveness via implementation policies and practices and implementation climate. However, numerous authors suggest human resource factors may also affect the implementation of innovation. Therefore, there is a potential to enhance the original model of implementation effectiveness by including separate treatment of human resource factors.

Nystrom, Ramamurthy and Wilson (2002) studied the implementation of the imaging technology among 555 hospitals from Wisconsin, Minnesota, and Illinois, U.S.A. The authors found that organizational resources availability influenced the

innovation implementation (Nystrom et al., 2002). The authors defined resources as both financial resources and human resources (defined as having skilful and talented personnel). However, the authors did not distinguish between financial and human resources in their analysis. Although the resources availability affected the effective implementation of the imaging technology, the study did not draw a clear conclusion whether financial or human resources would probably have differential impacts on the effective implementation.

Nevertheless, Snell and Dean (1992) commented that a number of studies have indicated that skillful and competent employees are a key to effective implementation of technological innovation. Implementing technological innovation can improve organizational performance. Effective implementation requires higher average skills from organizational members to manage the implementation process (Spenner, 1983). Arguably, skilful and talented employees should adapt themselves to the change process more easily. A study of relocation within a State government department in the Queensland Public Service (QPS) indicated that competent and confident employees viewed the relocation as an opportunity rather than as a threat, thus they were more willing to participate in the change (Jimmieson, Terry, & Callan, 2004). Likewise, Starkweather (2005) commented that talented and competent K-12 teachers were better managed activities that promoted the successful implementation of technology, innovation, design, and engineering curriculum.

Implementing new technologies or practices may enhance work effectiveness, however, it may require more skills and capabilities from organizational members to deal with the new technologies. For instance, organizations can provide supportive training of how to use computerized bookkeeping. However, if most employees have a low level of computer literacy, the training may be ineffectual and could possibly

create a resistance to using the technology. On the other hand, computer literate employees may adjust themselves to the new technology more smoothly and less problems. Based on previous studies, numerous authors suggest human resource factors, defined here as having skilful and talented personnel, may also affect the implementation of innovation.

Hypothesis 6: Human resources availability will significantly and positively influence implementation effectiveness.

2.9.2 Innovation effectiveness and attitudes toward future innovation adoption

An attitude is an individual's belief about whether the outcome of his/her action will be positive or negative. Many innovation researchers (e.g. Damanpour, 1991a; Damanpour, 1991b; Frambach & Schillewaert, 2002; Lehman, Greener, & Simpson, 2002) have identified positive beliefs and motivational readiness as facilitators of adopting innovations. I propose that much of this positive attitude will come from past experiences with innovation. Particularly, the knowledge gained from past behavior will help to shape intention (Fishbein & Ajzen, 1975) because experience makes knowledge more accessible in memory (Fazio & Zanna, 1978). This implies that innovation adoption may be more effectively modeled for organizations who gained benefits from the past implementation. This suggestion is supported by a study of the implementation of organizational websites by 288 members of a Chamber of Commerce in the U.S.A. (Flanagin, 2000). That research suggested that the perceived benefit from technology was one of the best predictors of future innovation adoption. Likewise, a survey of 298 companies in Hong Kong indicated that perceived benefits were positively related to attitudes towards adoption (Au & Enderwick, 2000).

This past research has confirmed the link between the attitude and innovation adoption. This thesis complements that research by verifying the link between the successful innovation implementation and organizational attitude toward innovation. Thus, I propose that perceiving greater innovation effectiveness with the current innovation will correspond to a more positive overall attitude towards future innovation adoption within organization.

Hypothesis 7: There will be a significant and positive relationship between innovation effectiveness and organizational attitude toward future innovation adoption.

Figure 2-3 shows the extended model of implementation effectiveness. This model will be examined and compared with the original model of implementation effectiveness in chapter 4.

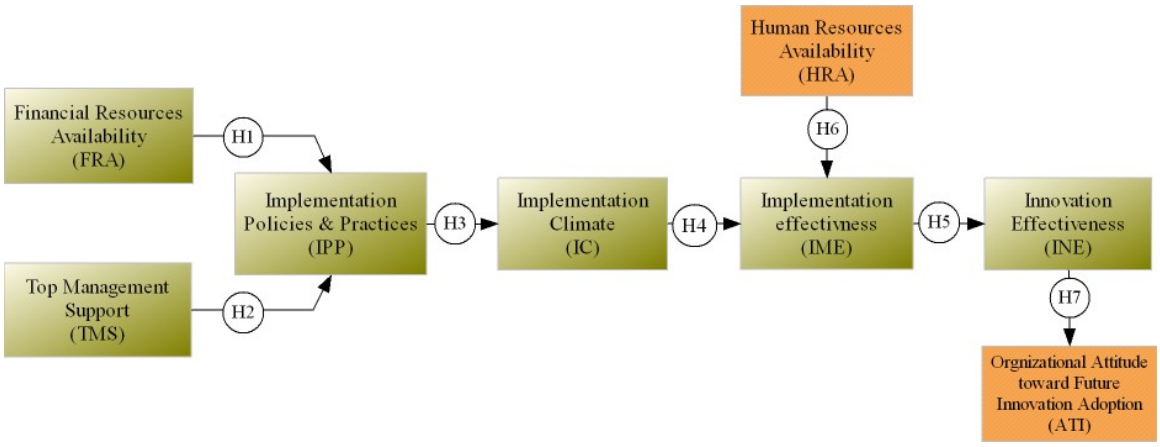

Figure 2-3: The extended model of implementation effectiveness

2.9.3 Generalizing the extended model of implementation effectiveness

Notwithstanding the recent activity in understanding and developing a model of innovation implementation effectiveness, this line of research has not yet been extended beyond the North America context. Due to continuing rapid globalization of

business, there is a pressing need to develop a general model that can be applied in other contexts.

The current thesis purposely obtains samples from two countries (Australia and Thai) to test the generalizability of the extended model of implementation effectiveness. Since the proposed extended model of implementation effectiveness has been developed from a range of literatures with various populations and samples, it is reasonable to suggest that the proposing extended model of implementation effectiveness should be able to generalize across Australia and Thailand.

Hypothesis 8: The proposed extended model of implementation effectiveness will be able to generalize across Australian and Thai samples.

2.10 Summary

This chapter began with a review of the innovation concept and stage models of innovation. Then, it focused on the implementation stage and reviewed theoretical and empirical research relating to innovation implementation. Based on critical evaluation of the original model of implementation effectiveness (Klein et al., 2001), two studies were proposed. The first study will examine the full original model of implementation effectiveness using data gathered in. Second study aimed to enhance the original model of implementation effectiveness. Chapter 3 describes the construct operationalization, data collection and analysis methodology.

CHAPTER 3 : RESEARCH METHODOLOGY

This research adopts a positivist approach to the research question and uses a questionnaire consisting of items adapted from prior published research to gather data from respondents seen as appropriate informants of their firm's innovation implementation experience. The firms and their representatives were selected from contact lists of an Australian and a Thai organization specializing in assisting organizations to undertake innovations. Once the sample frame had been determined, a pilot questionnaire was developed and trialed before the final questionnaire was distributed.

3.1 Population and Sampling Frame

Population refers to the entire group of interest that the researcher wishes to investigate. All industrial firms implementing innovation are constituted the population of the current thesis. The sampling frame is a listing of all the elements in the population from which the sample drawn. The current thesis obtained the sampling frame of *QMI Solutions* and the *Thailand Productivity Institute (TPI)*. *QMI Solutions* are not-for-profit organization (partly government-funded), which are dedicated to helping industries adopt soft and hard technologies for organizational improvement. A unit within the Thailand Ministry of Industry, *TPI* promotes widespread usage of productivity concepts and techniques in pursuit of better economic performance. The list of potential Australian respondents included clients who contacted with *QMI Solutions* regarding new technologies and practices adoption and implementation in the past three years. Typical *QMI solutions'* products and services included enterprise resource planning, lean product development, and factory layout. The list of potential respondents from *TPI* included clients who contacted the

organization and attended seminars or received advice from *TPI* experts regarding performance improvement. The potential respondents contacted the industry partner regardless of whether or not they engaged in training, seminars, or help with innovation implementation. Furthermore, it was supplemented by an additional data source. *QMI Solutions* and *TPI* supplied the following information about each firm: (1) company name, address, and phone number; (2) industry type; and in some cases, (3) contact details of one or two senior managers. The names and contact details on the lists were checked via the internet or phone directories where possible to minimize misdirected contact attempts. Due to the nature of *QMI Solutions*' marketing, the Australian firms were based mainly in Queensland and Victoria, Australia. The Thai firms were based mainly in Bangkok and the surrounding suburban area.

Structural equation modeling (SEM) is required to have an adequate sample size to assess significance. Klein (2005) recommends 10 cases per an estimate path parameter. The current thesis proposed the models, which comprises five to nine parameters, for SEM investigation. Therefore, the current thesis is required at least 90 samples for the SEM analysis. A sample of 1,500 firms was randomly selected from the *QMI Solutions* and *TPI* databases (750 Australian and 750 Thai firms). Fowler (2002) mentioned that there is no agreed-upon standard for acceptable response rates. However, surveys that are distributed through the mail attain lower responses rate than those administered face-to-face. Generally, the mail surveys often report 5% to 20% response rate (Fowler, 2002). I expected 15% to 20% response rate from my mail surveys. Therefore, the sample of 750 firms from each country should be adequate for my final sample size.

Responses from 257 firms (17.72% response rate) were finally included in this thesis. Of the 257 firms, there were 135 Australian firms (18% response rate) and 122

Thai firms (16% response rate). An analysis of organizational characteristic data is discussed in chapter 4.

3.1.1 Participants

The unit of analysis in this research is the organization. The research participants were the key people who managed the implementation process: senior managers engaged in innovation projects. Because the current thesis focused on innovation implementation, only organizations that had experiences of innovation implementation were included into this thesis. I performed a manipulation check by asking question "Can you please identify the innovation that you have introduced in the last 3 years?" Many organizational studies have employed the three-year time frame asking questions retrospectively (e.g. Rosenberg & Jackman, 2003; Stephenson & Sage, 2007; Szulkin, 1999).

3.2 The survey instrument

As this research was part of Australian Research Council (ARC) industry linkage research project (LP 0455129: Organizational innovation adoption: The effect of external, technology diffusion agencies), there were a number of additional items included in the questionnaire that were constructed by other researchers to gather data designed to address other research questions. However, for the constructs of interest for this study, I began instrument development procedures by adapting established measures from previous studies (Ajzen, 1991; Klein et al., 2001; Nystrom et al., 2002; Totterdell, Leach, Birdi, Clegg, & Wall, 2002). The adaptation involved minor changes, as previously used instruments were developed for use within the innovation implementation process, but limited to a single innovation. For example, the original item was "this plant is strongly committed to the successful implementation of MRP

II". I changed into "In this organization, money has been readily available to support activities related to the implementation of innovation". After a preliminary instrument had been developed, it was reviewed with five academic experts and practitioners drawn from four different areas: innovation management, organizational psychology, industrial engineering, and industrial consultancy. After all items were endorsed, a pilot study was performed. Details of the pilot study will be described in a following section.

There are eight main constructs measured in this thesis. Five constructs (top management support, financial resources availability, implementation policies and practices, implementation climate and implementation effectiveness) are adapted from Klein et al.'s (2001) study. Three constructs are adapted from other studies, i.e. human resource availability (Nystrom et al., 2002), innovation effectiveness (Totterdell et al., 2002) and organizational attitude toward future innovation adoption (Ajzen, 1991). As I have noted earlier, my survey comprised part of the ARC industry linkage research project. There were 8 measured constructs from my thesis examination, and other extra 15 measured constructs from the main project. A lengthy questionnaire may possibly reduce the response rate, therefore ARC research project chief investigator recommended to minimize the length of the questionnaire. I attempted to maintain original items as many as possible, but I had to sacrifice some items to reduce the questionnaire length. After meeting with the ARC research project chief investigator and a senior research assistant, I agreed to exclude seven items from three batteries (the main project excluded considerable numbers of items as well. I did not have details here, as those constructs were not a part of my thesis). Finally, 44 items out from original 52 items were included to the current thesis (see Appendix A for a list of scales items).

The next section describes the measured construct information that used for this thesis. All scales were five-point Likert scale, unless otherwise stated.

Financial resources availability. This construct investigates financial resource allocation within the company. Four questions were selected from Klein et al.'s (2001) original seven items. Cronbach's alpha for the original battery was .93. Sample items were: "Money is readily available to pay for special projects in the organisation" and "This organisation can't afford to spend money on anything but essentials" (reverse scored).

Top management support. This construct examines the extent to which top management supports and commits to the implementation process. Three items were selected from the Klein et al.'s original six items. Cronbach's alpha for the original study was .93. The items were "Our organization is strongly committed to the successful implementation of innovation", "Innovation implementation is generally carefully planned and costed" and "Innovation implementation is always part of a long term strategic plan."

Implementation policies and practices. Eight questions were used to ask individuals to what extent their organization endorsed policies and practices such as training, rewards or incentives, innovation assistance, time for participating in innovation implementation, and communication about innovation implementation. Cronbach's alpha for the original study was .96.

Implementation climate. Three items explored shared perception of managerial expectations of the extent to which employees supported the implementation of innovation. Cronbach's alpha for the original study was .93. A sample item is an "Employees do not really care whether implementations succeed or fail".

Implementation effectiveness. This was defined as an organization's overall evaluation of the implementation process. Cronbach's alpha for the original study was .93. The questions were represented by four adjective pairs: many problems/few problems; employee resistance/employee acceptance; rough/smooth; and complicated/simple. This type of scale captures overall attitudes (Ajzen, 1985).

Innovation effectiveness. This indicates an organization's realization of the intended benefits of a given innovation. Sixteen items described the overall innovation benefits. Cronbach's alpha for the original study was .79. The innovation effectiveness measure evaluates improvements in various aspects, i.e. organizational finances (e.g. cost effectiveness and financial performance), customer issues (e.g. customer satisfaction and customer responsiveness), employee factors (e.g. management-employee relation and employee morale) and quality of life (e.g. health and safety).

A composite measure of overall innovation effectiveness was used in the analysis based on following justifications. First, Klein et al. (2001) examined innovation effectiveness in terms of overall benefits. Their study was not intended to compare and contrast the correlates of specific innovation benefits. Second, innovation effectiveness may be perceived as a cumulative benefit. This means that the more various benefits that are perceived, the stronger the overall indicator of innovation effectiveness.

Human resources availability. Two items were adapted from Nystrom et al's original four items. Cronbach's alpha for the original study was .73. The items included the availability of skilled labor resources and managerial talent. The other two original items, which were remove from this thesis, related to financial resources availability, and were similar to Klein et al.'s items as previously described.

Organizational Attitude toward future innovation adoption. Individuals were asked about their attitude toward innovation adoption in future. The scale was developed based on the theory of planned behavior (Ajzen, 1991). Questions were represented by five adjective pairs: dislike/like; a bad idea/a good idea; negative/positive; worthless/valuable; bad/good. Respondents were asked to rate their views on 7-point Likert scales (-3 to 3).

Organizational characteristics (Control variables). As noted earlier in chapter two, organizational characteristics such as size and industries influence innovation adoption (Damanpour, 1992, 1996). Although, the current thesis focuses on innovation implementation, I would like to ensure that the possible control variables are taken into account. To prevent potential confounding effects on dependent measures, the following organizational characteristics were utilized as statistical controls: company size (determined by employee numbers), and industry types. Due to the small numbers of respondents in each industry, industry type was categorized into the "manufacturing" and "non-manufacturing" sector.

3.3 Data Collection Procedure

This section describes two main processes that is a pilot study and data collection for two main studies. The collection of the data for both studies was incorporated in one survey, due to cost and logistic constraints.

3.3.1 Instrument development

In Australia, all measures were administered in English. For organizations in Thailand, the translation of the questionnaire into (official) Thai language was accomplished through a two-stage translation-back translation procedure. First, the author translated the questionnaire from English into Thai. The Thai version was then

back-translated into English by a bilingual volunteer, who was not aware of the purpose of the study. Following this, the original questionnaire was compared with the back-translated English version, and differences resolved through discussion (Goh, 2003). This process ensured an accurate translation of the original English language version of the questionnaire.

Once the questionnaires were finalized, they were further tested in a pilot study. Ten questionnaires (English version) were distributed to academic staffs with school of Management, Queensland University of Technology and school of Psychology, University of Queensland. This academic staffs were not aware of the aims of thesis. Other ten questionnaires (Thai version) were also distributed to academic staffs in Chulalongkorn University, Thailand. After completing their questionnaires, I discussed any part of the survey that they considered might be ambiguous or unclear. Overall, the pilot study respondents indicated that the questionnaires were clearly understandable, although some respondents were concerned about the length of the questionnaire, which included additional 15 constructs related to the broader ARC research project. After discussing this issue with my supervisors and the main ARC project research assistant, some items were removed or combined to minimize the questionnaire length. These altered items were not related to my research constructs, therefore all items and scales for the present study remained the same.

3.3.2 Data collection process in Australia and Thailand

Questionnaires were mailed either directly to Australian organizations, or to a collaborator in Thailand. The collaborator was fully instructed in procedures of administering the questionnaires and entering data. Accompanying each questionnaire was an information sheet explaining the purpose of the study, assuring anonymity, and giving instructions as to what to do with the survey when completed.

A consent form was attached, along with instructions, to inform participants of the nature of the study, and that their involvement was purely on a voluntary basis. Full confidentiality of participants' responses was also assured and approval of this study by the Queensland University of Technology Ethics Committee was obtained. A full copy of the survey package is reproduced in appendix B (English version) and C (Thai version). On the front of each survey pack was a four digit number. This identification number allowed for a follow up telephone call to be made three months later to companies who had not returned the survey. In the follow up telephone call, participants who had not responded were asked to mail back the survey. Alternatively, Australian participants were given the option of completing the same survey through a website (due to budget limitation as well as internet capability, the web-based survey option was not offered in Thailand). In some cases, participants requested a new survey pack, as theirs had been lost. There were initially 58 returned questionnaires from the Australian sample, and 69 from the Thailand sample. A telephone follow-up was performed with 560 Australian and 450 Thai organizations. An additional 77 returned questionnaires from the Australian sample and an additional 53 returned questionnaires from the Thai sample were the outcomes of this follow-up. The comparison of organizational size, revenue and industry sectors with the total population showed no differences. Consequently, no response bias was assumed. A total of 122 Thai organizations returned the paper-based questionnaires. In Australia, a total of 135 returned questionnaires responses were received (87 organizations completed the paper-based questionnaire, 17 organization participated via phone survey, and 31 organizations participated via the web-based survey). Council of Professional Associations on Federal Statistics (1999) suggested that incentives are one of the potential improvements for organizational survey. Many

social sciences, psychology, heath, and management research employed some forms of incentives to improve their response rate (Goh, 2003; Horvath & Andrews, 2007; Putnam & Fengyan, 2007). There was also general agreement that in most cases incentives should be considered as a tool only after other potential methods to improve response (e.g., well-designed questionnaires) have been exhausted. The current thesis has integrated a survey design and incentives methods for response rate improvement. The survey layout was designed for easy reading (e.g. 12-font size with reasonable white space) with colored glossy quality paper. All participants were rewarded, in the form of receiving a benchmarking report outlining recommendations arising from the research. Australian participants were also invited to attend a workshop on innovation performance measurement.

3.4 Summary

This chapter began by examining the scope of the population of interest and sample, followed with information relating to measures. The procedures of data collection in Australia and Thailand were clearly elaborated in this chapter. Next, chapter four describes data analysis procedures and results.

CHAPTER 4 : ANALYSIS OF DATA AND RESULTS

This thesis aims to enhance Klein et al.'s (2001) existing model of implementation effectiveness. This chapter supplies initial descriptive statistics of the two samples and examines the influence of industry and firm size on the eight main theory based constructs. To examine construct validity and reliability, it was necessary to develop the measurement model before using the outputs of the measurement model as inputs for the structural models used in study one and study two. Since analysis of the measurement model and the structural models uses goodness of fit measures, they are discussed in general terms before the measurement model is developed. Then I test the measurement model by using confirmatory factor analysis. The following sections describe how study one (examining Klein et al.'s (2001) original model of implementation effectiveness) and study two (examining the enhanced model of implementation effectiveness) are analyzed, then the results of each study is presented.

4.1 Organizational characteristics

Table 4-1 presents the organizational characteristics of respondents. The majority of the Australian organization sample (104 companies; 77%) had 100 employees or less, while the majority of the Thai sample (73 companies; 60%) employed more than 100 people. Seventy-three Australian respondents (54%) were in manufacturing, while the remainder (46%) was spread across other industries (e.g. construction, pharmaceuticals, and telecommunications). Fifty Thai organizations (49%) were in the manufactures, while the remainder (51%) was in other industries. The results also indicated that large portion of Australian (38%) and Thai (42%) organizations implemented product innovations more than process and management

innovations. Averagely, during 2004-2006 each Australian firm implemented three innovations while each Thai firm implemented two innovations.

Table 4-1: A summary of organizational characteristics

Variables	Scale	Australia	Thailand
Number of employees	100 or less	104	49
	More than 100	30	73
Industry types	Manufacturing	73	60
	Non-manufacturing	62	62
Innovation types	Product innovation	132	107
	Process innovation	100	58
	Management innovation	116	87

4.2 Descriptive analysis

4.2.1 Data screening

There were 15 missing values for the Australian data set and 18 missing values for the Thai data set. These missing valued appeared to be randomly spread. Missing data is a problem in multivariate data analyses, and several methods have been proposed for dealing with the issue. Little and Rubin (1987) and Rubin (1996) suggested that the multiple imputation process is superior to more traditional methods, such as a listwise or a pairwise deletion and mean substitution. A number of general reviews recommending multiple imputation have been published (Graham, Cumsille, & Elek-Fisk, 2003; Schafer & Olsen, 1998; Sinharay, Stern, & Russell, 2001). Therefore, this thesis employed the multiple imputations technique with the Expectation-Maximization (EM) algorithm in SPSS to estimate missing values. The EM procedure operates in two discrete steps. First, the expectation (E) step computes the expected value of the complete data log likelihood. Next, the maximization (M)

step substitutes the expected values for the missing data obtained from the E step and then maximizes the likelihood function as if no data were missing to obtain new parameter estimates. The procedure iterates through these two steps until a set level of convergence is obtained.

4.2.2 Normality and collinearity testing

After estimating the missing values, skewness and kurtosis testing was used to examine deviation of variables distributions from normality. One way of determining whether the degree of skewness and kurtosis are significantly non-normal is to compare the numerical value for skewness or kurtosis with twice the standard error of that value (2SE), and check the range from negative 2SE to positive 2SE (Field, 2005). If the values for skewness and kurtosis fall within this range, the normally assumption is considered to not be seriously violated. The results from this analysis (Table 4-2) indicated that there were no variables with extreme values. Although organizational attitude toward future innovation adoption construct had skewness and kurtosis more then 2SE in both samples, an inference test can be used as a general guideline. Tabacknick and Fidell (1996) recommended to look at the shape of the distribution as well. Examining the shape of distribution showed only minor deviations from normality; therefore, I decided not to perform any transformation.

Table 4-2: A summary of skewness, kurtosis, and its standard errors

	Control variables		Variables used in models							
Samples	IND	SIZ	TMS	FRA	IPP	IC	IME	INE	HRA	ATI
Australia										
Skewness	0.69	0.05	-0.20	-0.36	-0.06	-0.39	-0.27	-0.24	0.18	-1.49
Std. Error	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Kurtosis	-0.37	-0.33	0.54	-0.40	1.17	-0.07	0.17	0.06	-0.37	2.99
Std. Error	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
Thailand										
Skewness	0.37	-0.41	-0.20	-0.36	-0.39	-0.27	0.21	0.18	-0.20	-0.60
Std. Error	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Kurtosis	-1.89	-1.87	0.54	-0.40	-0.07	0.17	0.39	-0.37	-0.15	-0.28
Std. Error	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43

Key: IND-industry type, SIZ-organization size, TMS-top management support, FRA-financial resources availability, IC-implementation climate, IPP-implementation policies and practices, IME-implementation effectiveness, INE-innovation effectiveness, HRA-human resources availability, ATI-organizational attitude toward future innovation adoption

Tabachnick and Fidell (1996) commented that a correlation value exceed 0.85 is considered to be serious multicollinearity. The correlations matrix (see Table 4-3) had no bivariate correlations greater than 0.85, indicating there was no redundancy in the measures. A preliminary examination of correlations indicated that there were relationships among variables. The relationships among variables will be detailed in a later section.

Table 4-3: Correlation matrix, mean, and standard deviation among hypothesized variables

Country	Variables	Mean	SD	TMS	FRA	IPP	IC	IME	INE	HRA	ATI
Australia	TMS	4.00	0.72								
(n=135)	FRA	2.70	0.64	0.17*							
	IPP	3.51	0.72	0.55**	0.04						
	IC	4.14	0.83	0.36**	-0.01	0.36**					
	IME	3.36	0.57	0.28**	-0.04	0.21*	0.27**				
	INE	3.79	0.35	0.34**	-0.03	0.42**	0.18*	0.42**			
	HRA	2.91	1.00	0.40**	0.15*	0.40**	0.30**	0.22**	0.21*		
	ATI	2.25	0.81	0.19*	0.06	0.28**	0.14*	0.34**	0.43**	0.12*	
	SIZ			-0.13	0.06	0.00	-0.05	-0.08	-0.07	0.01	-0.01
	IND			0.03	-0.09	-0.03	-0.14	-0.11	0.07	-0.02	0.09
Thailand	TMS	3.13	0.63								
(n=122)	FRA	3.28	0.84	0.36**							
	IPP	3.45	0.76	0.51**	0.15						
	IC	2.99	0.84	0.40**	0.25**	0.31**					
	IME	3.27	0.93	0.14*	0.06	0.29**	0.33**				
	INE	3.78	0.37	0.20**	-0.06	0.26**	0.08	0.40**			
	HRA	2.67	0.83	0.42**	0.35*	0.22*	0.31**	0.37**	0.39**		
	ATI	1.61	0.97	0.24**	0.16*	0.27**	0.13*	0.35**	0.36*	0.13*	
	SIZ			0.15	0.13	0.11	0.15	-0.05	-0.03	0.16	0.06
	IND			-0.15	-0.07	-0.11	-0.01	0.01	-0.09	-0.01	-0.20

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

** Correlation is significant at the 0.01 level (2-tailed).

Key: TMS-top management support, FRA-financial resources availability, HRA-human resources availability, IC-implementation climate, IPP-implementation policies and practices, IME-implementation effectiveness, INE-innovation effectiveness, ATI-organizational attitude toward future innovation adoption, SIZ-organization size, IND-industry types.

4.2.3 Organizational size as a control variable

The Australian sample represented small sized companies, while Thai sample represented medium to larger sized companies. The correlation matrix (Table 4-3) showed that the company size did not relate significantly with most measured variables in each sample. However, given the different sample size, it was important to consider organizational size as a control variable in order to minimize a confound effect in the study. To reconfirm the bivariate correlation result, I split the total sample by company size (i.e. 100 employees or less and more than 100 employees). The results of bivariate correlation by company size (a complete correlation matrix is in appendix D) indicated that the pattern of relationship among variables was similar, except for implementation effectiveness and innovation effectiveness. This could mean that the company size has some effect on these two variables. Therefore, company size was included in the model testing as a control variable.

4.3 The use of goodness of fit measures as criteria for SEM

Goodness of fit measures is designed to indicate the general overall model fit with respect to the sample data and variances. In structural equation modeling, there is no single or omnibus goodness of fit measure. A number of such measures are calculated and reported as the each contribute analytical information and collectively provide insight into the overall fit of the model or facto solution to the analyzed data. In line with this practice, I report the following indices: relative chi-square (CMIN/DF), goodness-of-fit index (GFI), Bentler's comparative fit index (CFI) (Bentler, 1992), Tucker-Lewis Index (TLI) and the root mean squared error of approximation (RMSEA)

The simple fit index is called relative chi-square (CMIN/DF). CMIN/DF is the

minimum sample discrepancy divided by degrees of freedom. Values below 1.0 indicate an "overfitted" model and values larger than 2.0, or the more moderate limit of 5.0, indicate that the model does not fit observed data and requires improvement (Shumacker & Lomax, 1996). However, this index may be overly sensitive to sample size; therefore, other fit indices should be considered as well.

"The GFI can be loosely considered to be a measure of the proportion of variance and covariance that the proposed model is able to explain (similar to R^2 value from regression analysis)" (Raykov & Marcoulides, 2000, p.38). The CFI is a comparative index between the fit of the proposed model and a baseline model in which the observed variables are assumed to be uncorrelated with each other. The CFI value is between 0 and 1.00. GFI, and CFI values exceeding 0.90 indicate a good fit of the model to the data (Byrne, 1998; Kelloway, 1998). The Tucker-Lewis Index (TLI) is comparative index between proposed model and null model with a measure of parsimony. TLI values exceed 0.9 indicate a good fit of the model to the data (Byrne, 2001). RMSEA values below 0.05 indicate a very good fit to the data; however values below .08 are also considered adequate (Steiger, 1990).

Table 4-4 summarize the goodness of fit measures reported and lists their recommended acceptable ranges of cut off values.

Table 4-4: A summary of goodness of fit statistics criteria

Goodness of Fit Measure	*Explanation*	*Recommended Value*
CMIN/DF	The minimum sample discrepancy divided by degrees of freedom	Between 1 to 2
GFI	Goodness of fit index: it is a measure of overall degree of fit.	0.90 or more
CFI	Comparative fit index: compares the proposed model and a baseline model	0.90 or more
TLI	Tucker-Lewis index: comparative index between the proposed model and the null model with a measure of parsimony	0.90 or more
RMSEA	Root mean square error of approximation: tests how well the model would fit the population covariance matrix with unknown but optimally chosen parameter values	0.08 or less

4.4 Construct validity and reliability in measurement model

One of the eight theory based constructs used in the structural models, innovation effectiveness (which captures the various benefits accruing from successful innovation implementation) has four subscales (finance, customers, employees and quality of life). As noted in chapter 3, overall effectiveness of the innovation is an aggregate measure. Consequently, the sum of the 14 items measuring potential benefits was used to operationalize innovation effectiveness. The remaining seven main constructs, top management support (TMS-3 items), financial resources availability (FRA-3 items), implementation policies and practices (IPP-8 items), implementation climate (IC-3 items), implementation effectiveness (IME-4 items), innovation effectiveness (INE-16 items), human resources availability (HRA-2 items) and organizational attitude toward innovation adoption (ATI-5 items), were personalized using confirmatory factor analysis (CFA). Figure 4.1 depicts the CFA structure used to convert observed variable values into measures of the seven theory-based constructs.

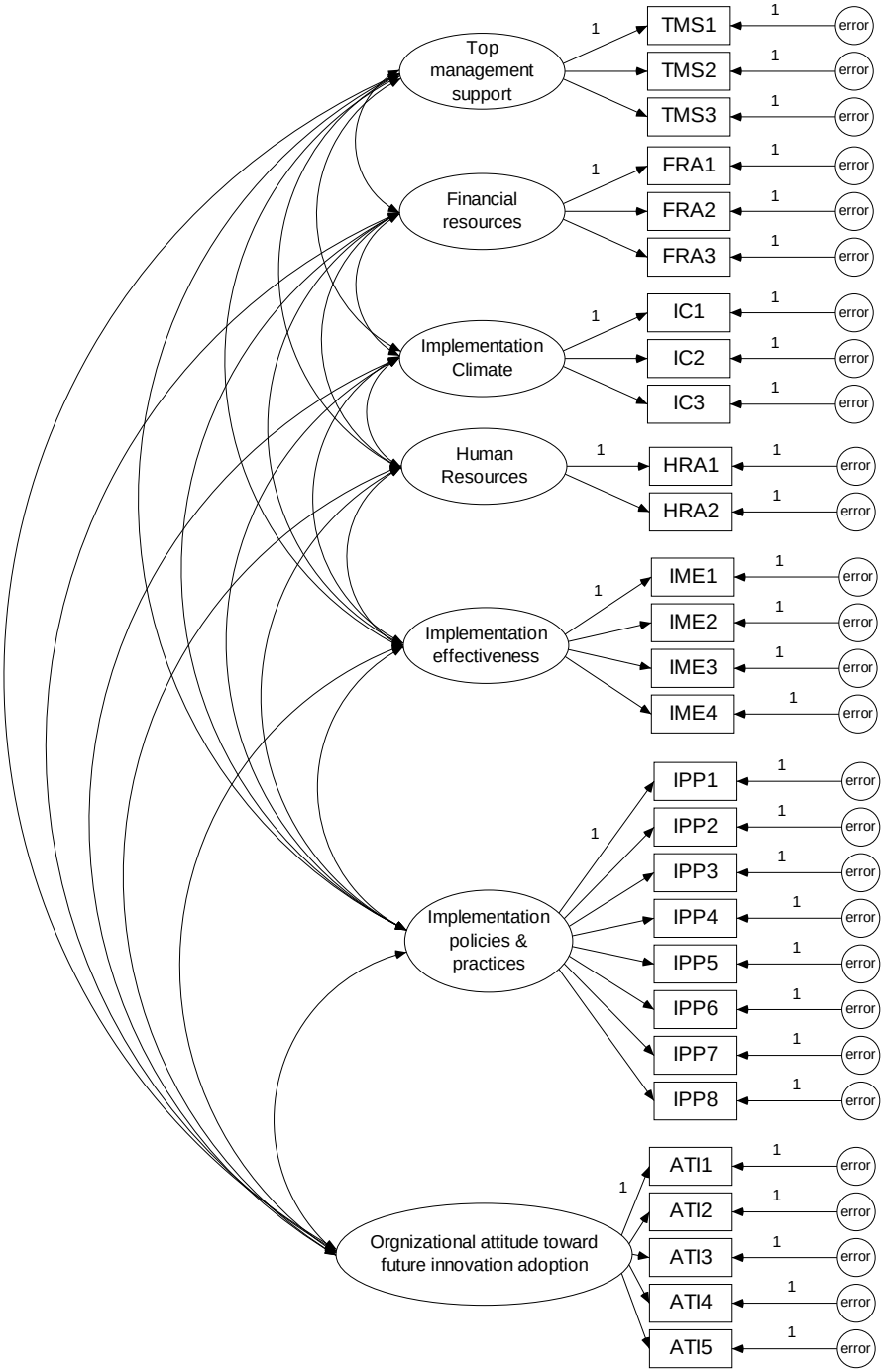

Figure 4-1: Overall CFA model of seven constructs

I performed a first-order CFA using Analysis of Moment Structures (AMOS) version 7.0 (Arbuckle, 2006). CFA used patterns in correlations or covariance matrices to assign weights to values of observed variables. Mathematically, the minimal number of observed variables required to perform a CFA is three. However, the models with factors that have only two indicators are more prone to estimation problem, especially when the sample size is small (Klein & Knights, 2005). The human resources availability construct had only two measurement items so it was necessary to perform an overall CFA model for seven constructs together. Construct validity in CFA is examined by testing hypothesized relations between observed and latent variables (Hoyle & Smith, 1994). This approach tests both discriminant validity (the measures of each concept should different from the other concepts) and convergent validity (the correlation among items, which make up the scale) simultaneously.

A multiple group invariance test was used to determine if the same measurement model applied to the two national samples. This test examines measurement invariance by comparing CFA models with factor loadings constrained to be equal with CFA models where factor loadings are unconstrained. If the goodness of fit indices for the models are statistically similar the measurement model applies to both samples. I then computed the average variance extracted, internal consistency using Cronbach's alpha as well as a zero-order correlation across samples.

4.5 Results of confirmatory factor analysis

The goodness of fit statistics indicated that the CFA model represented a poor fit to the Australian [$\chi^2(303) = 530.55$, $p < .05$, GFI = 0.77, CFI = 0.88, TLI = 0.86, RMSEA = 0.08] and Thai [$\chi^2(303) = 578.58$, $p < .05$, GFI = 0.75, CFI = 0.85, TLI = 0.83, RMSEA = 0.09] data. Table 4-5 lists these indices and recommended cut off

vales for each indices. Overall, the output of this first CFA model suggested that there were possible areas of misfit. To identify the problematic areas, I examined the modification indexes (MIs), which revealed three parameters indicative of cross-loadings. First, apart from the hypothesized factor loading on financial resources availability, the item "This organization can't afford to spend money on anything but the essentials" cross-loaded on implementation effectiveness with a MI value of 19.11. Second, apart from the hypothesized factor loading on implementation policies and practices, the item "Employees are well informed about the strategic reasons behind the implementation of innovations" cross-loaded on implementation effectiveness construct with a MI value of 15.28. Third, apart from the hypothesized factor loading on implementation policies and practices, the item "Most employees have been so busy that they have very little time to devote to the implementation of innovation" cross-loaded on organizational attitude toward future innovation adoption with a MI value of 18.84. Additionally, these three items did not have substantial loadings on the factors to which they were originally assigned.

The information related both to model fit and possible misspecification of models, led me to conclude that those three problematic items were inappropriate for use with my samples. Therefore, I decided to respecify the model by removing the three problematic items from the original 28 items. The goodness of fit statistics indicated that the respecified CFA model represented an adequate fit to both the Australian [$\chi^2(231) = 399.74$, $p < .05$, GFI = 0.89, CFI = 0.91, TLI = 0.90, RMSEA = 0.07] and Thai [$\chi^2(231) = 394.80$, $p < .05$, GFI = 0.89, CFI = 0.90, TLI = 0.90, RMSEA = 0.08] data. Table 4-5 compares the CFA results before and after removing the three problematic items. Chi square comparison between CFA models before and after removing the three items indicated significant value in both samples, which

meant the measurement model after removing the three items was better than the original measurement model.

Table 4-5: CFA results before (model 1) and after (model 2) removing the three problematic items

Goodness of Fit Measure	***Australia***		***Thailand***		***Recommended Value***
	CFA model 1	**CFA model 2**	**CFA model 1**	**CFA model 2**	
Chi Square	530.55	399.74	578.58	399.74	
(df)	(303)	(231)	(303)	(231)	
GFI	0.77	0.89	0.75	0.89	0.90 or more
RMSEA	0.08	0.07	0.09	0.07	0.08 or less
TLI	0.86	0.90	0.83	0.90	0.90 or more
CFI	0.88	0.91	0.85	0.90	0.90 or more

Fornell and Larcker (1981) consider a construct to display convergent validity if average variance extracted (AVE) is at least .50. AVE is calculated as the sum of the squared standardized indicator item loadings on the factor representing the construct, divided by this sum plus the sum of indicator item error. Table 4-6 displays the AVE of each construct and factor score weights.

Table 4-6: Average variance extracted (AVE) and factor score weights for Australian and Thai samples

Studied constructs	*Australia*		*Thailand*	
	Factor score weight	**AVE**	**Factor score weight**	**AVE**
Top management support		0.83		0.79
TMS1	0.80		0.64	
TMS2	0.68		0.76	
TMS3	0.68		0.43	
Financial resources availability		0.79		0.80
FRA1	0.70		0.91	
FRA2	0.73		0.74	
Implementation policies and practices		0.71		0.78
IPP1	0.46		0.71	
IPP2	0.45		0.71	
IPP3	0.73		0.69	
IPP4	0.60		0.71	
IPP5	0.85		0.81	
IPP6	0.85		0.66	
Implementation climate		0.85		0.93
IC1	0.76		0.86	
IC2	0.76		0.86	
IC3	0.82		0.85	
Implementation effectiveness		0.87		0.84
IME1	0.71		0.82	
IME2	0.49		0.84	
IME3	0.73		0.74	
IME4	0.80		0.70	
Human resources availability		0.79		0.74
HRA1	0.78		0.48	
HRA2	0.83		0.60	
Organizational attitude toward future innovation adoption		0.94		0.91
ATI1	0.89		0.83	
ATI2	0.93		0.91	
ATI3	0.95		0.90	
ATI4	0.92		0.90	
ATI5	0.91		0.87	

4.5.1 Results of measurement model invariance test

The next step was to examine if the respecified model was equally reliable in both the Australian and Thai samples. To perform the multi group invariance test , I set individual parameters to be equally constrained across the two samples. A comparison between unconstrained [$\chi^2(462) = 794.55$, $p < .05$] and constrained [$\chi^2(486) = 861.75$, $p < .05$] models indicated a significant difference [$\chi^2_{different}$ (24) = 67.20, $p < .05$]. This result revealed that the full metric invariance model was not applicable for Australian and Thai datasets. Provided with this information, I performed all subsequent tests to identify the location of this noninvariance. This procedure is also called partial measurement invariance test (Klein, 2005). Ideally, testing of invariance requires identical full metric invariance patterns across different groups. However, more quantitative comparisons now consider a partial metric invariance as a reasonable practice (Labouvie & Ruetsch, 1995; Widaman, 1995). Partial invariance testing involves freeing one parameter at a time and using chi-square changes to locate subscales that are invariant across the samples. This process is continued until all targeted indicators have been tested. I report only parameters that indicated significant different chi-square values (Table 4-7).

The freed parameters were (A) between an item "This organization experiences [$_{\text{few}}$ 1 2 3 4 5$_{\text{many}]}$ problems with innovation implementation over past 3 years" (IMP3) and implementation effectiveness factor [$\chi^2(23) = 57.11$, $p < .05$]; (B) between an item "Innovation is always part of a long term strategic plan in our organization" (TMS2) and top management support factor [$\chi^2(22) = 48.76$, $p < .05$]; (C) between an item "This organization experiences [$_{\text{rough}}$ 1 2 3 4 5$_{\text{smooth}]}$ processes with innovation implementation over past 3 years" (IMP2) and implementation effectiveness factor [$\chi^2(21) = 40.59$, $p < .05$]; (D) between an item "Introducing

innovation into this organization would be [$_{\text{worthless}}$ -3-2 -1 0 1 2 3$_{\text{valuable}}$]" (ATI2) and organizational attitude toward future innovation adoption factor [$\chi^2(20) = 32.79$, $p <$ .05]; and (E) between an item "Our organisation has provided someone to help when employees get stuck on a problem while using an adopted innovation"(IPP5) and implementation policies and practices [$\chi^2(19) = 29.31$, *ns*]. Consistent with the partial metric invariant result, five items were noninvariant across the groups. As discussed earlier, the partial metric invariance is reasonable practice. It can be concluded that the measurements used in this thesis were valid and reliable. Therefore, I decided to use this measurement model for testing the structural models in the later section.

Table 4-7: A test of partial measurement invariance of overall CFA model

Models	Chi-square (df)	P	CFI	TLI	RMSEA	Chi-square differences
1.Unconstrained model	67.20(24)	.00	.90	.90	.05	--
2.Freed one parameter (IMP3)	57.11(23)	.00	.90	.90	.05	10.09**
3.Freed two parameters (IMP3, TMS2)	48.76(22)	.00	.89	.88	.05	18.44**
4.Freed three parameters (IMP3, TMS2, IMP2)	40.59(21)	.00	.90	.88	.05	26.61**
5.Freed four parameters (IMP3, TMS2, IMP2, ATI2)	32.79(20)	.04	.90	.88	.05	34.41**
6.Freed five parameters (IMP3, TMS2, IMP2, ATI2, IPP5)	29.31(19)	.06	.90	.90	.05	37.89**

4.5.2 Construct reliability of composite measurements

Next, I examined internal consistency of the composite measures (Cronbach's Alpha). It is widely suggested that the alpha coefficient of .70 is a minimum acceptable threshold (Nunnally & Bernstein, 1998). Table 4-8 shows that all measured constructs achieved a good reliability across two samples. Due to the partial invariant measurement, the composite reliabilities between two samples were

not identical. However, the differences among the reliability values were relatively small.

Table 4-8: Composite reliability and standard error for each construct

Measures / Country	Australia Reliability (Standard error)	Thailand Reliability (Standard error)
Top management support	.77 (.12)	.70 (.15)
Financial resources availability	.76 (.17)	.71 (.20)
Implementation policies & practices	.81 (.11)	.82 (.10)
Implementation climate	.92 (07)	.90 (.07)
Implementation effectiveness	.74 (.08)	.83 (.15)
Innovation effectiveness	.85 (.02)	.86 (.02)
Human resources availability	.73 (.27)	.79 (.27)
Organizational attitude toward future innovation adoption	.96 (.03)	.94 (.06)

4.6 Analysis Procedures for study one and two

As noted earlier, the first tests the full original model of implementation effectiveness and study two tests an enhanced model of implementation effectiveness. To assess these models, I performed path analyses with latent variables using a single indicator. The path analysis with latent variables is known as structural equation modeling. I used this technique to examine dependence relationships among eight latent variables.

Due to the sample size, it was necessary to reduce a model complexity (number of parameters); therefore, I used a composite score for each construct. Each latent variable has only one observed indicator associated with it. For example, Figure 4-2 shows that measurement of top management support (the "observed" variable) is an indicator of TMS (the "latent" variable in the structural model). The arrow goes from the latent variable to the indicator, showing that the indictor is caused by the latent variable. The observed variable also contains some measurement error (as indicated

by etms). A commonly used method to calculate this error term is (1 – Reliability of the variable A) multiply by variance of the variable A (Byrne, 2001).

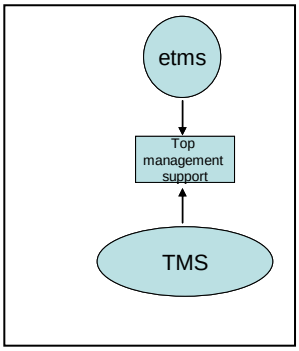

Figure 4-2: An example of single indicator of latent variable

4.7 Results of study one

Study one aims to examine the original model of implementation effectiveness. As noted earlier in this chapter, organization size had the potential to influence the relationship between implementation effectiveness and overall innovation effectiveness. Therefore, it is adding to the original model as a control variable. Goodness of fit results indicated that the original model of implementation effectiveness represented a poor fit to the Australian [$\chi^2(13) = 31.73$, $p < .05$] and Thai [$\chi^2(13) = 41.09$, $p < .05$] data (see Table 4-9 fro the remaining indices). Although the GFI values indicated an adequate fit among two samples, GFI I sensitive to sample size (Fan, Thompson, & Wang, 1999). CFI, TLI and RMSEA values all indicated a poor fit to the datasets. Thus, it was apparent that there were possible areas of misfit. To identify the problematic areas, I examined the MIs. The maximum MI was associated with the path from top management support to implementation climate. The value of 15.65 indicated that freeing this parameter would reduce a chi-square value by at least 15.65. This path between top management support and implementation climate was also in Klein et al.'s (2001) final model. Therefore I adapted the path between top management support and

implementation climate into the model. Subsequently, I reexamined the original model with the additional path (see Figure 4-3) across two samples.

Table 4-9: Goodness of fit results of the original model examination between Australian and Thai samples

Goodness of Fit Measure	*Australia*	*Thailand*	*Recommended Value*
CMIN/DF	2.44	3.16	Between 1 to 2
GFI	0.94	0.91	0.90 or more
RMSEA	0.10	0.13	0.08 or less
TLI	0.74	0.56	0.90 or more
CFI	0.84	0.72	0.90 or more

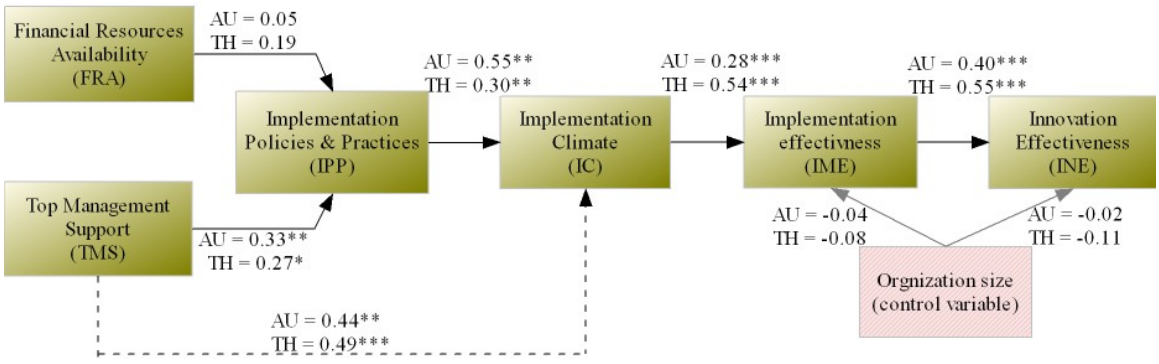

Figure 4-3: The original model of implementation effectiveness with the additional path from TMS to IC

Path loadings shown in Figure 4-3 indicate positive relationships among variables (TMS to IPP; IPP to IC; IC to IME, and IME to INE). The hypothesized relationship between financial resources availability and implementation policies and practices is insignificant. Further, organization size (the control variable) did not significantly relate to implementation effectiveness. Lastly, there is an insignificant relationship between organization size and innovation effectiveness as well. Further, the additional path from top management to implementation climate was significant across Australian and Thai samples. Table 4-10 displays summarized findings of the

first study (testing the full original model of implementation effectiveness).

Table 4-10: Summarized findings of Study one (testing the full original model of implementation effectiveness

Hypothesized relationships	*Australia*	***Thailand***
1. Financial resources availability influences implementation policies and practices	Not found	Not found
2. Top management support influences implementation policies and practices	Yes	Yes
3. Implementation policies and practices influences implementation climate	Yes	Yes
4. Implementation climate influences implementation effectiveness	Yes	Yes
5. Implementation effectiveness influences innovation effectiveness	Yes	Yes
An additional emerged path	Top management support influences implementation climate	

Results from Table 4-11 indicate that the original model with the additional path (TMS to IC) represents a marginal fit to the Australian [$\chi^2(12) = 24.03, p < .05$] and Thai [$\chi^2(12) = 23.89, p < .05$] data. Although the TLI values of both samples are low, it is close to the minimum desired value of 0.90. In both samples, the chi-square comparison identifies a significant difference between the original model and the original model with the additional path [Australia: $\chi^2_{different}(1) = 7.70, p < .05$; Thailand: $\chi^2_{different}(1) = 17.20, p < .05$], indicating the original model with the additional path (TMS to IC) improved the model fit in both the Australian and Thai samples. However, RMSEA value from Thai sample was above the desired value. In Australian sample, RMSEA value represented mediocre model fit. RMSEA is a widely used index among SEM analysts. It measures the average contribution of each model restriction to the weighted sum of discrepancies between the empirical and the model-implied covariance matrices (Nasser & Wisenbaker, 2003). In other words, RMSEA is a significant index of "badness of fit" (Browne & Cudeck, 1993) and the poor RMSEA results suggest the model should be rejected.

Table 4-11: Goodness of fit results of the original model (with the additional path from TMS to IC) examination between Australian and Thai samples

Goodness of Fit Measure	*Australia*	*Thailand*	*Recommended Value*
CMIN/DF	2.00	1.99	Between 1 to 2
GFI	0.95	0.95	0.90 or more
CFI	0.90	0.90	0.90 or more
TLI	0.89	0.87	0.90 or more
RMSEA	0.08	0.09	0.08 or less

The analyses suggest that although study one provides only marginal support for Klein et al's (2001) original model of implementation effectiveness, it strongly points to an intention between top management support and implementation climate. As a result, the relationship between top management support and implementation climate was added to the extended model of implementation effectiveness for an examination in study two. The following section will discuss results of the extended model of implementation effectiveness and consider, amongst other things, whether the extended model enhances Klein et al.'s (2001) original model.

4.8 Results of study two

Study two examines the extended model of implementation effectiveness, which included human resources availability and organizational attitude toward future innovation adoption. Figure 4-4 shows the revision of the extended model of implementation effectiveness based on the finding of study one.

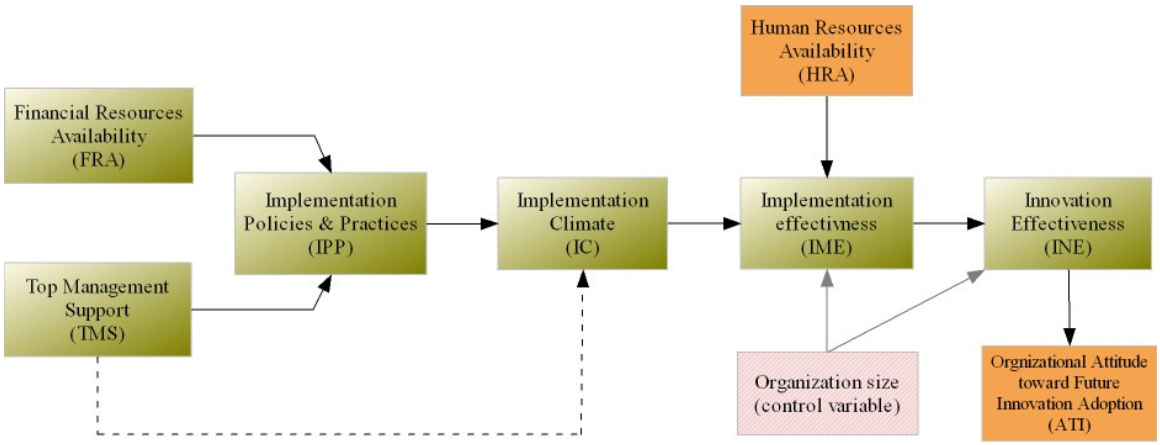

Figure 4-4: A revision of the extended model of implementation effectiveness

Results in Table 4-12 indicate that the proposed model represents an adequate fit to the Australian sample [$\chi^2(23) = 38.77$, $p < .05$]. Although the relative fit index (TLI) is under the acceptable value, it is very close to the desired value. Theoretically, a model chi-square value should not be significant if there is a good model fit. The *p*-value was close to 0.02, therefore the model chi-square was quite significant. However, using only the chi-square model value alone is not recommended (Byrne, 2001): other goodness of fit statistics should be considered. The overall goodness of fit (GFI), the comparative fit (CFI) and parsimonious fit (RMSEA) values of Australian sample all suggest the model is sound. An additional consideration is the improvement of the CFI and RMSEA values obtained in study one.

Table 4-12: Comparative results of the Goodness of fit measures between the original model and extended model for Australian sample

Goodness of Fit Measure	*The original model **	*The extended model*	*Recommended Value*
CMIN/DF	2.00	1.68	Between 1 to 2
GFI	0.95	0.95	0.90 or more
TLI	0.89	0.89	0.90 or more
CFI	0.90	0.93	0.90 or more
RMSEA	0.08	0.07	0.08 or less

*with the additional path from top management support to implementation climate

Similarly, the goodness of fit statistics within the Thai sample showed a very good model fit [$\chi^2(23) = 34.75$, *ns*, GFI = 0.94, CFI = 0.92, TLI = 0.93, RMSEA = 0.06]. Table 4-13 showed the overall fit measures achieved the desired values. Again, the relative fit value (TLI) and the parsimonious fit value (RMSEA) were considerably better than obtained in study one, which points to the conclusion that adding the extra variables increases the model specification.

Table 4-13: Comparative results of the Goodness of fit measures between the original model and extended model for Thai sample

Goodness of Fit Measure	*The original model **	*The extended model*	*Recommended Value*
CMIN/DF	1.99	1.51	Between 1 to 2
GFI	0.95	0.95	0.90 or more
TLI	0.87	0.93	0.90 or more
CFI	0.90	0.92	0.90 or more
RMSEA	0.09	0.06	0.08 or less

* with the additional path from top management support to implementation climate

The examination of the extended model using the Australian and Thai samples separately provides information on a baseline model for both samples. The next step examines the extended model of implementation effectiveness across Australian and Thai samples simultaneously. The aim of this examination is to determine whether

the model was equally applicable to both groups. I performed a multi group test by constraining each parameter in the baseline model to be equal across the two samples. The unconstrained [$\chi^2(46) = 143.11$, $p < .05$] and constrained [$\chi^2(56) = 254.98$, $p < .05$] models were significant difference [$\chi^2_{different}$ (10) = 118.87, $p < .05$], which suggests examination of different models for Australian and Thai samples. To identify the areas of differences, I reviewed the MIs for each sample.

4.8.1 Post hoc development the extended model of implementation effectiveness

The maximum MI within the Australian sample was associated with a path from top management support to overall innovation effectiveness and indicated that if this parameter were to be freely estimated, the overall chi-square value would drop by about 4.47. The goodness of fit statistics results from the extended model in the Thai sample and a lack of large potential chi-square changes in the MIs suggested the extended model did not need modification. Given the minimum goodness of fit statistics from Australian model, I added a path from top management support to overall innovation effectiveness into the extended model for a re-examination.

The goodness of fit statistics showed that the revision of the extended model in the Australian sample improved model fit [$\chi^2(22) = 33.52$, *ns*, GFI = 0.95, CFI = 0.95, TLI = 0.92, RMSEA = 0.06]. The model chi-square and overall fit values showed a significant improvement from previous model [$\chi^2(23) = 38.77$, $p < .05$, GFI = 0.95, CFI = 0.93, TLI = 0.89, RMSEA = 0.07]. Therefore, I decided to keep the path from top management support to overall innovation effectiveness in the extended implementation effectiveness model for the Australian sample. Figures 4-5a and 4-5b show the final extended model of implementation effectiveness that derived from Australian and Thai samples. Overall, the models from Australia and Thailand were

similar, except for the additional path between top management support and innovation effectiveness, which occurred only in the Australian sample. These similarities and the one point of difference will be discussed in the next chapter. Details of path loading and hypothesis testing will be discussed in a later section.

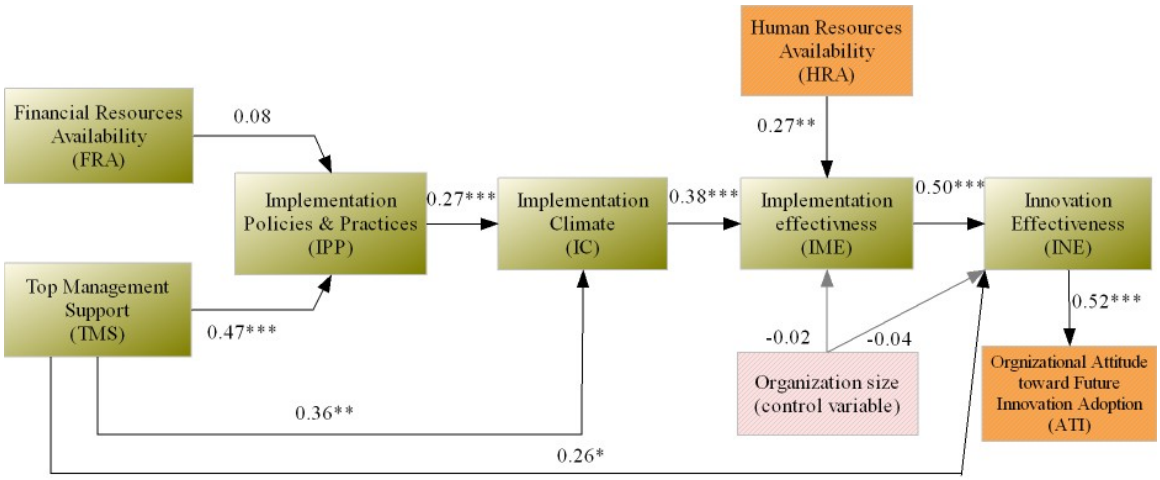

Figure 4-5a: A final extended model of implementation effective for Australian sample

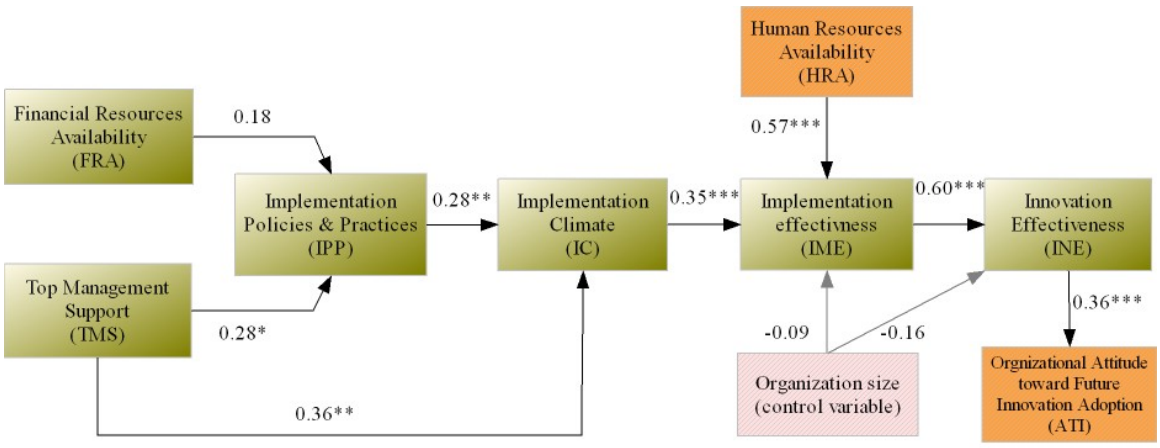

Figure 4-6b: A final extended model of implementation effective for Thai sample

To confirm that the final models were fully mediated, I compared a rival model (each construct had a path to every other construct in the model) to the final extended models from Figures 4-5a and 4-5b. If the final extended models are fully mediated, the rival model's chi-square should not be significantly different from the extended models' chi-squares. If a significant difference in chi-square occurs, the alternative model should be examined.

Comparisons between the rival non-mediated model [$\chi^2(9) = 11.51$, *ns*] and the Australian [$\chi^2(22) = 33.52$, *ns*] and Thai models [$\chi^2(23) = 34.75$, *ns*] indicated no significant differences [Australian$\chi^2_{different}$ (13) = 21.93, *ns*; Thai$\chi^2_{different}$ (14) = 23.25, *ns*]. Given these results, the final model for Australian and Thai samples remained as in Figure 4-5a and 4-5b. Having validated the models, the next step was to determine the significance of direct and indirect effects among variables in the final models. The aim of examining direct and indirect effects was to test the hypothesized relationships among variables.

4.8.2 Hypotheses assessments

In this section, I test my hypotheses via direct and indirect effects examination. Although, the current thesis hypothesized direct relationships among variables, the extended model of implementation effectiveness implied the mediation effects. Mediation is the influence of a third variable on a relationship "which represents the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" (Baron & Kenny, 1986). Ideally, the Sobel test is used to determine the direct and indirect effects in the meditated model. However, the Sobel test is very sensitive to sample size and works best in a large sample (Preacher & Hayes, 2004). Alternatively, AMOS 7.0 offers the estimation of direct, and indirect effects through the bootstrap procedure. The bootstrap technique

allows researchers to determine the stability of parameter estimates with a greater degree of accuracy (Byrne, 2001). The bootstrap technique can be used with a moderate sample size (Yung & Bentler, 1996); and was appropriate to use in this instant. Consistent with Efron and Tobshirani's (1993) recommendations, I constructed 95% confidence intervals (CIs) on the basis of 10,000 bootstrap estimates. The bootstrap procedure illustrated the significance of direct and indirect effects among variables as shown in Table 4-14. If both direct and indirect effects have significant values, a partial mediation occurs. If the direct effect value is not significant but the indirect effect value is significant, a full mediation occurs.

Table 4-14: Direct and indirect effects in Australian and Thai samples

Direct effect	*Countries*	*Indirect effect*	*Countries*	***Remarks***
FRA→ IC	AU = 0.02 TH = 0.09	FRA→ IPP → IC	AU = 0.35* TH = 0.46**	IPP did not mediate between FRA and IC (because FRA did not significant relate to IPP)
TMS → IC	AU = 0.36** TH = 0.36**	TMS→ IPP → IC	AU = 0.74*** TH = 0.56***	IPP partial mediated between TMS and IC
IPP → IME	AU = 0.04 TH = 0.12	IPP → IC → IME	AU = 0.65*** TH = 0.63***	IC full mediated between IPP and IME
IC → INE	AU = 0.13 TH = 0.12	IC → IME → INE	AU = 0.88*** TH = 0.95***	IME full mediated IC and INE
HRA → INE	AU = 0.16 TH = 0.19	HRA → IME → INE	AU = 0.77*** TH = 1.17***	IME full mediated HRA and INE
IME → ATI	AU = 0.14 TH = 0.12	IME → INE → ATI	AU = 1.02*** TH = 0.96***	INE fully mediated IME and ATI

The results of direct and indirect effects analysis through the bootstrap procedure confirmed mediation effects for implementation climate, implementation effectiveness and innovation effectiveness. Furthermore, the results supported significant relationships among most variables (see Table 4-15 for a summary). Firstly, (H1) financial resources availability did not significantly influence implementation policies and practices in both samples (Australian sample: β = 0.06, *ns*; Thai sample: β = 0.18, *ns*). As hypothesized in H2, top management support significantly and positively influenced implementation policies and practices (Australian sample: β = 0.47, $p < .05$; Thai sample: β = 0.28, $p < .05$). Likewise, for H3 implementation policies and practices significantly and positively affected implementation climate (Australian sample: β = 0.27, $p < .05$; Thai sample: β = 0.28, $p < .05$). Similarly, for H4 implementation climate also significantly and positively influenced implementation effectiveness (Australian sample: β = 0.38, $p < .05$; Thai sample: β = 0.35, $p < .05$). Moreover, for H5 implementation effectiveness was also significantly and positively affected by human resources availability (Australian sample: β = 0.27, $p < .05$; Thai sample: β = 0.57, $p < .05$). In addition, for H6 implementation effectiveness significantly and positively influenced overall innovation effectiveness (Australian sample: β = 0.50, $p < .05$; Thai sample: β = 0.60, $p < .05$). Finally, for H7 organizational attitude toward future innovation adoption was significantly and positively effected by overall innovation effectiveness (Australian sample: β = 0.52, $p < .05$; Thai sample: β = 0.36, $p < .05$).

Besides my hypotheses, there were two additional relationships that emerged. Firstly, a significant and positive relationship between top management support and implementation climate (Australian sample: β = 0.36, $p < .05$; Thai sample: β = 0.49, $p < .05$). This relationship was consistent with Klein et al.'s (2001) findings.

Secondly, a significant and positive relationship between top management support and overall innovation effectiveness emerged within Australian sample ($\beta = 0.26$, $p < .05$). Potential explanations and implications of these emerging paths are discussed in the next chapter.

Table 4-15: A summary of hypotheses testing based on the final extended model of implementation effectiveness

Hypotheses	*Australia*	*Thailand*
1. Financial resources availability influences implementation policies and practices	Did not support hypothesis	Did not support hypothesis
2. Top management support influences implementation policies and practices	Supported hypothesis	Supported hypothesis
3. Implementation policies and practices influences implementation climate	Supported hypothesis	Supported hypothesis
4. Implementation climate influences implementation effectiveness	Supported hypothesis	Supported hypothesis
5. Human resources availability influences implementation effectiveness	Supported hypothesis	Supported hypothesis
6. Implementation effectiveness influences innovation effectiveness	Supported hypothesis	Supported hypothesis
7. Overall innovation effectiveness influences organizational attitude toward future innovation adoption	Supported hypothesis	Supported hypothesis
8. The proposed extended model of implementation effectiveness can generalize across Australian and Thai samples.	Not fully supported, an additional path between top management support and innovation effectiveness has emerged from this study	

4.9 Summary

This chapter presented the results of data analyses. The results from construct testing demonstrated the validation and reliability of the measurements used in this thesis. Although the results from study one did not support the original model of implementation effectiveness, it drew attention to the relationship between top management support and implementation climate. Finally, the results from study two confirmed that the extended model had improved the original model of implementation effectiveness. Furthermore, the results indicated there was a significant relationship between top management support and innovation effectiveness emerging within Australian sample. The next and final chapter develops some interpretations of the findings and considers the implications arising from the research.

CHAPTER 5 : DISCUSSION AND CONCLUSION

Although Klein et al.'s (2001) model has received considerable attention in academic circles no one has re-examined the full original model of implementation effectiveness. This thesis is the first to replicate Klein et al.'s (2001) original model and develops a new extended model of implementation effectiveness.

This chapter interprets the results of both studies. I consider the similarities and differences between study one's results and Klein et al.'s original model. Next, this chapter turns to study two's results and discusses the generalizability of the extended model of implementation effectiveness across Australia and Thailand. Further, it suggests possible explanations of differences between the final models for the Australia and Thailand samples. This chapter also discusses limitations of the study and makes some recommendations for future research directions. Lastly, the chapter identifies the contributions of the thesis in terms of the theoretical and practical implications for research scholars and practitioners.

5.1 Replication of Klein et al.'s (2001) original model of implementation effectiveness

The original model assumed that organizational differences in innovation effectiveness are related to implementation effectiveness and that implementation effectiveness, in turn, is related to top management support, financial resources availability, implementation policies and practices, and implementation climate. Figure 5-1 summarizes the results of the replication Klein et al.'s (2001) original model. Most of Klein et al.'s hypothesized relationships were found in the Australian and Thai samples, with the exception of the relationship between financial resources availability (FRA) and implementation policies and practices (IPP). Furthermore, the relationship between top

management support (TMS) and implementation climate (IC) emerged in this thesis and in Klein et al.'s (2001) final model. The following sections discuss each hypothesis in detail.

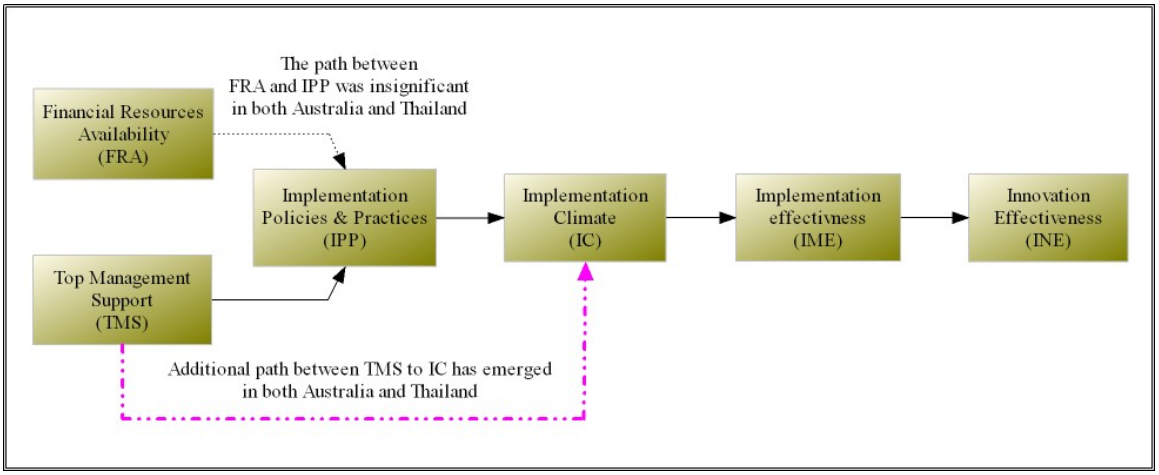

Figure 5-1: A summary of the results of the replication of Klein et al.'s(2001) original model of implementation effectiveness

5.1.1 Top management support (TMS) → implementation policies and practices (IPP)

This results show that TMS influences IPP positively: the more that senior management realize the importance of implementing the innovation, the more they introduce implementation-related polices and practices. Previous studies' results generally support this finding (e.g., Guido, et al., 2007; Nigel, et al., 2005) and indeed Klein et al. (2001) hypothesized this relationship. Nevertheless, this finding is particularly interesting, as Klein and her colleagues (2001) did *not* find a significant path between TMS and IPP. Their bivariate correlations indicated a moderate relationship between TMS and IPP ($r = .31$, $p < .05$), but the path was not significant in their final model. Further, their bivariate correlations between TMS and implementation climate (IC) ($r = .55$, $p < .001$) showed a stronger relationship than between TMS and IPP. Given their correlation results, it is not surprising that Klein et al.'s (2001) preliminary model

test using regression analysis did not find significant path between TMS and IPP. Regression is best when the IV is strongly correlated with the DV but uncorrelated with other IVs (1996). Klein et al.'s (2001) study also showed a high correlation between TMS and financial resources availability (FRA) (r = .52, p < .001). Further, there was also a high correlation between FRA and IPP (r = .42, p < .01). This raises a possibility that FRA takes power from TMS in explaining the relationship with IPP. As a result, Klein et al. (2001) found a significant relationship between FRA and IPP, but not between TMS and IPP. On the other hand, this thesis showed a weak to moderate relationship between TMS and FRA ($r_{Australia}$ = .17, p < .05; $r_{Thailand}$ = .36, p < .01). However, this thesis indicated a non-significant relationship between FRA and IPP ($r_{Australia}$ = ..04, *ns*; $r_{Thailand}$ = .15, *ns*). Therefore, FRA did not affect the relationship between TMS and IPP in this thesis.

It is useful to consider the context of the two sets of findings. Klein et al.'s (2001) studied the implementation of the Manufacturing Resources Planning (MRP II) system. It is almost impossible to implement the MRP II system without a computer. Therefore, organizational members require IPP such as system training, software accessibility and user-help services. In many companies, technology specialists or computer technicians may presume a major role in developing and providing these policies and practices. When organizations provide an adequate budget to these technicians, they may have a direct influence in forming IPP more than top managements. If it is the case, FRA could possibly take a power from TMS in explaining IPP and that is why Klein et al.'s (2001) final model showed a strong significant relationship between FRA and IPP, not TMS and IPP.

This thesis studied a range of innovations and many of which were not computer based. For example, when designing a new product, organizational members may require additional time to obtain some ideas of the new product. Further, they require additional

experiences through training and networking. In this case, top management may assume a primary role in providing or authorizing these policies. Thus, the current research did not show a shared variance between TMS and FRA, instead it showed a strong direct relationship between TMS and IPP. The current findings are in line with previous research in innovation management, technology management, and change management indicating a significant relationship between TMS and IPP (e.g. Ashok & Mary, 1997; Helfrich, Weiner, McKinney, & Minasian, 2007; Jarvenpaa & Ives, 1991).

5.1.2 Top management support (TMS) → implementation climate (IC)

This thesis also found an additional significant direct relationship between TMS and IC. Although the path between TMS and IC was not included in the original model of implementation effectiveness, Klein et al. (2001) also found this path emerging in their results. This means that the IC was a result of TMS as well as from IPP. My findings indicate that organizational members differentiate separate effect on innovation implementation from managerial commitment and policies and practices.

The robustness of this relationship is demonstrated by its emergence in both the Australian and Thai samples. Although Klein et al. (2001) did not hypothesize the relationship, two recent studies published after the current commenced, suggest its existence. Kathleen, Gregory and Charles (2006) conducted a study of patient safety initiatives (PSI) implementation among 252 hospitals from 37 States in the US. The authors concluded that top management support was related to perceptions of PSI's importance. Likewise, Lee, Kim and Kim's (2006) study of the enterprise-wide knowledge management initiatives implementation in 42 Korean organizations indicated that top management support fostered a climate for knowledge management.

The path between TMS and IC emerged empirically from my data. Despite not being hypothesized, the relationship between TMS and IC has been supported not only

from the results of Klein et al. (2001), but from other research as well. The combined and growing body of evidence strongly supports inclusion of the path from TMS and IC in the models of implementation effectiveness.

5.1.3 Financial resources availability (FRA) → implementation policies and practices (IPP)

Given the finding of prior studies, including Klein et al.'s (2001) study, the lack of a significant association between FRA and IPP is surprising. Many studies of enterprise resource planning systems (ERP) implementation indicated the evidence that companies spent a lot of money in providing ERP training (Alemayehu & Arjun, 2006), higher pay package during implementation (Ramaraj, 2007), incentives programs (Kweku-Muata & William, 2003), and technical support (Willis, Ann Hillary, & Amy, 2001). The absence of a significant relationship between FRA and IPP in both the Australia and the Thailand samples brings the question "Does money really matter for the implementation activities?" What could be the potential explanation of the dissimilarity between this finding and the evidence in literature?

Firstly, the difference of studied innovation could affect the results. Klein et al.'s study (2001) examined an innovation called manufacturing resource planning system (MRP II). The MRP II is a predecessor of ERP, both of them are a business information integration system (Joseph & Diane, 2006). Both MRP II and ERP are considered radical innovations as they produce extensive organizational, operational and managerial changes (Spathis & Ananiadis, 2005; Wu & Wang, 2006). Implementing radical innovations, such as information integration systems, incur sizeable financial investments in implementation activities. In some cases the implementation project was abandoned when the money ran out (Ada, 2003). The studied innovation in Klein et.al.'s (2001) study (2001), i.e. MRP II, could be considered a radical innovation to the organizations in their study, therefore,

the financial resources availability was significantly influenced by implementation policies and practices.

In contrast, I investigated various innovations, such as new products or services, new technologies or machinery, and new management practices. These innovations are not necessarily radical innovations but could be upgrades of an existing technology or practice. To explore this possibility, I obtained the radicalness of information from the main research project with permission from the chief investigator. My thesis was part of a wider project in which a question asked respondents "To what extent were implemented innovations radically different from what the organisation had or did?" A five-point Likert scale was used (1= not at all and 5 = a great deal). Table 5-1 shows the mean score of radicalness by nation and innovation types.

Table 5-1: Organizational perception of radicalness from their implemented innovations

Innovation types	*Australia*	*Thailand*	*Numbers of respondents who rated 5*	
	Mean (SD)	*Mean (SD*	*on radicalness scale (%)*	
			Australia	*Thailand*
Product/service innovation	3.27 (0.89)	2.76 (0.91)	2 (1.48%)	2 (1.63%)
Process innovation	3.26 (1.10)	2.59 (0.89)	12 (8.89%)	3 (2.45%)
Management innovation	3.16 (1.09)	2.94 (1.20)	6 (4.44%)	2 (1.63%)
Overall radicalness	3.12 (0.86)	2.73 (0.85)	2 (1.48%)	2 (1.63%)

The overall radicalness scores from Australia (mean = 3.12) and Thailand (mean = 2.74) confirm that Australian and Thai companies did not perceive a great deal of radicalness in their implemented innovations. Further, the number of firms that rated five (a great deal) on the radicalness of their implemented innovations was low. These points to the conclusion that the innovations studied in this research were essentially incremental

changes in both Australian and Thai samples. Furthermore, the industry samples across the two samples were similar. Also the organization size was controlled to minimize the confounding effect and maximize the generalizability.

Given these differences in radicalness, it is interesting to consider the idea that financial resource allocation can depend upon the level of radicalness. A case in point considers the Queensland University of Technology (QUT) implemented replacement of its Online Learning and Teaching (OLT) system with the Blackboard Academic Suite in 2007/2008. Both Blackboard and OLT are web-based learning management systems that allow students to access their online learning materials. Implementing Blackboard did not require a radical change to the entire organization of QUT. Moreover, QUT could utilize its present technicians to provide some training or update the manuals for staff members. Staff members have used the OLT previously, thus they had some prior knowledge of web-based learning management systems. Hence, staff members did not require extensive support from the organization. As such, a large implementation budget was not critical factor in establishing policies and practices for implementing incremental innovations.

It may be that FRA affects IPP for radical innovations but not for incremental innovations. The IPP that are needed for radical innovations are highly resource intensive and require greater FRA; while those needed for more incremental innovations have fewer financial requirements. This thesis did not intend to investigate the potential moderating effects of the radicalness of the innovation (and, indeed, the sample size precludes a post hoc). The question remains open for future research.

Having skilful and knowledgeable employees can be an additional cost to organizations, and as such, there may have been an indirect relationship of financial resources via human resources availability. However, the test of the alternative model which included the path from FRA to HRA (study 2), did not provide evidence of such a

relationship. Finally, it could be argued that respondents were not aware of FRA issue because they were not involved with the financing decisions; however, the respondents were senior managers and therefore would be considered knowledgeable with aspects of finance and implementation plan.

5.1.4 Implementation policies & practices (IPP) → the implementation climate (IC)

As hypothesized, this thesis found a relationship between IPP and IC; better policies and practices for implementation increased the level of support by organizational members for implementation activities.

Interestingly, Klein et al.'s (2001) study did not find a significant path from IPP to IC. The authors stated "Our findings regarding the relationship of implementation policies and practices and implementation climate are difficult to interpret" (Klein et al., 2001). However, when I examined the bivariate correlation from Klein et al.'s original study, I found that there was moderate relationship between IPP and IC (r = .40, p <.01). This means that the relationship between these two variables was identified (at the bivariate correlation) in the original study. Further, I investigated correlations among IPP, IC and IME to determine some possible explanations of the disparity in Klein et al.'s (2001) and this thesis' findings. The bivariate correlations from Klein et al.'s (2001) study indicated a relatively strong relationship between IPP and IME (r = .51, p <.001). Particularly, the relationship between IPP to IME from Klein et al.'s (2001) study is comparatively stronger than my thesis ($r_{Australia}$ = .21, p < .05; $r_{Thailand}$ = .29, p < .01); in other words, IPP had a direct effect on IME rather than being mediated by IC as hypothesized (and as found in my thesis).

Historical research in climate defines the climate as a shared perception of organizational members relating policies, practices and procedures in particular setting such as safety climate (Griffin & Neal, 2000), service climate (Schneider, White, & Paul,

1998) climate for creativity (Ekvall, 1996), climate for sexual harassment (Willness, Steel, & Lee, 2007) and climate for organizational change (Jimmieson, Terry, & Callan, 2004). General measures of climate subsumed measures of policies and practices in particular types of climate. Many past studies (e.g. Ekvall, 1996; Griffin & Neal, 2000; Jimmieson et al., 2004; Willness et al., 2007) confirmed that policies and practices affected organizational climate. Further, Helfrich et al.'s (2007) research using Klein et al.'s (2001) original model of implementation effectiveness (details were discussed in chapter two) also confirmed the relationship between IPP and IC among health sector organizations. This thesis also found a fundamental relationship between IPP and IC. The missing linkage between IC and IPP from Klein et al.'s (2001) study could possibly be caused by the studied innovation-MRP II system. As I mentioned earlier, the implementation of MRP II requires extensive technical knowledge regarding hardware and software. Organizational members, who are provided adequate supportive policies and practices, may be willing to participate or use innovation directly. Thus, the relationship between IPP and IME from Klein et al.'s (2001) study was not obligatory mediated through IC. It is probable that the non-significant relationship between IPP and IC occurred specifically in Klein et al.'s (2001) study context.

5.1.5 Implementation effectiveness (IME) → innovation effectiveness (INE)

As I have mentioned earlier in the chapter 1, my thesis based on the assumption that effective implementation will lead to effective innovation overall. The hypothesis that IME will lead to INE is supported. An effective implementation is characterized by smooth procedure, fewer problems and less resistance among organizational members to use an innovation or participate in the implementation activities (Klein et al., 2001); such an implementation is more likely to lead to gaining benefits from the innovation. This thesis also indicated that IME fully mediates the relationship between IC and INE. This

means that the organization's perception of implementation climate (IC) influenced the implementation process (IME), which in turn affected the benefits derived from the innovation (INE). The relationships among IC→IME→INE have been supported by previous studies as well (e.g. Arezes & Miguel, 2005; Palo & Padhi, 2006; Rayworth, 1993).

5.2 Improvement of Klein et al.'s (2001) original model of implementation effectiveness

Previous research indicated that financial and human resources influence implementation effectiveness (Jimmieson et al., 2004; Nystrom, Ramamurthy, & Wilson, 2002; Starkweather, 2005). Moreover, during the implementation stage, human resources become one of the major success factors for the implementation (Porter, 2005). Klein et al.'s study (2001) did not consider human resources. Therefore, this thesis included both financial and human resources availabilities into the model of implementation effectiveness (Figure 5-2).

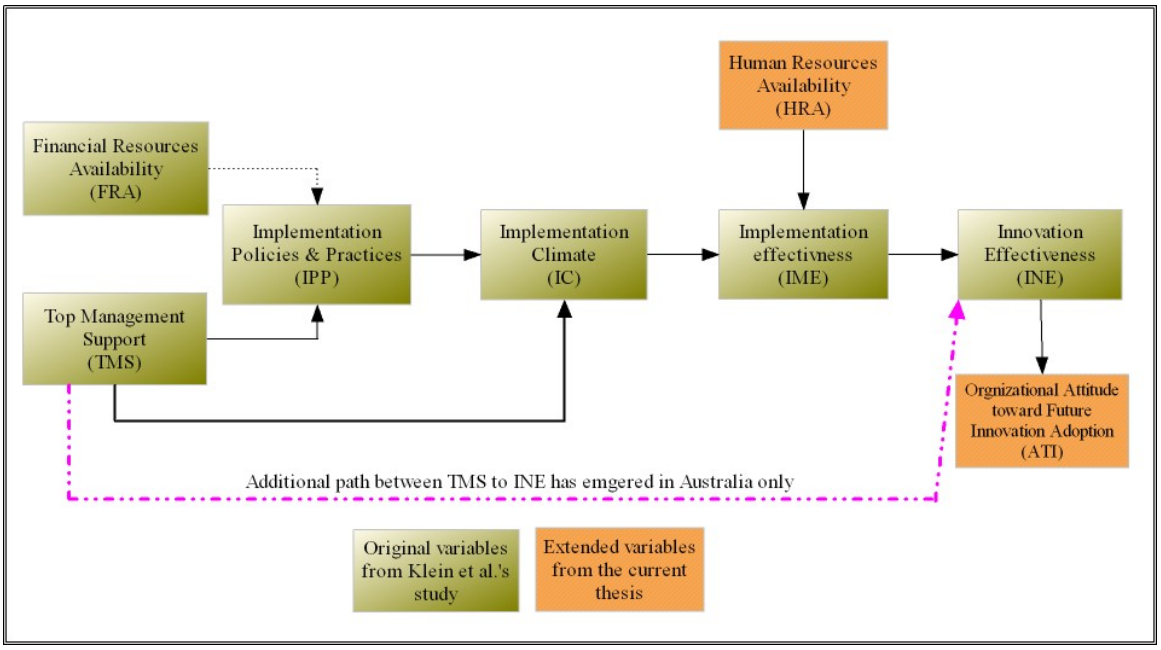

Figure 5-2: A summary of results of the extended model of implementation effectiveness

5.2.1 Human resources availability (HRA)→ Implementation effectiveness (IME)

This thesis confirms that skillful and capable employees increase the level of implementation effectiveness in both Australian and Thai organizations. This finding creates a better understanding of factors influencing the success of the implementation. The original model of implementation effectiveness implied that effective implementation is affected only by the climate for implementation. However, only perceiving the importance of the implementation may not be sufficient to drive successful implementation. For instance, imagine an employee who perceives a positive implementation climate surrounding a new IT innovation but who is unable to make full use of the specific IT training provided due to an overall lack of computer literacy. That employee, and others like him/her, is less likely to use the innovation accurately and thus the success of the implementation will be low.

Based on the findings from this study, therefore, I suggest that organizations may be required to have capable staff who can deal with any problem occurring during the implementation as well. Further practical implications are discussed in later section.

5.2.2 Innovation effectiveness (INE) → Attitude toward future innovation adoption (ATI)

My extended model of implementation effectiveness extends beyond the end of the implementation stage to the post implementation stage. Generally, studies of innovation implementation focus on the implementation completeness and success. However, the question remains "Why, at the end of the implementation, do some companies decide to adopt more innovations and some companies not?" Previous research has identified that a positive attitude toward innovation influences innovation adoption (Damanpour, 1991). However, until now, we did not know if past implementation affected an organizations' mind-set about future innovation adoption. Therefore, this thesis contributes to our

understanding of innovation by examining relationships among implementation effectiveness, innovation effectiveness and organizations' attitude toward future innovation adoption.

This thesis indicated that when organizations perceive that the innovation is effective in a number of areas, they have a more positive attitude toward future innovation adoption. This useful finding, while novel in the field of innovation implementation, is consistent with knowledge within social and cognitive psychology theory regarding attitude formation where research has shown that attitudes are often based on previous experiences (e.g. Anderson, Hodge, Lavallee, & Martin, 2004; Jacoby, Gorry, & Baker, 2005; Poortman & Van Tilburg, 2005). In the field of innovation however, the finding has further implications. Based on the theory of planned behavior (Ajzen, 1991), Unsworth et al. (2005) developed the theoretical framework called innovation theory of planned behavior (I-TPB) to explain innovation adoption at the organizational level. The I-TPB suggests that an organization's positive attitude towards an innovation will enhance the likelihood of further innovation adoption in the future. Thus, those organizations that perceive greater benefits from an implemented innovation are more likely to have positive attitudes towards future innovation adoption, which in turn may lead to an actual innovation adoption. This thesis examined the relationships among IME→ INE → ATI. Future researchers may consider a longitudinal study to examine the relationship among organizations' attitude toward future innovation adoption and the actual adoption in the future.

5.2.3 Top management support (TMS) → Innovation effectiveness (INE)

This thesis examined if the extended model of implementation effectiveness was equivalent across Australia and Thailand by performing multiple group analysis in AMOS 7.0. The results indicated that the extended model of implementation effectiveness was

not equivalent across the Australian and Thai samples. The post hoc analysis of the extended model suggested introducing the path from top management support to innovation effectiveness in Australia. It is possible that this finding represents a percept-percept bias, such that those who purport high levels of top management support also, therefore, report high levels of benefits. However, while there was moderate correlation between top management support and innovation effectiveness within the Australian sample (r = .34, p = .01), the correlation between these two variables in the Thai sample is substantially lower (r = .20, p = .01). Thus, it is unlikely that the relationship in the Australian sample is simply due to a percept-percept bias.

Yet, the direct relationship between TMS → INE has also been suggested in a recent study by Tan and Zhao (2003) who studied the implementation of a technical information system among 22 research oriented commercial companies in Singapore; they concluded that when organizations perceived a high level of top management support, they also perceived the potential benefits of the technical innovation. Singapore has some similarities to Australia. Singapore has achieved tremendous economic success and has attained the status of a "developed country", while Thailand remains status as "developing country". Singapore is a first among Asian countries that became the developed country (Dolven, 1998). A number of comparative studies indicated that Australian and Singaporean firms have shared some managerial practices (Braithwaite, Westbrook, & Mallock, 2007; Fisher, Lee, & Johns, 2004; Phau & Kea, 2007). Given that Singapore's organizational practices and national economy are more similar to Australia than Thailand, the emerged path from TMS → INE in Australia has supported by Tan and Zhao's (2003) empirical study.

Although the direct relationship between TMS → INE was found in the Australian sample, there could be some unobserved mediating variables, which were not included in this thesis. For instance, Auden, Shackman and Onken (2006) commented that highly

committed top managers can effectively manage uncertainty during project implementation, which may affect firm performance. Daily and Huang (2001) stated that managers who strongly support a project implementation regularly check and determine implementation performance. Further, they take actions to alleviate negative outcomes during the project implementation to ensure a successful project at the end. Top management wants successful implementation and they know that improvements are valued and will be noticed. These perceptions can encourage such managers to go the extra mile. Lin's (2007) study indicated that top management support influenced organizations to share the experience-based information to other networks during the implementation. This information sharing is essential because it enables organizations to achieve the implementation goals and to find effective corrections of problems during the implementation. Furthermore, it is possible that top management who greatly commit to a project implementation monitor their implementation performance analytically. Orlikoff (1995) suggested the system governance (standard criteria which reflect what organizations want to achieve from a project) provides consistent direction and critical oversight for the overall performance. Thus, high levels of top management support may mitigate the risk of implementation through checking and corrective action (Daily & Huang, 2001), information sharing (Lin, 2007), and monitoring the implementation through system governance (Orlikoff, 1995).

The research design for this thesis did not include any potential mediating effects between top management support and innovation effectiveness (other than IPP, IC, and IME). In addition, of course, it must be acknowledged that the single-source data may have influenced the emergence of this result. However, I suggest that this finding is a useful contribution as it extends our understanding of innovation effectiveness.

5.2.4 Possible justifications of non-equivalent model of implementation effectiveness between Australia and Thailand

This thesis proposed the extended model of innovation implementation effectiveness based on existing theories and empirical studies. This thesis thus hypothesized model equivalence across Australia and Thailand. In the main, this hypothesis was upheld and most of the model was generalizable across both samples. However, because the path between TMS and INE occurred only in Australian firms, the question remains "Why does this path not emerge in Thailand?" What are possible explanations of the model difference between Australia and Thailand?

Governmental policies and regulations

The governmental policies and regulations toward innovation could drive top management to consider on innovation implementation seriously. In Australia, the government has initiated various policies to support businesses to adopt and implement innovation. For instance, the Queensland State Government developed the "Smart State" program to foster local business in relation to innovation adoption, new technologies and new research and development. Furthermore, grants and funding are available to support innovation projects among local industries, e.g. the innovation start-up funding scheme (ISUS) where the government financially supplies a company up to $85,000 for new technology-based-product or service development project. Likewise, the Victoria State Government announced a $66 million funding innovation project for local business (DIIRD, 2007). Moreover, in 2003, the Victoria State Governments formed the Department of Innovation, Industry and Regional Development to develop innovative industries across Victoria. It is plausible that Australian governmental policies and regulations influence innovation implementation across the country. Furthermore, there are technological diffusion agencies funded by Australian government which assist

Australian firms to adopt and implement new technologies effectively. Such support by the Government may mean that any commitment provided by top management is funneled directly into garnering the benefits of the innovation.

In Thailand, Rotchnakitmnuai and Speece (2003) conducted interviews with accounting/financial managers and managing directors from various industries such as manufacturing, hospitality and airline. They found that Thai government regulation hindered companies implementing electronic banking for their business transactions. Intrarakumnerd (2005) reported that overall, innovation related investment in Thailand was much lower than the neighbor such as Korea, Taiwan, Singapore and Malaysia. The author indicated that several constraints of innovation activities mainly related to government support and regulations.

Research suggests that environment variables such as politics, government policies and regulations affected innovation adoption among organizations (Goulden, 2005; Tan, Chen, & Liu, 2006; Tierney, 2007). The governmental regulations and policies can be considered as an environmental context that could affect innovation process from adoption to implementation stages. The different rules, regulations and policies between Australia and Thailand could possibly affect the final model of implementation effectiveness. It also can be argued that government policies and regulations could hinder or support companies during innovation implementation stage as well. Australian top management could possibly feel more enthusiastic with innovation implementation since Australian policies and regulations support local businesses engaged in innovation implementation. As a result, top management people are more actively involved in innovation implementation. On the other hand, because of the lack of support from government or external agencies, Thai top management may not personally commit to the innovation project as such. They could participate in innovation implementation activity passively or minimally. Without the government assistance and encouragement, they

could be less willing to undertake and complete innovation projects. Although being an innovative company is often critical to long term success, Thai top management, especially small to medium-sized companies with limited resources, could feel that it is too risky to be innovative in an environment that offers no external support.

Global competitiveness

Another possible explanation of non-equivalent models of implementation effectiveness between Australia and Thailand is competiveness within internal and external markets. A high level of competiveness acts as a sign for companies to take an innovative response critically (Gharavi, Love, & Cheng, 2004). The different levels of competitiveness perhaps influence how top managements prioritize innovation. Recent data from the IMD world competitiveness yearbook indicated that in 2007 the overall competitiveness level in Australia is ranked 12th while Thailand is ranked 33rd (see Table 5-1). Indeed, the past four years, Australia had higher competitiveness than Thailand. The higher competitiveness of Australia could make successful innovation implementation more critical for Australian companies as local competitors seek competitive advantage through innovation.

Implementation tactics

Implementation tactics could also explain of the differences between Australia and Thailand models. The success of the implantation tactics can be attributed to the top managements' ability to make things happen. Nutt (1987) conducted multiple case studies among 68 companies and identified four implementation tactics that organizations use to implement new ideas or technologies. They are:

1. Intervention implementation - top mangers create a new norm or re-norm for the change.
2. Participation implementation - top managers and delegated stakeholders specify implementation plan.

3. Persuasion implementation - top management authorizes an external expert to develop implementation plan.
4. Edict implementation - top managers indicate implementation plan and induce organizational members compliance via training and policies.

Later, Nutt conducted another study in 1998 examining a relationship between implementation tactics and perceived project success. Nutt (1998) conducted telephone interviews with 376 organizations that have implemented new technologies or practices. He found that the top management that used intervention and participation implementations, perceived high level of benefits from implementations. On the other hand, top managements who used persuasion and edict implementations perceived adequate benefits from implementations. Given that Australia's mean score (mean = 3.79) of innovation effectiveness (perceived benefits) was higher than Thailand's mean score (mean = 3.48), it could possibly be influenced by the implementation tactics.

Nutt (1998) noted a significant relationship between implementation tactics that top managements employed and perception of implementation benefits which, in the context of the present study, suggests Australia and Thailand may employ different implementation tactics based on their management styles. Gelfand, Erez and Aycan (2007) concluded from their meta-review of cross-cultural studies in organizational behavior that national culture influenced leaders and followers within organizations.

Culturally, most Thais are uneasy about losing face. When employees are required to share their ideas in the presence of top management, they tend to remain silent most of the time. They keep silent because they do not want to say anything impractical or unconstructive that might humiliate them. Younger employees keep quiet because they feel lacking in experience to suggest any ideas. Furthermore, in Thai culture, younger people are taught to play the role of an observer rather than a speaker. Additionally, most Thai organizations operate under a centralized management system (Kaweevisultrakul &

Chan, 2007) and hierarchical orientation, with organizational members simply follow orders (Cuong & Swierczek, 2008). Therefore, it can be generally assumed that Thai managers are more likely to employ edict-based implementation tactics.

In Australia, Ashkanasy, Trevor-Roberts and Kennedy (2000) identified mateship as an Australian cultural tract. This implies that the Australian management style focuses more on the group and egalitarianism (Sarros, Gray, Densten, & Cooper, 2005). Likewise, Baird, Harrison and Reeve (2007) concluded from 184 organizations in manufacturing and service industries that prominent characteristics of Australian organizations were outcome orientation and people orientation. Therefore, it can be generally assumed that Australian top management is more likely to employ participation implementation tactics.

To the extent that Australia employs a participation approach and Thailand employs edict approach, the differences among implementation tactics utilization and management styles could constitute the different models of implementation effectiveness between Australia and Thailand. The participative approach may lead Australian top managements to be responsible for implementation activities (e.g. endorsing policies, influencing climate for implementation) as well as the implementation outcomes (innovation effectiveness). One the other hand, the edict approach may lead Thai top managements to perceive that the organizational members are responsible for implementation activities. The success or failure of the implementation could be due to the technology or employees. The theoretical and especially the practical implications are considerable. I strongly recommend the future research to investigate the influence of implementation tactics on implementation effectiveness. Comparison models of implementation effectiveness among organizations that use the four different implementation tactics identified by Nut (1995) may result in sound prescriptive advice about matching implementation tactics to innovation types.

5.3 Limitations and future research directions

As with any research, this research has a number of limitations. First, common method variance is a potential concern. Common method variance arises in a situation where shared-variance among constructs in the study is contributed by the data collection method (Song & Zahedi, 2005). This variance may inflate true relationships among the constructs (Tsai & Ghoshal, 1998). According to Podsakoff, MacKenzie, Lee and Podsakoff's recommended remedies (2003), I strongly believe that the common method was not a threat to the reliability of findings. The evidence was the well-fit CFA model, the measure items for each construct illustrated good localization. Further, the comparative results between fully mediated model and non-mediated model indicated that the non-mediated model did not represent the data any better than the fully-mediated model.

This thesis employed a self-report survey. Informants may inflate the benefits they perceive from innovation implementation in order to protect the company image; however Well and Olson (1989) found that self-report performance figures provided by managers were strongly correlated with corresponding objective measures. This provides some support for the validity of the responses received.

Further, the research design was cross-sectional method, which precluded analysis of true causality or time effect. Critical questions such as "will models differ over time during innovation implementation?" or "how do these independent variables influence innovation effectiveness over time?" can only be addressed by longitudinal research, which would require more resources than were available for the present research.

Resource consideration impacted on the length of the questionnaire, and constructs were measured using less items than Klein et al.'s (2001) original study. While the measurement models were acceptable fits to the data collected a full replication using all

questions from the original study may be useful to test the enhance model of implementation effectiveness. Indeed, future studies may want to add additional theoretically relevant constructs, such as intervening variables (e.g. radicalness of the innovation, perception of problems during implementation, an existing implementation vision), environmental context (e.g. governmental policies and regulations, global competitiveness) and institutional context (e.g. implementation tactics). Furthermore, I strongly recommend replicating this study in different countries and contexts as the conclusions about cultural inferences in particular are limited in a two nation sample.

Finally, I have drawn most of the respondents from the industry partners' database. These organizations are at the very least interested at some level in innovation. Thus, I suggest future research can be performed, including organizations who are not explicitly interested in innovation

5.4 Theoretical implications

Overall, this research indicates broad support for Klein et al.'s (2001) original consolidation of innovation implementation theory while enriches the theory by adding additional constructs and associations between established constructs.

This thesis confirms that human resources influence successful implementation. Previous research (Meredith, 1987; Nystrom et al., 2002) suggested that skillful and talented people can understand innovation and manage some problem during implementation. The extended model has significantly improved Klein et al.'s (2001) original model, and this thesis contributes a richer model of implementation effectiveness by integrating innovation chances, innovation management and human resources literatures.

Furthermore, I employed the SEM technique to overcome the analysis of data discrepancy from the original study. SEM is generally considered to be more rigorous in

parsimonious model testing than is multiple regression analysis [which was used in Klein et al.'s (2001) study]. The SEM technique also allows researcher to test model equivalence between two groups simultaneously (the test is called multiple group analysis). This thesis takes advantage of the SEM technique by collecting the data from two different countries, Australia and Thailand. Using data from multiple nations and the SEM technique, this thesis can confirm the generalizability of the extended model of implementation across Australia and Thailand. Furthermore, various industry sectors and innovation are also considered as a methodological contribution from this thesis (see Table 5-2).

Table 5-2: The distinctions between Klein et al.'s (2001) original study and this thesis

Klein et al.'s (2001) study	***This thesis***
Created the integrative model of implementation effectiveness	Full replication of the original model and then developed the extended model
Study based on a single innovation	Study based on various innovations
33 organizations in the manufacturing industry	257 organizations in manufacturing and non-manufacturing industries
The study used regression analysis to modify the model and used path analysis to examine overall model fit	To overcome regression analysis limitation, the study employed SEM technique to examine both measurement model and structural model
Testing only financial resources effect on the model	Testing both financial and human resources effect on the model. Furthermore, the study added additional variable (attitude toward future innovation adoption) as a consequent variable of the implementation effectiveness model.
The study based on only U.S.A. companies	Employed the model to test in the different context; Australia and Thailand

5.5 Practical implications

The findings suggest that managers should be cognizant of the importance of human resources, such as skilled staff, when considering innovation implementation. These human resources may help overcome limited finances in some organizations, particular in

small to medium sized companies. Analogously, you may have the money to buy a car. However, to use it you need driving skills, and knowledge of maintenance issues. If you have family members who can teach you to drive and maintain the car, money is not required at this stage. Similarly, small to medium sized companies often complain of being financially restricted and therefore being unable to adopt and implement innovations. In other cases, companies may have funding to adopt a new technology, but lack the budget to implement it successfully. This thesis demonstrates that human resources can enhance innovation implementation effectiveness in addition to financial resources. The finings suggest such companies may have the capability to successfully undertake innovations if they adopt a human rather than a financial resource-based approach. For example, companies can utilize skilled employees to help with implementation, rather than hiring external consultants.

To ensure the success of innovation implementation, organization members must not only use the innovation, but they must realize organizational improvements from its use. This study identifies the significant role of implementation climate and implementation effectiveness in innovation use. Maximizing communication channels within organizations regarding innovation implementation is essential. Organizations should create communication channels wherein all innovation participants can pose questions or seek information, share their ideas, or participate in planning for innovation implementation. The more involved staff members are in the implementation process, the fewer criticisms they are likely to have. Additionally, a participative implementation process would entice more staff members to voluntarily use innovation. For this reason, managers need to develop positive perceptions of innovation implementation among organization members. In doing so, benefits or improvements will be evident.

Additionally, top management is a major predictor of innovation implementation effectiveness. Top management should endorse activities which foster implementation

effectiveness, such as clarifying communications, providing supportive policies and reducing organizational resistance (Basu, Hartono, Lederer, & Sethi, 2002), and a deficiency is a major impediment to implementation planning success (Cerpa & Verner, 1998).

5.6 Conclusion

The modern world as we know it is no longer as stable and predictable as it was some twenty years ago. The forces of globalization, information technology and other technical advancement have made companies adopt and implement innovations. From innovation researchers' perspective, innovation is any product, service, technology, machinery, or managerial practice that is new to an organization. Innovation adoption is the organizational decision to purchase or implement an innovation. Innovation implementation, in contrast, occurs when organizations put an innovation into use. The difference between adoption and implementation is fundamental: organizations often adopt innovations but fail to implement them successfully.

Past research seeking to identity common predictors of implementation effectiveness is typified by qualitative case studies. Each of qualitative result demonstrates parts of implementation story. Yet, what has been missing is an integrative model that captures and clarifies the multiple determinants of innovation implementation effectiveness. Klein et al.(2001) proposed widely discussed theoretical model of implementation effectiveness. This thesis re-examined Klein et al.'s (2001) original model of implementation effectiveness and enhanced the original model of implementation effectiveness by introducing the human resources availability and organizations' attitude toward future innovation adoption. It also overcame methodology and analysis limitations from Klein et al.'s (2001) original study. A major outcome of this thesis is an enhanced model of innovation implementation effectiveness where represents a significant advance towards a

context sensitive general model of innovation effectiveness.

To conclude, this thesis has contributed to the advancement of our understanding in management of innovation implementation. Furthermore, this thesis clarifies the validity of Klein et al.'s (2001) original model of implementation effectiveness and suggests an enhanced version of Klein et al.'s (2001)original model. Future researchers are encouraged to apply the extended version of implementation effectiveness model into different contexts. This in turn will facilitate future development of more effective management of innovation implementation.

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APPENDIX A

SCALES ITEMS

Constructs	Items	Scale
Top Management Support	1. Our organization is strongly committed to the successful implementation of innovation 2. Innovation implementation is generally carefully planned and costed 3. Innovation implementation is always part of a long term strategic plan	Five-point Likert scale (1=not at all; 5=a great deal)
Financial Resources Availability	4. Money is readily available to pay for special projects in the organization 5. This organization can't afford to spend money on anything but essentials 6. Recently, financial resources for organizational investments have been cut back	Five-point Likert scale (1=not at all; 5=a great deal)
Implementation policies and practices	7. Our organization provides training to employees before innovation implementation has taken place. 8. Training is often available to employees during innovation implementation phase. 9. In our organization, the more employees know about innovation and its implementation, the better their chances are of getting promoted or bonus or raise. 10. Our organization has provided someone to help when employees get stuck on a problem while using an adopted innovation. 11. Helpful books and/or manuals are available when employees have problems with the innovation. 12. Most employees have been so busy that they have very little time to devote to the implementation of innovation. 13. Our organization has encouraged employees to take time off from their regular work tasks to attend implementation meetings and training sessions. 14. Employees are well informed about the implementation process.	Five-point Likert scale (1=not at all; 5=a great deal)
Implementation Climate	15. Employees do not really care whether the implementations succeeded or failed 16. If employees can avoid using the innovation, they do 17. When given a choice, employees choose not to use the inn	Five-point Likert scale (1=not at all; 5=a great deal)

SCALES ITEMS

Constructs	Items	Scale
Implementation effectiveness	18. many/few problems	Five-point Likert scale (1=many problems; 5=few problems)
	19. Resistance/ Acceptance	Five-point Likert scale (1=resistance; 5=acceptances)
	20. Rough/smooth	Five-point Likert scale (1=rough process; 5=smooth process)
	21. Complicated/simple	Five-point Likert scale (1=complicated process; 5=simple process)
Human Resources Availability	22. There is usually abundant availability of required labor skills within our organizations for introducing innovation.	Five-point Likert scale (1=not at all; 5=a great deal)
	23. There is usually no shortage of managerial talent to effectively introduce and implement innovation.	
Organizational Attitude	24. A bad idea /good idea	Seven-point Likert scales (-3 to 3).
toward future	25. Negative / positive	
innovation adoption	26. Worthless / valuable/	
	27. Bad / good	
	28. Dislike / like	

SCALES ITEMS

Constructs	Items	Scale
Innovation effectiveness	29. Productivity? 30. Performance efficiency and productivity? 31. Costs/labor? 32. Greater reliability and consistency in performance? 33. Communication within the organization? 34. Diversity of products or services? 35. The organization's responsiveness to customer demands? 36. Health and safety within the organization? 37. Employee involvement? 38. Customer or client satisfaction? 39. The financial performance of the organization? 40. Management-employee relations? 41. The quality of the products or services? 42. Employee morale? 43. Trust within the organization? 44. The flexibility of the organization?	Five-point Likert scale (1= Made much worse; 5 = greatly improved

APPENDIX B

Organizational Survey (English version)

Who Are We?
We are researchers from the Work Effectiveness Research Program at Queensland University of Technology. Our aim is to make the workplace more effective and to promote the success of Australian organisations.

Why Would You Participate in This Research?

Innovation in organisations is a phenomenon that is being promoted by governments, technology diffusion agencies, organisational stakeholders, media, and the public. There are many reasons for promoting innovation in today's dynamic marketplace, however, the introduction of innovation is not always successful, nor is it appropriate in all situations.

The aim of this research is to increase the performance of Australian organisations through understanding the circumstances in which innovation will be most successful and the implementation processes that will be most effective. The project is funded by an Australian Research Council Linkage grant (LP0455129), with QMI Solutions and Concentric as industry partners.

By participating in this research you will:

a) **Help to increase our understanding of innovation in Australian organisations**
b) **Help to formulate policy recommendations regarding innovation adoption and implementation**
c) **Receive a benchmarking report that outlines your innovation levels (and factors affecting innovation adoption) against other Australian organisations**
d) **Receive a report outlining recommendations that arise from the research**
e) **Receive an invitation to a workshop on innovation performance measurement, including free performance measurement software to assist your organisation in improving innovation effectiveness**

For the purpose of this survey, we define:

- *Innovation* as a technology or practice that an organisation is using for the first time, regardless of whether other organisations have previously used the technology or practice.
- *Innovation adoption* as an organisation's decision to install an innovation with the organisation. Adoption is a decision point, a plan, or a purchase.
- *Implementation* as the stage following adoption: the transition period during which organisational members ideally become increasingly skillful, consistent, and committed in their use of an innovation.
- *Introduction of innovation* as including both the adoption and implementation of an innovation.

The information you provide will be treated confidentially.
No-one from outside the QUT research team will have access to a particular organisation's responses. The names of individual persons are not required in any of the responses. The benchmarking and recommendations reports will provide anonymous and/or aggregated findings, in such a way that specific organisations cannot be identified.

How do I fill in this questionnaire?

Participation in this research is completely voluntary. If you do agree to participate, you can withdraw from participation at any time during the study without comment or penalty. Your decision to participate will in no way impact upon your current or future relationship with QUT or with any external body (e.g., ARC, QMI Solutions, Concentric).

There are three major sections to this questionnaire and it should take approximately half an hour to complete. The first asks for details about your organisation. The second section deals with innovations introduced into your organisation in the last three years – what those innovations entailed, the outcomes of introducing those innovations, and your experiences of and attitudes towards innovation. The third and final section concerns any dealings you may have had with external agencies, such as technology diffusion agencies, government agencies, and universities.

As you will see there are a number of types of questions. Most ask you to tick one box that best fits your response, however others ask you to circle the answer that best fits your response, and a few ask you to write your response down. You will also notice that some of the questions are very similar; that is, they ask your opinion about the same or similar issues. This overlap in questions ensures that QUT can maintain the reliability and validity of the questionnaire.

There are no right or wrong answers to this survey. Please answer as many questions as you can. The success of the research depends upon your answering these questions openly, accurately, and as fully as possible.

If you have any questions regarding this questionnaire, please contact: Sukanlaya Sawang, School of Management, Queensland University of Technology, s.sawng@qut.edu.au, Phone: 07 3864 5081

Please contact the Research Ethics Officer on 3864 2340 or ethicscontact@qut.edu.au if you have any concerns or complaints about the ethical conduct of the project. The return of the completed questionnaire is accepted as an indication of your consent to participate in this project.

We would like to thank you for taking the time to participate in this research. Please return the questionnaire in the prepaid envelope provided.

Section One: Your Organisation

This section asks for details regarding your organisation so that we are able to examine any differences in innovation effectiveness across different types of organisations. This information remains strictly confidential.

1. Organisation Name: _____

2. In what year was your organisation established?_____

3. In which industry does your organisation belong?
   (Please tick one only)
   a. Financial services ❑
   b. Automotive industry ❑
   c. Construction ❑
   d. IT-Technology ❑
   e. Electrical industry ❑
   f. Manufacturing ❑
   g. Service generally ❑
   h. Telecommunication ❑
   i. Chemical industry ❑
   j. Mechanical engineering ❑
   k. Pharmaceutical industry ❑
   l. Design Consultancy ❑
   m. Other (please specify): ❑
   _____

4. How many employees in your organisation?
   a.Less than 20 ❑
   b. 20-50 ❑
   c.51-100 ❑
   d. 101-200 ❑
   e.201-500 ❑
   f. 501-1000 ❑
   g. More than 1000 ❑

5. What was the approximate gross revenue of your organisation for 2003-2004?

   $0-$5M ❑
   $5-$10M ❑
   $10-$50M ❑
   $50-$200M ❑
   $200-$500M ❑
   >$500M ❑

	None at all	Low	Moderate	High	Very high	N/A
6. What is the intensity of competition in your industry?	❑	❑	❑	❑	❑	❑

7. **To what extent do you agree with the following statements regarding your organisation?**

	Not at all	Just a little	To some extent	Quite a lot	A great deal
There are a large number of departments in our organisation with different functions and specialties below the CEO (i.e., marketing, accounting, HR)	❑	❑	❑	❑	❑
There are a high number of occupational specialties or job titles in this organisation	❑	❑	❑	❑	❑
The organisation is highly de-centralized and participatory, encouraging many organisational members to be involved in decision making	❑	❑	❑	❑	❑
The organisation is highly centralized and decision making is primarily the responsibility of senior management	❑	❑	❑	❑	❑
For most tasks there are well-developed rules and policies	❑	❑	❑	❑	❑
Everyone in this organisation has a well-defined and specific job to do	❑	❑	❑	❑	❑
This organisation can't afford to spend money on anything but the essentials	❑	❑	❑	❑	❑
Money is readily available to pay for special projects in the organisation	❑	❑	❑	❑	❑
Recently, financial resources for organisation investments have been cut back	❑	❑	❑	❑	❑
Our organisation is performing well relative to our competitors	❑	❑	❑	❑	❑

8. **To what extent do you agree with the following statements?**

	Not at all	Just a little	To some extent	Quite a lot	A great deal
The philosophy of our management is that in the long run we get ahead playing it slow, safe and sure.	❑	❑	❑	❑	❑
Our business has been built up by taking calculated risks at the right time.	❑	❑	❑	❑	❑
Decision making here is too cautious for maximum effectiveness.	❑	❑	❑	❑	❑
Our management is willing to take a chance on a good idea.	❑	❑	❑	❑	❑

9. **Relative to other organisations in your industry, to what extent does your organisation emphasise:**

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Continual improvement of operating efficiency	❑	❑	❑	❑	❑
Product quality through the use of quality circles	❑	❑	❑	❑	❑
Making significant modifications to your current manufacturing technology/process to improve efficiency and effectiveness	❑	❑	❑	❑	❑
Products and/or services that are stable and consistently defined throughout the market	❑	❑	❑	❑	❑
Sacrificing current profitability to gain market share	❑	❑	❑	❑	❑
Price-cutting to increase market share	❑	❑	❑	❑	❑
Setting prices below that of the competition	❑	❑	❑	❑	❑
Gaining market share at the expense of cash flow and profitability	❑	❑	❑	❑	❑
Basic research to provide the organisation with a future competitive edge	❑	❑	❑	❑	❑
Long-term considerations when making budget allocations	❑	❑	❑	❑	❑
Formal tracking of significant general trends	❑	❑	❑	❑	❑
Forecasting key indicators of operations	❑	❑	❑	❑	❑
Being number-oriented and analytical in your operations	❑	❑	❑	❑	❑
Using detailed, factual information to support day to day decision making	❑	❑	❑	❑	❑
Comprehensive analysis of business opportunities or challenges	❑	❑	❑	❑	❑
Use of planning techniques	❑	❑	❑	❑	❑
Increasing capacity (i.e., prepare to handle a greater volume of business) before competitors do the same	❑	❑	❑	❑	❑
Being the first ones to introduce new products and/or services to the market	❑	❑	❑	❑	❑
Adopting innovations early	❑	❑	❑	❑	❑
Constantly seeking opportunities related to the present operations	❑	❑	❑	❑	❑

10. **To what extent does your organisation use the following practices?**

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Routine gathering of opinions from customers	❑	❑	❑	❑	❑
Explicit tracking of the policies and tactics of competitors	❑	❑	❑	❑	❑
Forecasting sales, customer preferences, technology, etc.	❑	❑	❑	❑	❑
Special market research studies	❑	❑	❑	❑	❑

11. **To what extent do you agree with the following statements regarding your company's attitude and behaviour toward aligning organisational functions/processes (e.g., technology, software, and business processes) and business strategy**

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Links between technology/software/processes and business strategy are clearly formulated and pursued	❑	❑	❑	❑	❑
Investments in new technology/software/processes are screened for consistency with business strategy	❑	❑	❑	❑	❑
Senior Managers have a general understanding of how products, markets, and technology/software/processes interact and manage these interactions strategically	❑	❑	❑	❑	❑
Innovations or new processes/products are important for our company as they enhance or enable our business strategy	❑	❑	❑	❑	❑

Section Two: Innovation in Your Organisation

This section deals with any innovation that you have introduced in your organisation over the last three years and covers the types of innovation that you have introduced (if any) and their outcomes, your organisation's view of innovation, and your experiences of implementing innovations in your organisation.
Please remember that for the purpose of this survey, we define:

- *Innovation* as a technology or practice that an organisation is using for the first time, regardless of whether other organisations have previously used the technology or practice.
- *Innovation adoption* as an organisation's decision to install an innovation with the organisation. Adoption is a decision point, a plan, or a purchase.
- *Implementation* as the stage following adoption: the transition period during which organisational members ideally become increasingly skillful, consistent, and committed in their use of an innovation.
- *Introduction of innovation* as including both the adoption and implementation of an innovation.

12. The following is a list of categories of common innovations introduced in Australian manufacturing organisations. Can you please identify which ones (and how many of each category), if any, you have introduced in the last 3 years?

Remember, these innovations do not need to have been successful to be counted.

	Introduced?	How many?
New plant or machinery	❑	_____
New manufacturing or product-based technology	❑	_____
Changes in business services	❑	_____
New products	❑	_____
Changes to existing products	❑	_____
New processes or work design systems (e.g., TQM)	❑	_____
New administrative systems (e.g., communication systems, inventory systems)	❑	_____
HRM innovations (e.g., appraisal or reward systems, training)	❑	_____
Organisational restructuring innovations (e.g., merger, expansion)	❑	_____
Other: _____	❑	_____

13. To what extent were these innovations radically different from what the organisation had or did before?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
New plant or machinery	❑	❑	❑	❑	❑
New manufacturing or product-based technology	❑	❑	❑	❑	❑
Changes in business services	❑	❑	❑	❑	❑
New products	❑	❑	❑	❑	❑
Changes to existing products	❑	❑	❑	❑	❑
New processes or work design systems (e.g., TQM)	❑	❑	❑	❑	❑
New administrative systems (e.g., inventory systems)	❑	❑	❑	❑	❑
HRM innovations (e.g., appraisal or reward systems, training)	❑	❑	❑	❑	❑
Organisational restructuring innovations (e.g., expansion)	❑	❑	❑	❑	❑
Other: _____	❑	❑	❑	❑	❑

14. To what extent do you agree with the following statements regarding your organisation's view of innovation?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
We consider our organisation to be innovative	❑	❑	❑	❑	❑
We usually wait to make sure an innovation proves itself successful in other organisations before adopting it ourselves	❑	❑	❑	❑	❑
Our organisation continually adopts new and improved ways to work	❑	❑	❑	❑	❑
Our organisation encourages and rewards those who take risks	❑	❑	❑	❑	❑
Our organisation understands the extent to which innovation affects the day to day running of our business.	❑	❑	❑	❑	❑
Our organisation has a good understanding of why innovation is important for the business.	❑	❑	❑	❑	❑
Our organisation needs to innovate in order to survive.	❑	❑	❑	❑	❑
We need to introduce innovation in our organisation to stay ahead of the competition.	❑	❑	❑	❑	❑
The rate of change in the marketplace is such that we don't need to be constantly looking for innovation	❑	❑	❑	❑	❑

15. In general, what effect have the innovations that you introduced in the last three years had on:

	Made much worse	Made worse	No effect	Improved	Greatly Improved
Productivity?	❑	❑	❑	❑	❑
Performance efficiency and productivity?	❑	❑	❑	❑	❑
Costs/labor?	❑	❑	❑	❑	❑
Greater reliability and consistency in performance?	❑	❑	❑	❑	❑
Communication within the organisation?	❑	❑	❑	❑	❑
Diversity of products or services?	❑	❑	❑	❑	❑
The organisation's responsiveness to customer demands?	❑	❑	❑	❑	❑
The quality of life of the general public?	❑	❑	❑	❑	❑
Health and safety within the organisation?	❑	❑	❑	❑	❑
Employee involvement?	❑	❑	❑	❑	❑
Customer or client satisfaction?	❑	❑	❑	❑	❑
The financial performance of the organisation?	❑	❑	❑	❑	❑
Management-employee relations?	❑	❑	❑	❑	❑
The quality of the products or services?	❑	❑	❑	❑	❑
The natural environment?	❑	❑	❑	❑	❑
Employee morale?	❑	❑	❑	❑	❑
Trust within the organisation?	❑	❑	❑	❑	❑
The flexibility of the organisation?	❑	❑	❑	❑	❑
Enabling your business strategy?	❑	❑	❑	❑	❑
Other _____?	❑	❑	❑	❑	❑

	They don't	Very slowly	Slowly	Quickly	Very quickly
16. How quickly do new technological developments arise in your environment?	❑	❑	❑	❑	❑

17. Do you have opportunities to exploit innovation? Yes ❑ No ❑

	None	Very slow	Slow	Fast	Very fast
18. What is the rate of innovation adoption in your industry?	❑	❑	❑	❑	❑

19. Please circle the response that best fits your views on innovation in your organisation.

I _____ the idea of introducing innovation into this organisation.

dislike -3 -2 -1 0 1 2 3 like

20. Overall, introducing innovation into this organisation would be

a bad idea	-3	-2	-1	0	1	2	3	a good idea
negative	-3	-2	-1	0	1	2	3	positive
worthless	-3	-2	-1	0	1	2	3	valuable
bad	-3	-2	-1	0	1	2	3	good

21. Is there an individual or group of individuals in the company who:

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Express confidence in what innovations can do	❑	❑	❑	❑	❑
Point out reasons why innovations would succeed	❑	❑	❑	❑	❑
Enthusiastically promote innovation advantages	❑	❑	❑	❑	❑

Implementation of Innovations in your Organisation

22. The list below details a number of measures that can be used by organisations to measure the effectiveness of innovations. Please tick in the first column those that you perceive to be important in measuring the effectiveness of innovations. Please tick or write in the second column those that were actually used in your organisation in the last three years.

Performance Measures	Important?	**Actual measurements used in organisation/Obtained record data**
Return on investment	❑	
Various profit margin measures	❑	
Sales and sales growth	❑	
Payback and payback period	❑	
Cash flow	❑	
Customer satisfaction	❑	
Customer retention rate	❑	
Labour productivity	❑	
Quality of products and /or services	❑	
Lead time	❑	
Delivery reliability and /or speed	❑	
Process time	❑	
Employee development	❑	
Employee knowledge	❑	
Other measures: Please specify? _____	❑	

23. If there are some measures above that you believe are important, but are not actually used in your organisation, please provide a reason/s below:

_____
_____
_____

24. Please circle the number that best describes your organisation's experiences with innovation implementation over the past three years.

Many problems	1	2	3	4	5	Few problems
Employee resistance	1	2	3	4	5	Employee acceptance
Rough	1	2	3	4	5	Smooth
Complicated	1	2	3	4	5	Simple

25. To what extent do you agree with the following questions regarding innovation implementation in your organisation over the past three years?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Employees do not really care whether the implementations succeeded or failed.	❑	❑	❑	❑	❑
If employees can avoid using the innovations, they do.	❑	❑	❑	❑	❑
When given a choice, employees usually choose not to use the innovations.	❑	❑	❑	❑	❑

26. How did your organisation introduce innovations and implementations over the last three years?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Senior managers identified a need for change.	❑	❑	❑	❑	❑
Stakeholders (e.g. employees) participated in the implementation process.	❑	❑	❑	❑	❑
External agencies/consultants persuaded the implementation.	❑	❑	❑	❑	❑
Senior manages persuaded employees to use the innovation.	❑	❑	❑	❑	❑
Senior manages controlled and monitored employees to use the innovation.	❑	❑	❑	❑	❑
I am confident that innovations would be successful in this organisation	❑	❑	❑	❑	❑
I expect that any innovations we introduce would be successful.	❑	❑	❑	❑	❑
We have successfully introduced innovations in the past.	❑	❑	❑	❑	❑

27. To what extent do you agree with the following statements regarding the implementation of innovation in your organisation?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Implementation is generally carefully planned and costed	❑	❑	❑	❑	❑
Innovation is always part of a long term strategic plan	❑	❑	❑	❑	❑
Our organisation often puts too little time into planning for implementation	❑	❑	❑	❑	❑
Our organisation provides training to employees before innovation implementation has taken place	❑	❑	❑	❑	❑
Training is often available to employees during innovation implementation phase.	❑	❑	❑	❑	❑
In our organisation, the more employees know about innovation and its implementation, the better their chances are of getting promoted or bonus or raise.	❑	❑	❑	❑	❑
Our organisation has provided someone to help when employees get stuck on a problem while using an adopted innovation.	❑	❑	❑	❑	❑
Helpful books and/or manuals are available when employees have problems with the innovation.	❑	❑	❑	❑	❑
Most employees have been so busy that they have very little time to devote to the implementation of innovation.	❑	❑	❑	❑	❑
Our organisation has encouraged employees to take time off from their regular work tasks to attend implementation meetings and training sessions.	❑	❑	❑	❑	❑
Employees are well informed about the implementation process.	❑	❑	❑	❑	❑
Employees are well informed about the strategic reasons behind the implementation of innovations	❑	❑	❑	❑	❑

28. To what extent do you agree with the following statements regarding the resources necessary to introduce innovations in your organisation?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
I expect that it would be costly to introduce innovations in this organisation.	❑	❑	❑	❑	❑
I am confident that we could overcome obstacles when introducing innovation.	❑	❑	❑	❑	❑
We have access to the resources we would need to use innovation in our organisation	❑	❑	❑	❑	❑
If we wanted to, there are no obstacles to our using innovation in our organisation.	❑	❑	❑	❑	❑
There is usually abundant availability of required labour skills within our organisations for introducing innovation.	❑	❑	❑	❑	❑
There is usually no shortage of managerial talent to effectively introduce and implement innovation.	❑	❑	❑	❑	❑
We possess cutting edge know-how or have the resources to create new know-how	❑	❑	❑	❑	❑
We have experience in implementing hard, technological innovation	❑	❑	❑	❑	❑
We have the relevant technological background and skill level for innovating	❑	❑	❑	❑	❑
We have previous experiences with soft, managerial innovation	❑	❑	❑	❑	❑
We know the benefits and ability of innovations that would support our practice processes	❑	❑	❑	❑	❑
We have existing hardware and software to support innovation	❑	❑	❑	❑	❑

Section Three: Innovation, Your Organisation, & External Agencies

This section is concerned with your organisation's use of external agencies in the adoption and implementation of new products, services and ways of working.

29. To what extent do you believe that the following agencies think you should introduce innovation into your organisation?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Your suppliers	❑	❑	❑	❑	❑
Your customers	❑	❑	❑	❑	❑
Your competitors and the industry more generally	❑	❑	❑	❑	❑
Technology diffusion agencies	❑	❑	❑	❑	❑
Government agencies/departments	❑	❑	❑	❑	❑
Professional associations/networks	❑	❑	❑	❑	❑
Universities or higher education institutes	❑	❑	❑	❑	❑

30. To what extent do you value the opinions of the following agencies in relation to introducing innovation in your organisation?

	Not at all	Just a little	To some extent	Quite a lot	A great deal
Your suppliers	❑	❑	❑	❑	❑
Your customers	❑	❑	❑	❑	❑
Your competitors and the industry more generally	❑	❑	❑	❑	❑
Technology diffusion agencies	❑	❑	❑	❑	❑
Government agencies/departments	❑	❑	❑	❑	❑
Professional associations/networks	❑	❑	❑	❑	❑
Universities or higher education institutes	❑	❑	❑	❑	❑

31. Have you had contact with technology diffusion agencies? Yes ❑ No ❑
If no, please go to Question X.

	No contact	Little contact	Some contact	A fairly large amount	A very large amount
32. What is the amount of contact you have had with technology diffusion agencies?	❑	❑	❑	❑	❑

33. Who initiated the contact between yourselves and the technology diffusion agencies?

    a. you/your organisation ❑
    b. the technology diffusion agency ❑
    c. mutual/both ❑

34. To what extent do the following provide you and/or your organisation with awareness of potentially relevant innovations? To what extent do they provide you and/or your organisation with access to innovation? And, to what extent do they assist you in implementing innovation?

For each of the above questions, please rate the agencies on the following scale:

1 – Not at all; 2 – Just a little; 3 – To some extent; 4 – Quite a lot; 5 – A great deal

	Awareness	Access	Assistance
Technology consultancy firms			
Technology diffusion agencies			
Government agencies / departments			
Universities or higher education institutes			

You

35. Please indicate your current job title or position:_____

36. Length of service with the organisation: (*in years*) _____

37. Length of service in your current role or position: (*in years*) _____

38. What is your highest education level?
    a. High school ❑
    b. Undergraduate ❑
    c. Post graduate ❑
    d. Certification or Diploma ❑
    e. Other(please specify):_____

39. Are you presently considering a specific innovation in your organisation? Yes ❑ No ❑
If no, why not?

_____
_____

THANK YOU.
PLEASE RETURN THIS SURVEY IN THE PREPAID ENVELOPE.

APEENDIX C

Organizational Survey (Thai version)

เกี่ยวกับบริษัทของท่าน

ทีมงานวิจัยขอความกรุณาให้ท่านแบ่งปันข้อมูลพื้นฐานเกี่ยวกับบริษัทของท่าน
เพื่อที่ผู้วิจัยจะสามารถศึกษาความแตกต่างของการรับนวัตกรรมมาใช้ในองค์การของกลุ่มธุรกิจที่แตกต่างกันได้ **ข้อมูลทุกอย่างของท่านจะถูกรักษาไว้เป็นความลับ**

1. ชื่อบริษัทของท่าน : _____

2. ปีที่ก่อตั้งบริษัท?_____

3. ประเภทของอุตสาหกรรม? (กรุณาเลือกเพียงประเภทเดียว)

a. การเงิน	❑	h. โทรคมนาคม	❑
b. อุตสาหกรรมยานยนต์	❑	i. อุตสาหกรรมเคมี	❑
c. ก่อสร้าง	❑	j. วิศวกรรมเครื่องกล	❑
d. เทคโนโลยีสารสนเทศ	❑	k. อุตสาหกรรมยา	❑
e. อุตสาหกรรมไฟฟ้า	❑	l. ที่ปรึกษาด้านงานออกแบบ	❑
f. อุตสาหกรรมการผลิต	❑	m. อื่นๆ (โปรดระบุ):	❑
g. การบริการ	❑	_____	

4. จำนวนพนักงานทั้งหมดโดยประมาณกี่คน?

a. น้อยกว่า 20	❑	e. 201-500	❑
b. 20-50	❑	f.501-1000	❑
c. 51-100	❑	g. มากกว่า 1000	❑
d. 101-200	❑		

5. รายได้ทั้งหมดโดยประมาณในช่วงปี 2546-2547 ?

a. 0-5 ล้านบาท	❑
b. 5-10 ล้านบาท	❑
c. 10-5 ล้านบาท	❑
d. 50-200 ล้านบาท	❑
e. 200-500 ล้านบาท	❑
f. มากกว่า 500 ล้านบาท	❑

	ไม่มีเลย	น้อย	ปานกลาง	ค่อนข้างมาก	มาก	ไม่รู้
6. ภาวะการแข่งขันในกลุ่มอุตสาหกรรมของท่านเป็นอย่างไร?	❑	❑	❑	❑	❑	❑

7. ท่านเห็นด้วยหรือไม่กับข้อความต่อไปนี้ที่เกี่ยวกับบริษัทของท่าน?

	ไม่เห็นด้วยเลย	เห็นด้วยเล็กน้อย	เห็นด้วย	เห็นด้วยค่อนข้างมาก	เห็นด้วยมากที่สุด
ในบริษัทมีหลายหน่วยงานหรือหลายแผนกที่อยู่รองมาจากผู้บริหารที่ทำหน้าที่แตกต่างกัน (เช่น แผนกการตลาด,แผนกทรัพยากรบุคคล,แผนกบัญชี)	❑	❑	❑	❑	❑
มีผู้เชี่ยวชาญในด้านด่างๆหรือชื่อตำแหน่งเป็นจำนวนมากในบริษัทแห่งนี้	❑	❑	❑	❑	❑
บริษัทมีการบริหารงานแบบกระจายอำนาจจากศูนย์กลาง และสนับสนุนให้ทุกคนมีส่วนร่วมในการตัดสินใจ	❑	❑	❑	❑	❑
บริษัทมีการบริหารแบบศูนย์รวมอำนาจ การตัดสินใจเป็นหน้าที่ของผู้บริหารอาวุโส	❑	❑	❑	❑	❑
งานส่วนมากมักจะมีกฎเกณฑ์และนโบบายระบุเกี่ยวกับงานอย่างชัดเจน	❑	❑	❑	❑	❑
ทุกคนในบริษัทมีหน้าที่หรือขอบเขตงานระบุไว้อย่างชัดเจน	❑	❑	❑	❑	❑
งบประมาณของบริษัทจัดไว้เฉพาะสิ่งที่จำเป็นจริงๆเท่านั้น	❑	❑	❑	❑	❑
บริษัทมีงบประมาณพอเพียงสำหรับโครงการเฉพาะกิจหรือโครงการพิเศษ	❑	❑	❑	❑	❑
บริษัทลดงบประมาณด้านการลงทุนเมื่อไม่นานมานี้	❑	❑	❑	❑	❑
บริษัทของเรามีผลการดำเนินงานที่ดีเมื่อเทียบกับบริษัทคู่แข่งขัน	❑	❑	❑	❑	❑

8. คุณเห็นด้วยกับข้อความต่อไปนี้หรือไม่?	ไม่เห็นด้วยเลย	เห็นด้วยนิดหน่อย	เห็นด้วย	เห็นด้วยค่อนข้างมาก	เห็นด้วยมากที่สุด
ปรัชญาในการบริหารงานของเราคือ เราจะเดินไปข้างหน้าอย่างช้าๆแต่มั่นคงและปลอดภัย	❑	❑	❑	❑	❑
ธุรกิจของเราคือการเสี่ยงในช่วงจังหวะเวลาที่เหมาะสม	❑	❑	❑	❑	❑
การตัดสินใจในบริษัทเป็นไปอย่างระมัดระวังมากๆเพื่อความสัมฤทธิ์ผลอันสูงสุด	❑	❑	❑	❑	❑
ผู้บริหารเต็มใจให้โอกาสสำหรับความคิดหรือข้อแนะนำดีๆจากพนักงาน	❑	❑	❑	❑	❑

9. หากเปรียบเทียบกับบริษัทคู่แข่งแล้ว บริษัทของคุณเน้นกิจกรรมดังต่อไปนี้มากน้อยเพียงใด

	ไม่เลย	เน้นเพียงเล็กน้อย	เน้นพอสมควร	เน้นค่อนข้างมาก	เน้นมากที่สุด
การปรับปรุงอย่างต่อเนื่องเพื่อประสิทธิภาพในการปฏิบัติงาน	❑	❑	❑	❑	❑
คุณภาพของผลิตภัณฑ์ตลอดจนการใช้วงจรคุณภาพ	❑	❑	❑	❑	❑
การปรับเปลี่ยนเทคโนโลยีหรือขั้นตอนการผลิตที่สำคัญเพื่อให้มีประสิทธิภาพและประสิทธิผลที่ดีขึ้น	❑	❑	❑	❑	❑
กำหนดผลิตภัณฑ์และ/หรือการบริการที่ชัดเจนออกสู่ตลาดอย่างสม่ำเสมอ	❑	❑	❑	❑	❑
การสละผลกำไรในปัจจุบันเพื่อเพิ่มส่วนแบ่งทางการตลาด	❑	❑	❑	❑	❑
การลดราคาเพื่อเพิ่มส่วนแบ่งทางการตลาด	❑	❑	❑	❑	❑
การตั้งราคาที่ต่ำกว่าบริษัทคู่แข่ง	❑	❑	❑	❑	❑
การเพิ่มส่วนแบ่งทางการตลาดโดยใช้กระแสเงินสดหมุนเวียนและผลกำไร	❑	❑	❑	❑	❑
การทำวิจัยพื้นฐานเพื่อทำให้บริษัทได้เปรียบคู่แข่งแข้น	❑	❑	❑	❑	❑
การติดตามแนวโน้มทางธุรกิจที่สำคัญๆอย่างเป็นทางการ	❑	❑	❑	❑	❑
การคาดคะเนตัวชี้วัดที่สำคัญในการปฏิบัติงาน	❑	❑	❑	❑	❑
การเน้นที่ตัวเลขและวิเคราะห์การดำเนินงาน	❑	❑	❑	❑	❑
การใช้รายละเอียดข้อมูลที่แท้จริงในการช่วยการตัดสินใจในการดำเนินงานแต่ละวัน	❑	❑	❑	❑	❑
	ไม่เลย	เน้นเพียง	เน้นพอสมควร	เน้นค่อนข้างมาก	เน้นมากที่สุด

		เล็กน้อย			
การวิเคราะห์โอกาสทางธุรกิจหรือสิ่งที่ท้าทาย	❑	❑	❑	❑	❑
การใช้เทคนิคการวางแผน	❑	❑	❑	❑	❑
การเพิ่มประสิทธิภาพ (เช่น การเตรียมรับมือยอดสั่งสินค้าจำนวนมาก) ก่อนที่คู่แข่งจะเตรียมการรับมือเช่นเดียวกัน	❑	❑	❑	❑	❑
การเป็นเจ้าแรกที่นำสินค้าหรือการบริการออกสู่ตลาด	❑	❑	❑	❑	❑
การรับนวัตกรรมมาใช้ก่อนคนอื่น	❑	❑	❑	❑	❑
การแสวงหาโอกาสที่เกี่ยวข้องกับการดำเนินงานในปัจจุบันอย่างสม่ำเสมอ	❑	❑	❑	❑	❑

10. บริษัทของท่านมีการใช้แนวปฏิบัติดังต่อไปนี้มากน้อยเพียงใด

	ไม่ใช้เลย	ใช้บ้างเล็กน้อย	ใช้พอสมควร	ใช้ค่อนข้างมาก	ใช้เป็นประจำ
การเก็บข้อมูลเกี่ยวกับความเห็นของลูกค้าอย่างสม่ำเสมอ	❑	❑	❑	❑	❑
กาาติดตามนโยบายและกลยุทธ์ของบริษัทคู่แข่ง	❑	❑	❑	❑	❑
การพยาการณ์ยอดขาย ความชอบของลูกค้าและเทคโนโลยี เป็นต้น	❑	❑	❑	❑	❑
การทำวิจัยทางการตลาดโดยเฉพาะ	❑	❑	❑	❑	❑

11. ท่านเห็นด้วยกับข้อความเกี่ยวกับทัศนคติของบริษัทและพฤติกรรมการปรับกระบวนการหรือการปฏิบัติงานขององค์การ) เช่น ด้านเทคโนโลยี ซอฟแวร์ หรือ กระบวนการทางธุรกิจ (ให้เข้ากับกลยุทธ์ของบริษัทอย่างไร

	ไม่เห็นด้วย	เห็นด้วยบ้าง	เห็นด้วย	เห็นด้วยค่อนข้างมาก	เห็นด้วยอย่างที่สุด
การเชื่อมโยงเทคโนโลยี ซอฟแวร์ กระบวนการและกลยุทธ์ทางธุรกิจที่ชัดเจนและมีการติดตามผล	❑	❑	❑	❑	❑
การวิเคราะห์การลงทุนในเทคโลยี ซอฟแวร์หรือกระบวนการใหม่ๆเพื่อให้สอดคล้องกับกลยุทธ์ทางธุรกิจ	❑	❑	❑	❑	❑
ผู้บริหารอาวุโสมีความเข้าใจทั่วไปว่าผลิตภัณฑ์ ตลาด และเทคโนโลยี ซอฟแวร์หรือกระบวนการธุรกิจ มีความสัมพันธ์กันอย่างไร และมีการจัดการความสัมพันธ์ดังกล่าวเชิงกลยุทธ์	❑	❑	❑	❑	❑
นวัตกรรม หรือกระบวนการ/ผลิตภัณฑ์มีความสำคัญสำหรับบริษัทเพราะว่าเป็นสิ่งที่ทำให้บริษัทบรรลุถึงกลยุทธ์เชิงธุรกิจใหม่ๆ	❑	❑	❑	❑	❑

เกี่ยวกับนวัตกรรมในบริษัทของท่าน

แบบสอบถามต่อจากนี้จะถามเกี่ยวกับนวัตกรรมที่บริษัทของท่านได้นำเข้ามาใช้ในช่วง 3 ปีที่ผ่านมา ทั้งนี้รวมถึงประเภทของนวัตกรรม และผลลัพท์ที่ได้ ตลอดจนถึงข้อคิดเห็นเกี่ยวกับนวัตกรรม และประสบการณ์ในการนำไปใช้ในบริษัทของท่าน ในแบบสอบถามนี้เรานิยามคำว่า:

- ***นวัตกรรม*** คือ เทคโนโลยี หรือ แนวปฏิบัติที่บริษัทนำเข้ามาใช้เป็นครั้งแรก โดยไม่คำนึงว่าบริษัทอื่นๆจะเคยใช้เทคโนโลยี หรือแบบปฏิบัติดังกล่าวมาก่อนหรือไม่
- ***การยอมรับนวัตกรรมมาใช้*** หมายถึง การตัดสินใจของบริษัทที่จะมีการนำนวัตกรรมมาใช้ในบริษัท การยอมรับในที่นี้เน้นไปที่การกระบวนการตัดสินใจ การวางแผนและการจัดซื้อนวัตกรรม
- ***การนำไปใช้*** หมายถึง ขั้นตอนที่ต่อจากการตัดสินใจยอมรับนวัตกรรม เป็นจุดเปลี่ยนของสมาชิกในองค์การที่จะต้องมีทักษะ ความสามารถและตั้งใจที่จะใช้นวัตกรรมนั้นอย่างสม่ำเสมอ
- ***การส่งเสริมแนะนำนวัตกรรมสู่บริษัท*** หมายถึง กระบวนการตัดแต่ตัดสินใจยอมรับนวัตกรรมนั้น ตลอดจนการนำนวัตกรรมนั้นไปใช้ให้ในบริษัท

12. ต่อไปนี้เป็นประเภทของนวัตกรรมที่ใช้ในอุตสาหกรรมการผลิตในประเทศไทย กรุณาระบุว่าระยะเวลา 3 ปีที่ผ่านมาบริษัทของท่านมีการใช้นวัตกรรมประเภทใดบ้าง และโปรระบุจำนวน (รวมนวัตกรรมที่ประสบความสำเร็จและไม่ประสบความสำเร็จ)

	นำมาใช้?	จำนวน?
โรงงานใหม่ หรือ เครื่องจักรใหม่	❑	_____
ระบบการผลิตใหม่ หรือ เทคโนโลยีทางการผลิต	❑	_____
การเปลี่ยนแปลงการบริการทางธุรกิจ	❑	_____
ผลิตภัณฑ์ใหม่	❑	_____
การเปลี่ยนแปลงผลิตภัณฑ์ที่มีอยู่แล้ว	❑	_____
กระบวนการหรือระบบการทำงานใหม่ (เช่น TQM)	❑	_____
ระบบการบริหารใหม่ (เช่น ระบบการสื่อสาร ระบบรายการสินค้า)	❑	_____
การจัดการทรัพยากรมนุษย์ (เช่น การประเมินผลการปฏิบัติงาน ระบบการให้รางวัล การฝึกอบรม)	❑	_____
การปรับโครงสร้างองค์การ (เช่น การรวมบริษัท การขยายบริษัท))	❑	_____
อื่นๆ โปรดระบุ: _____	❑	_____

13. นวัตกรรมต่อไปนี้มีความแตกต่างไปจากที่บริษัทเคยนำมาใช้มากน้อยเพียงใด ?

	ไม่แตกต่าง	แตกต่างเล็กน้อย	แตกต่าง	แตกต่างค่อนข้างมาก	แตกต่างโดยสิ้นเชิง
โรงงานใหม่ หรือ เครื่องจักรใหม่	❑	❑	❑	❑	❑
ระบบการผลิตใหม่ หรือ เทคโนโลยีทางการผลิต	❑	❑	❑	❑	❑
การเปลี่ยนแปลงการบริการทางธุรกิจ	❑	❑	❑	❑	❑
ผลิตภัณฑ์ใหม่	❑	❑	❑	❑	❑
การเปลี่ยนแปลงผลิตภัณฑ์ที่มีอยู่แล้ว	❑	❑	❑	❑	❑
กระบวนการหรือระบบการทำงานใหม่ (เช่น TQM)	❑	❑	❑	❑	❑
ระบบการบริหารใหม่ (เช่น ระบบการสื่อสาร ระบบรายการสินค้า)	❑	❑	❑	❑	❑
การจัดการทรัพยากรมนุษย์ (เช่น การประเมินผลการปฏิบัติงาน ระบบการให้รางวัล การฝึกอบรม)	❑	❑	❑	❑	❑
การปรับโครงสร้างองค์การ (เช่น การรวมบริษัท หรือ การขยายบริษัท)	❑	❑	❑	❑	❑
อื่นๆ โปรดระบุ: _____	❑	❑	❑	❑	❑

14. ท่านเห็นด้วยกับข้อความเกี่ยวกับวิสัยทัศน์ของบริษัทที่มีต่อนวัตกรรมต่อไปนี้อย่างไร ?

	ไม่เห็นด้วย	เห็นด้วยเล็กน้อย	เห็นด้วย	เห็นด้วยค่อนข้างมาก	เห็นด้วยที่สุด
บริษัทของเรามีการเปลี่ยนแปลงปรับปรุงสม่ำเสมอ	❑	❑	❑	❑	❑
บริษัทของเราต้องพิสูจน์เสียก่อนว่านวัตกรรมหนึ่งๆจะต้องประสบความสำเร็จในบริษัทอื่นๆมาก่อน แล้วบริษัทของเราจึงจะตัดสินใจรับมาใช้	❑	❑	❑	❑	❑
บริษัทของเรามีการรับสิ่งใหม่ๆมาใช้อย่างต่อเนื่อง และมีการปรับปรุงวิธีการทำงานอยู่เสมอ	❑	❑	❑	❑	❑
บริษัทของเราสนับสนุนและให้รางวัลแก่ทุกคนที่กล้าเสี่ยง	❑	❑	❑	❑	❑
บริษัทของเราเข้าใจว่านวัตกรรมมีผลต่อการดำเนินธุรกิจในแต่ละวัน	❑	❑	❑	❑	❑
บริษัทของเรามีความเข้าใจดีว่าทำไมนวัตกรรมจึงมีความสำคัญต่อธุรกิจ	❑	❑	❑	❑	❑
บริษัทของเราต้องการเปลี่ยนแปลงเพื่อการอยู่รอด	❑	❑	❑	❑	❑
บริษัทเราต้องการนำนวัตกรรมเข้ามาใช้เพื่อที่จะอยู่เหนือคู่แข่งขัน	❑	❑	❑	❑	❑
การเปลี่ยนแปลงในตลาดค่อนข้างคงที่ ดังนั้นบริษัทของเราจึงไม่มีความจำเป็นที่จะต้องปรับเปลี่ยนอยู่เสมอ	❑	❑	❑	❑	❑

15. การเปลี่ยนแปลงในบริษัทของท่านช่วง 3 ปีที่ผ่านมากมีผลลัพธ์โดยทั่วไปเป็นอย่างไร?

	แย่ลงมาก	แย่ลง	ไม่เปลี่ยนแปลง	ดีขึ้น	ดีขึ้นอย่างมาก
การเพิ่มผลผลิต?	❑	❑	❑	❑	❑
ประสิทธิภาพในการปฏิบัติงาน ?	❑	❑	❑	❑	❑
ต้นทุนหรือแรงงาน ?	❑	❑	❑	❑	❑
การปฏิบัติงานที่น่าเชื่อถือและสม่ำเสมอ ?	❑	❑	❑	❑	❑
การสื่อสารในบริษัท ?	❑	❑	❑	❑	❑
ความหลากหลายของผลิตภัณฑ์ หรือ การบริการ ?	❑	❑	❑	❑	❑
การตอบสนองความต้องการของลูกค้า ?	❑	❑	❑	❑	❑

	แย่ลงมาก	แย่ลง	ไม่เปลี่ยนแปลง	ดีขึ้น	ดีขึ้นอย่างมาก
คุณภาพชีวิตของพนักงาน ?	❑	❑	❑	❑	❑
สุขภาพและความปลอดภัยในบริษัท ?	❑	❑	❑	❑	❑
การมีส่วนร่วมของพนักงาน ?	❑	❑	❑	❑	❑
ความพึงพอใจของลูกค้าหรือผู้รับบริการ?	❑	❑	❑	❑	❑
สถานภาพด้านการเงินของบริษัท ?	❑	❑	❑	❑	❑
ความสัมพันธ์ระหว่างผู้บริหารและพนักงาน ?	❑	❑	❑	❑	❑
คุณภาพของผลิตภัณฑ์ หรือ การบริการ ?	❑	❑	❑	❑	❑
สิ่งแวดล้อม ?	❑	❑	❑	❑	❑
ขวัญและกำลังใจของพนักงาน ?	❑	❑	❑	❑	❑
ความไว้ใจในบริษัท ?	❑	❑	❑	❑	❑
ความคล่องตัวของบริษัท ?	❑	❑	❑	❑	❑
ความสามารถเชิงกลยุทธ์ทางธุรกิจ ?	❑	❑	❑	❑	❑
อื่นๆ โปรดระบุ _____?	❑	❑	❑	❑	❑

	ไม่เกิดเลย	เกิดช้ามากๆ	เกิดขึ้นค่อนข้างช้า	เกิดขึ้นอย่างรวดเร็ว	เกิดขึ้นอย่างเร็วมากๆ
16. การพัฒนาเชิงเทคโนโลยีเกิดขึ้นในบริษัทของท่านรวดเร็วมากน้อยเพียงใด ?	❑	❑	❑	❑	❑

17. ท่านมีโอกาสได้ใช้ประโยชน์จากนวัตกรรมบ้างหรือไม่ ? มี ❑ ไม่มี ❑

	ไม่มีเลย	ช้ามากๆ	ค่อนข้างช้า	เร็ว	เร็วมาก
18. อัตราการรับนวัตกรรมมาใช้ในอุตสาหกรรมของท่านเป็นอย่างไร ?	❑	❑	❑	❑	❑

19. กรุณาเลือกวงกลมหมายเลขที่บ่งบอกถึงความสัมพันธ์ของวิสัยทัศน์ของบริษัทและนวัตกรรม

บริษัท..... แนวความคิดในการนำนวัตกรรมเข้ามาใช้ในบริษัท

ไม่ชอบ -3 -2 -1 0 1 2 3 ชอบ

20. โดยรวมแล้ว การนำนวัตกรรมเข้ามาใช้ในบริษัทนั้นเป็น .....?

ความคิดที่แย่มาก ความคิดที่ดีมาก	-3	-2	-1	0	1	2	3	
เชิงลบ	-3	-2	-1	0	1	2	3	เชิงบวก
ไร้ค่า	-3	-2	-1	0	1	2	3	มีค่ามาก
แย่	-3	-2	-1	0	1	2	3	ดี

21. มีใครหรือกลุ่มพนักงานในบริษัทที่ .....?

	ไม่มีเลย	มีเพียงเล็กน้อย	พอมีบ้าง	มีเป็นจำนวนหนึ่ง
แสดงออกถึงความมั่นใจในว่านวัตกรรมใดที่สามารถนำไปปฏิบัติได้	❑	❑	❑	❑
แสดงเหตุผลว่าเหตุใดนวัตกรรมจึงประสบความสำเร็จ	❑	❑	❑	❑
กระตือรือร้นที่จะสนับสนุนข้อดีของนวัตกรรม	❑	❑	❑	❑

กระบวนการนำนวัตกรรมมาใช้ในบริษัท

22. รายการต่อไปนี้เป็นตัววัดความสำเร็จของการเปลี่ยนแปลงในบริษัท
หรือเป็นตัววัดประสิทธิภาพของนวัตกรรม กรุณากาเครื่องหมายถูกในช่องแรก
หากท่านเห็นว่าตัวชี้วัดดังกล่าวมีความสำคัญ
และในช่องถัดมากรุณากาเครื่องหมายถูกหรือระบุว่าท่านมีการใช้ตัววัดดังกล่าว
หรือมีการเก็บข้อมูลที่เกี่ยวข้องกับตัวชี้วัดดังกล่าวในบริษัทของท่านหรือไม่ในช่วง 3 ปีที่ผ่านมา

ตัวชี้วัด	**ความสำคัญ?**	**นำมาใช้ในบริษัท หรือมีการเก็บข้อมูล?**
ผลตอบแทนจากการลงทุน	❑	
อัตราผลกำไร	❑	
ยอดขายและการเพิ่มขึ้นของการขาย	❑	
ระยะเวลาการเอาทุนคืน	❑	
กระแสเงินสด	❑	
ความพึงพอใจของลูกค้า	❑	
อัตราการรักษาลูกค้า	❑	
ผลิตภาพด้านแรงงาน	❑	
คุณภาพของผลิตภัณฑ์ หรือ การบริการ	❑	
ระยะเวลาที่ใช้ในการส่งมอบสินค้า	❑	
ความน่าเชื่อถือในการจัดส่ง และ/หรือ ความเร็ว	❑	
ระยะเวลาที่ใช้ในการผลิต	❑	
การพัฒนาพนักงาน	❑	
ความรู้ของพนักงาน	❑	
ตัวชี้วัดอื่น โปรดระบุ_____	❑	

23. หากมีตัวตัวชี้วัดที่คุณระบุว่ามีความสำคัญแต่ไม่ได้นำมาใช้ในบริษัท หรือไม่มีการจัดเก็บข้อมูลไว้ โปรดกรุณาบอกเหตุผลดังกล่าว **(คำตอบของท่านสำคัญมากต่อการศึกษาของเรา โปรดสละเวลาบรรยายถึงเหตุผล)** :

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24. โปรดเลือกวงกลมหมายเลขที่บรรยายถึงประสบการณ์ของบริษัทของท่านที่ได้จากการนำเอานวัตกรรมมาใช้ในช่วง 3 ปีที่ผ่านมา

มีปัญหามาก	1	2	3	4	5	มีปัญหาเพียงเล็กน้อย
การต่อต้านจากพนักงาน	1	2	3	4	5	การยอมรับจากพนักงาน
ไม่ราบรื่น	1	2	3	4	5	ราบรื่นดี
ซับซ้อน	1	2	3	4	5	เรียบง่าย

25. คุณเห็นด้วยกับข้อความเกี่ยวกับการนำเอานวัตกรรมมาใช้ในบริษัทของท่านในช่วงเวลา 3 ปีที่ผ่านมา ต่อไปนี้มากน้อยเพียงใด ?

	ไม่เห็นด้วยเลย	เห็นด้วยเล็กน้อย	ต่อนข้างเห็นด้วย	เห็นด้วยมาก	เห็นด้วยมากที่สุด
พนักงานไม่สนใจว่าการนำเอานวัตกรรมเข้ามาใช้จะประสบความสำเร็จหรือล้มเหลว	❑	❑	❑	❑	❑
พนักงานมักจะพยายามหลีกเลี่ยงที่จะใช้นวัตกกรมทุกครั้งเมื่อพวกเขาประสบโอกาส	❑	❑	❑	❑	❑
หากให้ทางเลือกแก่พนักงานแล้ว พวกเขาเลือกที่จะไม่ใช้นวัตกรรมที่บริษัทนำเข้ามา	❑	❑	❑	❑	❑

26. บริษัทของคุณมีการนำเอานวัตกรรมเข้ามาใช้อย่างไรในช่วง 3 ปีที่ผ่านมา ?

	ไม่ใช่เลย	มีบ้างเล็กน้อย	ใช้บ้าง	ใช้มาก	ใช้มากที่สุด
ผู้บริหารอาวุโสชี้แจงความจำเป็นของการเปลี่ยนแปลงภายในบริษัท	❑	❑	❑	❑	❑
ผู้ได้ประโยชน์จากบริษัท (เช่น พนักงาน) มีส่วนร่วมในกระบวนการนำเอานวัตกรรมไปใช้	❑	❑	❑	❑	❑
ตัวแทนหรือที่ปรึกษาจากภายนอกจูงใจพนักงานในกระบวนการนำเอานวัตกรรมไปใช้	❑	❑	❑	❑	❑
ผู้บริหารอาวุโสจูงใจพนักงานในกระบวนการนำเอานวัตกรรมไปใช้	❑	❑	❑	❑	❑
ผู้บริหารอาวุโสควบคุมและดูแลให้พนักงานใช้นวัตกรรม	❑	❑	❑	❑	❑
ท่านมั่นใจว่าการนำเอานวัตกรรมมาใช้จะต้องประสบความสำเร็จในบริษัทของท่าน	❑	❑	❑	❑	❑
ท่านมั่นใจว่าทุกนวัตกรรมที่เลือกเข้ามาใช้ในบริษัทจะต้องประสบผลสำเร็จ	❑	❑	❑	❑	❑
ที่ผ่านมา บริษัทของเราประสบความสำเร็จในการนำเอานวัตกรรมมาใช้	❑	❑	❑	❑	❑

27. ท่านเห็นด้วยกับข้อความเกี่ยวกับกระบวนการนำนวัตกรรมเข้ามาใช้ในบริษัทของท่านดังต่อไปนี้อย่างไร

	ไม่เห็นด้วยเลย	เห็นด้วยเล็กน้อย	ต่อนข้างเห็นด้วย	เห็นด้วยมาก	เห็นด้วยมากที่สุด
มีการวางแผนกระบวนการนำนวัตกกรมเข้ามาใช้ตลอดจนค่าใช้จ่ายที่เกี่ยวข้อง	❑	❑	❑	❑	❑
นวัตกรรมเป็นส่วนหนึ่งของการวางแผนเชิงกลยุทธ์ระยะยาวเสมอ	❑	❑	❑	❑	❑
บริษัทของเรามีเวลาเพียงเล็กน้อยในการวางแผนการนำนวัตกรรมมาใช้ภายในบริษัท	❑	❑	❑	❑	❑
บริษัทของเรามีการจัดเตรียมการฝึกอบรมให้พนักงานทุกครั้งก่อนมีการนำเอานวัตกรรมเข้ามาใช้	❑	❑	❑	❑	❑
บริษัทจัดให้มีการฝึกอบรมในระหว่างที่มีการนำเอานวัตกรรมมาใช้	❑	❑	❑	❑	❑
ในบริษัทของเรายิ่งพนักงานคนใดที่มีความรู้เกี่ยวกับนวัตกกรมและการนำไปใช้มากเท่าไหร่ โอกาสที่พวกเขาจะได้ปรับตำแหน่งหรือได้เงินรางวัลพิเศษจะมีมากขึ้น	❑	❑	❑	❑	❑
บริษัทของเราจัดเตรียมเจ้าหน้าที่ไว้คอยช่วยเหลือพนักงานหากว่าพวกเขามีปัญหาเกี่ยวกับการใช้นวัตกรรมที่บริษัทกำลังส่งเสริมให้ใช้	❑	❑	❑	❑	❑
พนักงานส่วนมากยุ่งเสียจนไม่มีเวลาใส่ใจกับนวัตกรรมที่บริษัทพยายามจะส่งเสริมให้ใช้	❑	❑	❑	❑	❑
บริษัทส่งเสริมให้พนักงานมีการหยุดจากงานประจำเพื่อเข้าร่วมการอบรมหรือการประชุมเกี่ยวกับการนำเอานวัตกรรมมาใช้ในบริษัท	❑	❑	❑	❑	❑
พนักงานทุกคนได้รับการชี้แจงเกี่ยวกับขั้นตอนการนำนวัตกรรมมาใช้เป็นอย่างดี	❑	❑	❑	❑	❑
พนักงานทุกคนได้รับแจ้งเกี่ยวกับกลยุทธ์ที่อยู่เบื้อหลังของการนำนวัตกรรมเข้ามาใช้ในบริษัท	❑	❑	❑	❑	❑

28. ท่านเห็นด้วยกับข้อความที่เกี่ยวกับทรัพยากรที่จำเป็นในการส่งเสริมนวัตกรรมในบริษัทของท่านต่อไปนี้อย่างไร ?

	ไม่เห็นด้วยเลย	เห็นด้วยเพียงเล็กน้อย	ต่อนข้างเห็นด้วย	เห็นด้วยมาก	เห็นด้วยมากที่สุด
ท่านคาดว่าจะมีค่าใช้จ่ายในการส่งเสริมนวัตกรรมภายในบริษัท	❑	❑	❑	❑	❑
ท่านมั่นใจว่าท่านจะสามารถเอาชนะอุปสรรคที่เกิดขึ้นในระหว่างการส่งเสริมนวัตกรรมในบริษัท	❑	❑	❑	❑	❑
พวกเรามีการเข้าถึงทรัพยากรที่จำเป็นในการส่งเสริมการใช้นวัตกรรมภายในบริษัท	❑	❑	❑	❑	❑
ไม่มีอุปสรรคใดที่จะมาขัดหวาง หากเรามีความต้องการที่จะใช้นวัตกรรมนั้นอย่างแท้จริง	❑	❑	❑	❑	❑
บริษัทมีพนักงานที่มีความสามารถหรือชำนาญการเฉพาะมากมายที่จะสามารถช่วยในการส่งเสริมนวัตกรรมภายในบริษัท	❑	❑	❑	❑	❑
ปกติแล้วบริษัทไม่ขาดแคลนผู้บริหารที่มีฝีมือ โดยเฉพาะในการส่งเสริมและการนำนวัตกรรมไปใช้ในบริษัท	❑	❑	❑	❑	❑
บริษัทเราเป็นเจ้าของความรู้ความชำนาญที่ทันสมัย หรือมีทรัพยากรในการสร้างเสริมความรู้ความชำนาญใหม่ๆ	❑	❑	❑	❑	❑
บริษัทเรามีประสบการณ์ในการนำเอานวัตกรรมเชิงเทคโนโลยีเข้ามาใช้ในบริษัท	❑	❑	❑	❑	❑
บริษัทเรามีพื้นฐานเชิงเทคโนโลยีและทักษะในการประยุกต์ใช้	❑	❑	❑	❑	❑
บริษัทเรามีประสบการณ์ในการนำนวัตกรรมเชิงบริหารมาใช้	❑	❑	❑	❑	❑
บริษัทเราเข้าใจว่าประโยชน์และความสามารถของนวัตกรรมจะส่งเสริมกระบวนการทำงานในเชิงปฏิบัติ	❑	❑	❑	❑	❑
บริษัทเรามีทั้งฮาร์ดแวร์และซอฟ์แวร์ในการส่งเสริมนวัตกรรม	❑	❑	❑	❑	❑

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แบบสอบถามต่อไปนี้เกี่ยวกับการใช้บริการตัวแทนหรือที่ปรึกษาจากภายนอกเกี่ยวกับการส่งเสริมนวัตกรรมในบริษัทของท่าน

29. ท่านเห็นด้วยมากน้อยเพียงใดว่าตัวแทนต่างๆดังต่อไปนี้เห็นสมควรว่าบริษัทของท่านควรมีการรับเอานวัตกรรมเข้ามาใช้ ?

	ไม่เห็นด้วยเลย	เห็นด้วยเพียงเล็กน้อย	ต่อนข้างเห็นด้วย	เห็นด้วยมาก	เห็นด้วยมากที่สุด
ซับพลายเออร์	❑	❑	❑	❑	❑
ลูกค้า	❑	❑	❑	❑	❑
บริษัทคู่แข่งหรืออุสหากรรมโดยรวม	❑	❑	❑	❑	❑
บริษัทที่ปรึกษาด้านการส่งเสริมด้านเทคโนโลยี	❑	❑	❑	❑	❑
หน่วยงานส่งเสริมจากรัฐบาล	❑	❑	❑	❑	❑
เครือข่าย หรือ สมาคมผู้เชี่ยวชาญ	❑	❑	❑	❑	❑
มหาวิทยาลัย หรือสถาบันการศึกษา	❑	❑	❑	❑	❑

30. ท่านให้ความสำคัญกับความคิดเห็นเกี่ยวกับการส่งเสริมนวัตกรรมในบริษัทจากตัวแทนดังต่อไปนี้มากน้อยเพียงใด ?

	ไม่สำคัญ	สำคัญเพียงเล็กน้อย	ต่อนข้างสำคัญ	สำคัญมาก	สำคัญมากที่สุด
ซับพลายเออร์	❑	❑	❑	❑	❑
ลูกค้า	❑	❑	❑	❑	❑
บริษัทคู่แข่งหรืออุสหากรรมโดยรวม	❑	❑	❑	❑	❑
บริษัทที่ปรึกษาด้านการส่งเสริมด้านเทคโนโลยี	❑	❑	❑	❑	❑
หน่วยงานส่งเสริมจากรัฐบาล	❑	❑	❑	❑	❑
เครือข่าย หรือ สมาคมผู้เชี่ยวชาญ	❑	❑	❑	❑	❑
มหาวิทยาลัย หรือสถาบันการศึกษา	❑	❑	❑	❑	❑

31. ท่านเคยติดต่อตัวแทนหรือที่ปรึกษาเกี่ยวกับการส่งเสริมนวัตกรรมบ้างหรือไม่ ? เคย❑ ไม่เคย ❑
ถ้าไม่เคยโปรดข้ามไปตอบข้อ 35

	ไม่ได้ติดต่อ	บางครั้ง	พอสมควร	ค่อนข้างบ่อย	เป็นประจำ
32. ท่านติดต่อกับกับตัวแทนดังกล่าวบ่อยครั้งแค่ไหน?	❑	❑	❑	❑	❑

33. ใครเป็นผู้เริ่มติดต่อเกี่ยวกับการส่งเสริมนวัตกรรม ?
    a. ท่าน / บริษัทของท่าน ❑
    b. ตัวแทนหรือที่ปรึกษาจากภายนอก ❑
    c. ทั้งสองฝ่าย ❑

34. ตัวแทนดังต่อไปนี้มีการแจ้งให้ทราบเกี่ยวกับนวัตกรรมที่จะช่วยส่งเสริมผลการดำเนินงานของบริษัทมากน้อยเพียงใด? และตัวแทนดังกล่าวแนะนำวิธีการที่จะนำนวัตกรรมดังกล่าวมาใช้บ้างหรือไม่? นอกจากนี้ตัวแทนมีการช่วยเหลือในการสนับสนุนการใช้นวัตกรรมภายในบริษัทมากน้อยเพียงใด?

โปรดเลือกจากตัวเลขดังต่อไปนี้:
1 – ไม่เลย; 2 – มีบ้างเล็กน้อย; 3 – พอสมควร; 4 – ค่อนข้างมาก; 5 – เป็นประจำ

	แจ้งให้ทราบ	แนะนำวิธีการ	การให้ความช่วยเหลือ
บริษัทให้คำปรึกษาเกี่ยวกับเทคโนโลยี			
ตัวแทนเผยแพร่การใช้เทคโนโลยี			
ตัวแทนหรือหน่วยงานของรัฐบาล			
มหาวิทยาลัย หรือสถาบันการศึกษา			

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□□□□□□□□□□□□□□

35. โปรดระบุตำแหน่งของท่านในปัจจุบัน:_____

36. ระยะเวลาที่ทำงานให้แก่บริษัทนี้: (ปี) _____

37. ระยะเวลาที่ทำงานในตำแหน่งปัจจุบัน: (ปี) _____

38. ประวัติการศึกษา?
    a. มัธยม ❑
    b. ปริญญาตรี ❑
    c. ปริญญาโท หรือสูงกว่า ❑
    d. ประกาศนียบัตร/อนุปริญญา ❑
    e. อื่นๆ (โปรดระบุ):_____

39. ท่านกำลังพิจารณาที่จะนำนวัตกรรมใดมาใช้ในบริษัทของท่านเร็วนี้ ? ใช่ ❑ ไม่ใช่ ❑
ถ้าไม่ใช่ โปรดระบุเหตุผล?

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****ขอขอบพระคุณในการเสียสละเวลาอันมีค่าของท่าน**
โปรดส่งแบบสอบถามคืนโดยใช้ซองจดหมายพร้อมสแตมป์ที่แนบมาด้วย**

Appendix D

Bivariate correlation matrix by company size

Company Size	Variables	TMS	FRA	IPP	IC	IME	INE	HRA
(less than 100)	FRA	0.17*						
	IPP	0.53**	0.09					
	IC	0.36**	-0.03	0.36**				
	IME	0.28**	-0.09	0.21*	0.25**			
	INE	0.36**	-0.05	0.42**	0.11	0.37**		
	HRA	0.45**	0.09	0.40**	0.36**	0.26**	0.21*	
	ATI	0.19*	0.04	0.28**	0.14	0.32**	0.36**	0.23*
(100 or more)	FRA	0.41**						
	IPP	0.57**	0.02					
	IC	0.48**	0.36**	0.26*				
	IME	0.10	0.01	0.20	0.46**			
	INE	0.11	-0.13	0.16	0.18	0.40**		
	HRA	0.45**	0.04	0.24*	0.45**	0.37**	0.49**	
	ATI	0.47**	0.02	0.28**	0.25*	0.35**	0.23*	0.12*

Note: TMS-top management support, FRA-financial resources availability, HRA-human resources availability, IC-implementation climate, IPP-implementation policies and practices, IME-implementation effectiveness, INE-innovation effectiveness, ATI-organizational attitude toward future innovation adoption