1LINKING USER ACCEPTANCE AND USER RESISTANCE: THE ROLE OF ATTITUDE IN

ENTERPRISE RESOURCE PLANNING IMPLEMENTATION PHASES

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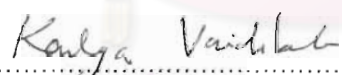Thesis Advisor   Professor Uthai Tanlamai, Ph.D.

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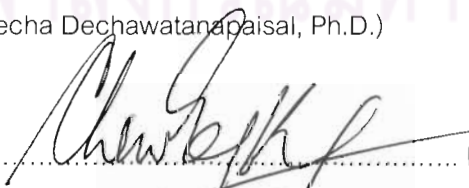
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การต่อต้านของผู้ใช้นั้นถูกพิจารณาว่าเป็นอุปสรรคต่อการพัฒนาและนำ
ระบบเทคโนโลยีสารสนเทศมาใช้ในองค์กรโดยมีการศึกษาผลกระทบของการต่อต้านต่อการ
ยอมรับของผู้ใช้ระบบอย่างต่อเนื่อง ผลการศึกษาในอดีตบ่งชี้ถึงผลกระทบในทางลบต่อความ
ตั้งใจเชิงพฤติกรรมในการใช้งานระบบ แต่ในกรณีที่การใช้งานระบบนั้นเป็นไปโดยปราศจาก
ความสมัครใจ การยอมรับเชิงสัญลักษณ์ได้รับพิจารณาว่ามีความเหมาะสมในการเป็นตัวแปร
บ่งชี้ถึงระดับการยอมรับในระบบเทคโนโลยีสารสนเทศมากกว่า งานวิจัยชิ้นนี้จึงมุ่งเน้น
การศึกษาความเชื่อมโยงของการยอมรับและการต่อต้านของผู้ใช้ระบบเมื่อการใช้งานระบบ
นั้นเป็นไปโดยปราศจากความยินยอม ข้อมูลวิจัยได้จัดเก็บจากรัฐวิสาหกิจขนาดใหญ่สาม
องค์กรที่มีช่วงของการพัฒนาระบบที่แตกต่างกันมาดำเนินการวิเคราะห์เพื่อหาหลักฐานเชิง
ประจักษ์ที่แสดงถึงบทบาทของเจตคติต่อการใช้งานระบบและเจตคติด้านการต่อต้านของผู้ใช้
ระบบ ซึ่งตัวแปรทั้งสองเป็นตัวแปรพื้นฐานของทฤษฎีเกี่ยวกับบทบาทของเจตคติที่มีต่อการนำ
ระบบมาใช้ในองค์กร ผลการวิจัยสนับสนุนแนวคิดของความไม่สมมาตรของผลกระทบ
ทางด้านลบ นั่นคือการต่อต้านของผู้ใช้ระบบนั้นมีผลในเชิงลบต่อการยอมรับระบบ และส่งผล
ต่อเนื่องไปยังความสัมพันธ์ระหว่างการยอมรับระบบและผลลัพธ์ของงานที่ทำ แต่ในทาง
กลับกันการยอมรับระบบไม่ได้ทำให้การต่อต้านของผู้ใช้ระบบเปลี่ยนไปแต่อย่างใด ผลวิจัยชิ้น
นี้ขยายผลความเข้าใจเชิงทฤษฎีที่เกี่ยวข้องกับความเชื่อมโยงระหว่างการยอมรับระบบและ
การต่อต้านของผู้ใช้ระบบ นอกจากนี้ผลวิจัยยังช่วยชี้ให้ผู้บริหารองค์กรเห็นถึงประเด็นสำคัญ
ที่ควรพิจารณาในการบริหารจัดการการเปลี่ยนแปลงที่เกิดจากการพัฒนาระบบการจัดการ
ทรัพยากรองค์กร

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THANACHART RITBUMROONG : LINKING USER ACCEPTANCE AND USER RESISTANCE: THE ROLE OF ATTITUDE IN ENTERPRISE RESOURCE PLANNING IMPLEMENTATION PHASES. THESIS ADVISOR : PROF. UTHAI TANLAMAI, Ph.D., 222 PP.

User resistance is known to be a great obstacle of information system implementation. Thus, previous information system researchers have continued investigating the influence of user resistance on user acceptance. The literature has shown that the resistance phenomenon can weaken behavioral intention to use a system. But when the system usage is mandated, symbolic adoption appears to be a better dependent variable of the Technology Acceptance Model. This study aims to examine the link between user acceptance and user resistance in a mandatory-usage context. Two attitude constructs (attitude towards system usage and resistance attitude) were conceptualized to determine the level of user acceptance and user resistance and, subsequently, empirically tested for their relationships with theoretical antecedents. The effects of these two phenomena on job-related outcomes were examined as well. Survey data were collected from three large state-owned enterprises in Thailand dealing with Enterprise Resource Planning implementation at different phases. Results of data analysis provide support to the asymmetric negativity effects such that user resistance negatively affects user acceptance and its influence on job-related outcomes, but not vice versa. The findings broaden the theoretical explanations on the linkage between user acceptance and user resistance, and also offer practical insights for managing change from Enterprise Resource Planning implementation.

Acknowledgements

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Chapter I

Introduction

1.1 Background and Rationale of the Study

Organization members who play the role of users are seen to have a critical impact on the success or failure of Information Systems (IS). This is evidenced by a growing number of IS studies emphasizing the vital role of users such as: user perceptions (Agarwal and Prasad, 1998; Lou, Luo, and Strong, 2000; Zviran, Pliskin, and Levin, 2005), user involvement (Amoako-Gyampah, 2007; Kappelman, 1995; Kappelman and McLean, 1992; Robey and Farrow, 1982), and user expectation (Bhattacherjee, 2001; Szajna and Scamell, 1993; Warshaw and Davis, 1985). Academia and practitioners pay special attention to these particular aspects of users in order to elevate the level of user acceptance of technology, one of the critical conditions dealing with IS success. Among other competing theories, Technology Acceptance Model (TAM) is seen to be the most robust model in describing how an individual accepts a newly introduced system (Lee, Kozar, and Larsen, 2003). Despite the fact that TAM has been employed extensively in a wide array of contexts, there are some criticisms regarding its limitations.

Lee et al. (2003) argue that the focus of TAM is narrowly on the role of technology and design. The essence of this model seems to emphasize the encompassing role of system attributes: usefulness and ease of use. With system usage as a dependent variable, TAM's argument seems to support the idea that a degree of user acceptance is determined by usage behaviors. When usage is involuntary, this context presents a challenge for TAM. Brown et al. (2002) indicate that measuring system usage appears to be irrelevant when users are required to use the system.

User resistance, one of the most cited concepts in the literature concerning IS success, is another paradigm dealing with how users negatively react to systems being implemented. In the broadest sense, resistance refers to any attempts

that try to slow, impede, hinder or reject change in order to maintain the status quo (Bovey and Hede, 2001a; Coetsee, 1999; Val and Fuentes, 2003). In a mandatory use context, users are left no choice but to use the system to perform their tasks. One example of negative consequences brought about by user resistance is the case of the adoption of Navy/Marine Corps Intranet (N/MCI), a United States Department of the Navy outsourcing program. Users strongly resisted the system, causing significant project delay and budget overruns, resulting in 6.9 million U.S. dollars in financial loss (Malhotra and Galletta, 2004).

Enterprise Resource Planning (ERP) is an information system with the aim of helping an organization improve business operations by integrating all functions along a value chain into one single system (Gupta, 2000). When business units work separately, this is most likely to lead to different work standards which, in turn, cause a communication problem, since data are kept redundant and inconsistent. The promises of ERP are to ease the pain of disparate workflows in an organization. Thus, the system creates interdependencies among business functions using the same data. If data are not entered correctly or completely, it will disrupt the whole chain of business processes. When user tasks are integrated with other tasks, they are required to use the system in order to support other users' functions. Hence, the usage within an ERP context seems to be mandatory (Brown et al., 2002).

Implementing ERP has been proven to take considerable effort. There is on-going concern about the high failure rate of ERP implementation (Kim, Lee, and Gosain, 2005). ERP implementation often requires a substantial amount of resources in an organization. When an implementation project cannot follow an original plan, it leads to budget overrun, which can lead to both financial and non-financial loss. The delay of an ERP implemented project can lead to frustration among employees, which can result in an opportunity loss for the organization, and so forth. Furthermore, even after an organization has successfully implemented and deployed the system, it still faces the risk of failing to achieve the objectives of adopting ERP. In a study it was found that over

50 percent of implemented ERP were less effective than original expectations (Yu, 2005). After ERP is deployed, it is not certain whether employees will realize the benefits of using ERP, and eventually they may stop using the system. One such example is Allied Waste Industries, Inc., a Fortune 500 company headquartered in Phoenix, Arizona, that decided to abandon its SAP R/3 after having invested around 130 million U.S. dollars (Kim et al., 2005).

Although many organizations have installed and implemented ERP to achieve a better integration in their business processes, there are still a large number of organizations planning to acquire this promising technology. The estimated size of the 2007 worldwide ERP market was approximately 19.2 billion U.S. dollars and at that time was believed to reach 25.2 billion U.S. dollars in the year 2011 at a growth rate of 7.6% (Pang et al., 2007). It seems that ERP continues to play a crucial role in helping many organizations to gain competitive advantage. In Thailand, a wide array of organizations in almost every industry acknowledged the advantages of ERP and decided to adopt this technology in the hope that the system would deliver its promises. In 2003, the estimated value of the Thai ERP market was 100 million U.S. dollars (Chandrachai, Pantumsinchai, and Tanlamai, 2006). Many Thai organizations invested significantly in ERP, yet it remained unclear whether the investment was worthwhile. A survey in Thailand conducted in 2004 reported that approximately 70% of 170 companies encountered project delay. Clearly, the delay brought losses to the organizations. Despite lessons learnt from these previous cases, Thai organizations today are still facing problems in implementing ERP.

After having integrated business processes and functions, ERP can create interdependency among business units. ERP users are often left no choice but to use the system. It is most likely that ERP usage is not a voluntary use environment but a mandated one. In a mandatory use environment, users are obliged to use the system to perform their jobs (Brown et al., 2002). The context of ERP presents a challenge for TAM since the dependent variable of the model, namely system usage, may no longer be a

good determinant for measuring the system success. Symbolic adoption which emphasizes the mental process of system adoption seems to be more plausible in this context (Nah, Tan, and Teh, 2004).

In order to provide a more comprehensive perspective of user acceptance of ERP, researchers have recommended that it should be conceptualized as a pattern of organizational change (Kwahk, 2006). An organizational change perspective presents an alternative view of IS implementation research. In particular, resistance to change is one common problem that has been addressed in IS research known as resistance to IS implementation. Organizational theories offer theoretical explanations of underlying causes of resistance to organizational change, such as individual characteristics and experiences (Smollan, 2006), communication problems (Val and Fuentes, 2003), power and politics (Trader-Leigh, 2002) and culture (Lakomski, 2001). IS implementation generally induces change in an organization. Hirschheim and Newman (1988) have described possible causes of resistance, including factors such as innate conservatism and uncertainty, indicating individual perception towards change initiated by IS implementation. When resistance to IS implementation is assessed, characteristics of a system, emphasized in TAM, have not been identified as being related to the topic under discussion (Hirschheim and Newman, 1988; Jiang, Muhanna, and Klein, 2000; Joshi, 2005). Vice versa, individual perceptions related to change have not been examined when TAM was the topic of a study (Amoako-Gyampah, 2007; Brown et al., 2002; Nah et al., 2004). Although user acceptance and resistance to change appear to be the opposite phenomena, recent research has attempted to link these two research paradigms. Bhattacherjee and Hikmet (2007) have introduced a dual-factor model theorizing the influencing role of resistance to change on system usage. The empirical evidence from this study shows that user acceptance and resistance to change can co-exist. The authors found that resistance to change negatively affected behavioral intention and usage behaviors.

It is becoming more evident that user acceptance and user resistance are not opposites but are inter-related concepts. Thus far, little is known about the relationship between these two perplexing phenomena. This study follows the initiative of previous research in exploring the linkage of user acceptance and user resistance. In order to create a new body of knowledge, this study primarily focuses on the context of the mandatory-usage context where it presents a challenge to the explanatory power of TAM. User resistance is incorporated to provide a larger view on how users can react favorably or unfavorably to the new system introduced. Key theoretical constructs are derived from both research paradigms and assessed empirically. Interview data help to provide case background. Survey data are used as empirical evidence, leading to the conclusions of this study. The results from this study will be applicable to both academia and industry. The knowledge will add to the literature of both user acceptance and user resistance. Practitioners could benefit from the key insights from the case data. The findings could be used to develop a change management plan or an intervention program during the implementation process in order to ensure the success of the implementation.

1.2 Problem Statement

Research on user acceptance has provided both researchers and practitioners with understanding precursors to system usage. Nevertheless, given a situation in which users use the system involuntarily, a usage behavior seems to present a misleading view of user acceptance of IS implementation. When symbolic adoption was introduced it was seen to be a better candidate in explaining this so-called phenomenon in a mandatory usage environment. Empirical evidence has shown that symbolic adoption could lead users to utilize a mandated system in a more creative manner (Wang and Hsieh, 2006); however, the concept of symbolic adoption measuring user acceptance in this environment is relatively new. There are few published empirical studies examining the role of symbolic adoption, and thus this gap in the literature calls for extensive empirical studies to explore what determines symbolic adoption.

The attitude construct has played an important role in IS research whether in TAM studies or in resistance to change research. These two paradigms of research can be seen to represent opposite views. TAM can be viewed as a set of factors promoting IS success, while resistance to IS implementation is another group of factors seen as hindering the implementation. TAM measures attitude towards using the system, whereas resistance to change is the attitude towards change brought about by IS being implemented. The two paradigms seem to share the same theoretical fundamental which is the role of attitude influencing a particular set of behaviors. Nonetheless, it remains unclear how these two phenomena are related. This study attempts to bring together TAM and resistance to change in order to understand the acceptance process of IS implementation as well as address the following research questions:

1. To what extent do perceived usefulness, perceived ease of use, subjective norm, and attitude towards system usage predict symbolic adoption in a mandatory-use context?

2. To what extent do perceived self-efficacy, perceived level of power in an organization, perceived inequity, and subjective norm predict resistance attitude and resistance behaviors in a mandatory-use context?

3. To what extent does user resistance affect user acceptance in a mandatory-use context?

4. To what extent are job-related outcomes affected by user acceptance and user resistance in a mandatory-use context?

1.3 Objectives of the Study

The objectives of this study are to:

1. examine the effects of individual perceptions on user attitude towards mandated IS implementation,

2. explore the role of user attitude towards mandated IS implementation during the user acceptance process,

3. study the effects of subjective norm on user attitude towards mandated IS implementation,

4. investigate the effects of user acceptance and resistance to change on job-related outcome and symbolic adoption, and

5. develop a theoretical framework determining the user acceptance of IS implementation based on TAM and resistance to IS implementation in a mandated environment.

1.4 Significance of the Study

With a significant number of studies attempting to revise and refine TAM, It may seem that the research area of user acceptance has already been extensively explored. Recently, the issue about the shortcoming of TAM in explaining a complex phenomenon of a mandatory use environment has been raised. A dependent variable of TAM has been criticized as offering irrelevant explanations about user acceptance (Brown et al., 2002; Nah et al., 2004). The main argument is that there is a need for a new tenable dependent variable in the context of involuntary usage and symbolic adoption proposed as a dependent variable for measuring user acceptance in an ERP context (Karahanna, 1999; Rawstorne, Jayasuriya, and Caputi, 1998). To date, only a few studies have empirically proved this tenet.

Another vital controversial contention is the role of attitude in the process of user acceptance. In the broadest sense, attitude can be generally defined as a

disposition to respond favorably or unfavorably to an object being evaluated (Ajzen, 1988). User attitude seems to be plausible in clarifying how a user reacts with the system, especially when system usage is involuntary. Recent studies have reported empirical evidence supporting the predictive nature of user attitude in explaining user responses to a system implementation (Brown et al., 2002). In addition, resistance to change is a different paradigm of research aiming to understand how individuals respond unfavorably by hindering an implementation process. The notable work of Piderit (2000) has brought considerable attention to the area of resistance to change. This notion of resistance to change was encouraged to be conceptualized following the concept of attitudes. By bringing together research from the two paradigms; user acceptance and resistance to change, Bhattacherjee and Hikmet (2007) have pointed to the existence of a linkage between these two areas.

This study continues to pursue a new body of knowledge by seeking to gain more understanding and exploring a different aspect of user acceptance in the context of a mandatory use environment. By exploring user acceptance together with user resistance, it is hoped that the results of this study will elevate the level of understanding about the user acceptance process in a mandatory use environment and create a new body of knowledge regarding IS and organizational theories. The implications of this study will help organizations to better plan for any new initiatives possibly yielding contributions related to a system implementation by taking greater care to organization members and facilitating change.

1.5 Summary of Chapter I

This chapter has discussed the motivation underlying this study by emphasizing the need to explore the linkage between user acceptance and user resistance. Subsequently, research questions and objectives were presented. The rest of the dissertation is organized as follows. The next chapter provides the theoretical background of user acceptance and resistance to IS implementation. Research

methodology will follow. Data analysis is presented. And this dissertation will be summarized with conclusion and discussion. Implications and limitations are also provided.

Chapter II
Literature Review

This chapter provides a review of past research in the area related to the research objectives of the present study. Relevant studies from the two paradigms of research are reviewed in order to provide the theoretical background of the topics being investigated. Further, the theoretical models and the Technology Acceptance Model (TAM) in the stream of user acceptance are reviewed. A discussion regarding the theories concerning resistance to change follows, and the chapter ends with the theoretical foundation of user attitude.

2.1 User Acceptance

Information System (IS) researchers have sought to understand what contributes to the success and failure of IS implementation. User acceptance is regarded as the pivotal episode of implementation since it is a process in which users form their attitude towards system use and behavioral intention to use (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989; Venkatesh and Davis, 2000). Among the studies focusing on user acceptance, it seems that significant attention has been given in order to verify and modify TAM. Originally, this model was adapted from the Theory of Reasoned Action (TRA), the theory that explains individual intention to perform a specific voluntary behavior. TRA theorizes how an individual intention is determined by a person's attitude and subjective norm (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Attitudes are influenced by salient beliefs concerning the outcomes of the behaviors in evaluation. Perceived Usefulness (PU) and Perceived Ease of Use (PE) are two salient beliefs theorized as determinants of users' attitudes towards using a system (Davis et al., 1989). The original version of TAM is illustrated in Figure 1. This earlier version of TAM prompted IS researchers to broaden the body of knowledge concerning user acceptance. Various variables, such as training, management support, result demonstrability, computer self-efficacy, and so forth, were included to augment the explanatory power of TAM (Legris, Ingham, and Collerette, 2003).
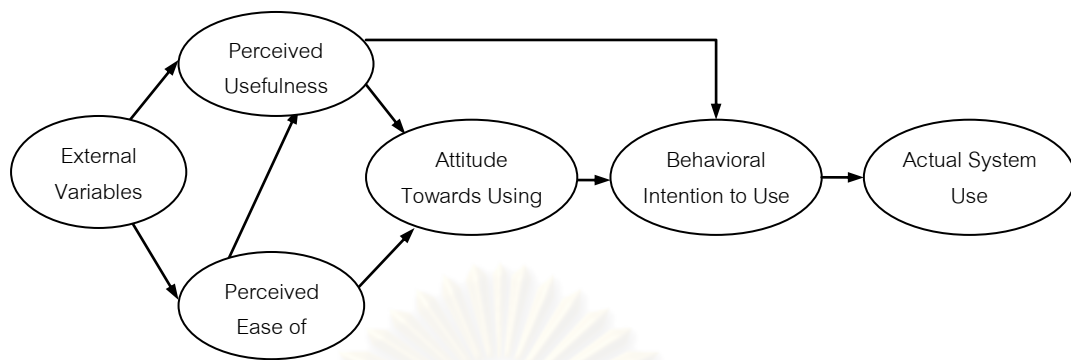
Figure 1 Original TAM (Davis et al., 1989)

As TAM was being empirically tested in many studies, there were on-going concerns regarding determinants of PU with the aim to provide a viable way for organizational interventions during the IS implementation process, which would help to gain user acceptance. To address this concern, Venkatesh and Davis (2000) extended TAM into TAM2, as shown in Figure 2, by including the influence of social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use). The findings showed that empirical data from four organizations measured at three different points of time strongly supported TAM2. Interestingly, contradictory results between voluntary and mandatory settings were found. Subjective norm, which was one of the three immediate determinants, was not found to have a direct significant relationship with behavioral intention in a voluntary setting. On the other hand, this construct appeared to significantly influence intention in a mandatory context during early stages of implementation but not after three months after implementation. This is consistent with the Theory of Planned Behavior (TPB), dealing with the situation that individuals have no control over their behaviors. The inclusion of voluntariness and social influence processes seems to provide a clearer picture. The distinctiveness of these two contexts should be recognized as pivotal factors in terms of gaining user acceptance. When users are required to use the system, social influence processes can be used to promote acceptance among users.
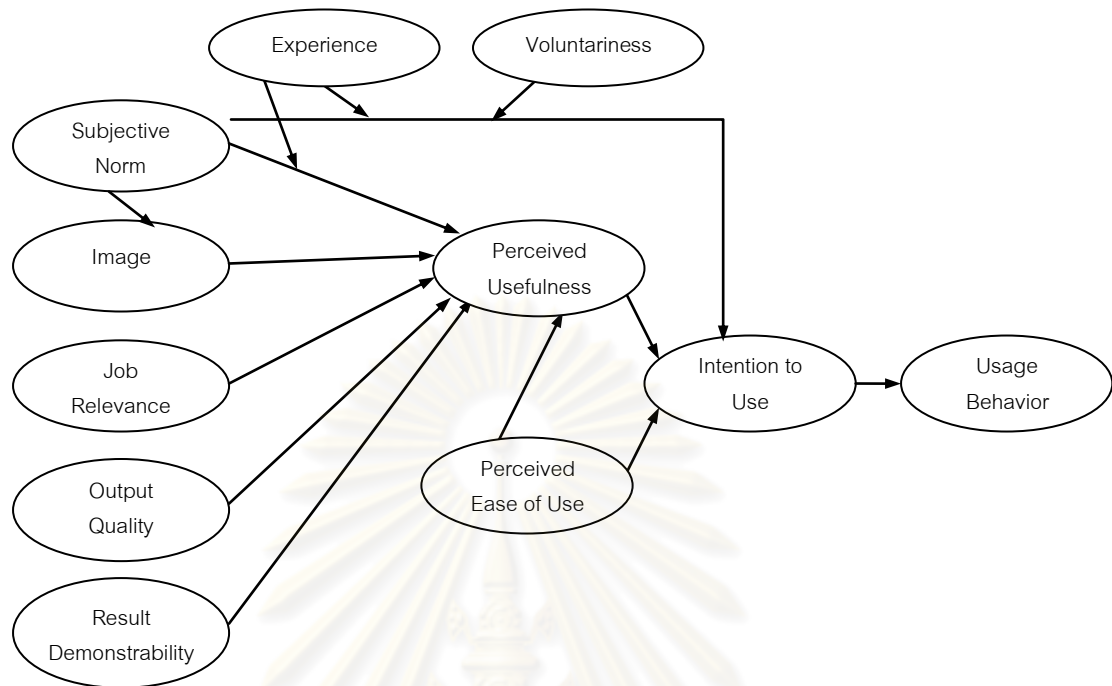
Figure 2 TAM2 (Venkatesh and Davis, 2000)

Later, Venkatesh et al. (2003) proposed the Unified Theory of Acceptance and Use of Technology (UTAUT). The authors reviewed a stream of user acceptance research theorized using intention or usage as a dependent variable. Eight competing models - TRA, TAM, Motivational Model, TPB, the combined TAM and TPB, the model of Personal Computer (PC) utilization, Innovation Diffusion Theory, and Social Cognitive Theory – were identified from prior studies. Their determinants of intention or usage were then empirically tested in order to formulate the unified model. From the test results, performance expectancy, effort expectancy, social influence, and facilitating conditions were theorized to be direct determinants of behavioral intention and usage behavior having gender, age, experience, and voluntariness of use as moderating variables, as depicted in Figure 3. Similar to TAM2, UTAUT confirmed the important role of social influences in determining usage behavior in a mandatory setting. Moreover, the results showed a significant relationship between system usage and facilitating conditions defined as an individual belief concerning an organizational and technical infrastructure to support the use of the system available. In a nutshell, the advancement

of this stream of research provides a clear understanding of how various factors and their interaction explain the technology usage behavior. Apart from the current determinants of system usage included in UTAUT, it was suggested that more attention should be paid to the link between user acceptance and individual or organizational usage outcomes. This is an interesting direction of this research stream since it provides a more holistic picture of user acceptance. Not only should users use the system as intended, the system usage should contribute to the organizational performance as well. It would not be favorable if the system usage could hurt individual or organizational efficiency.
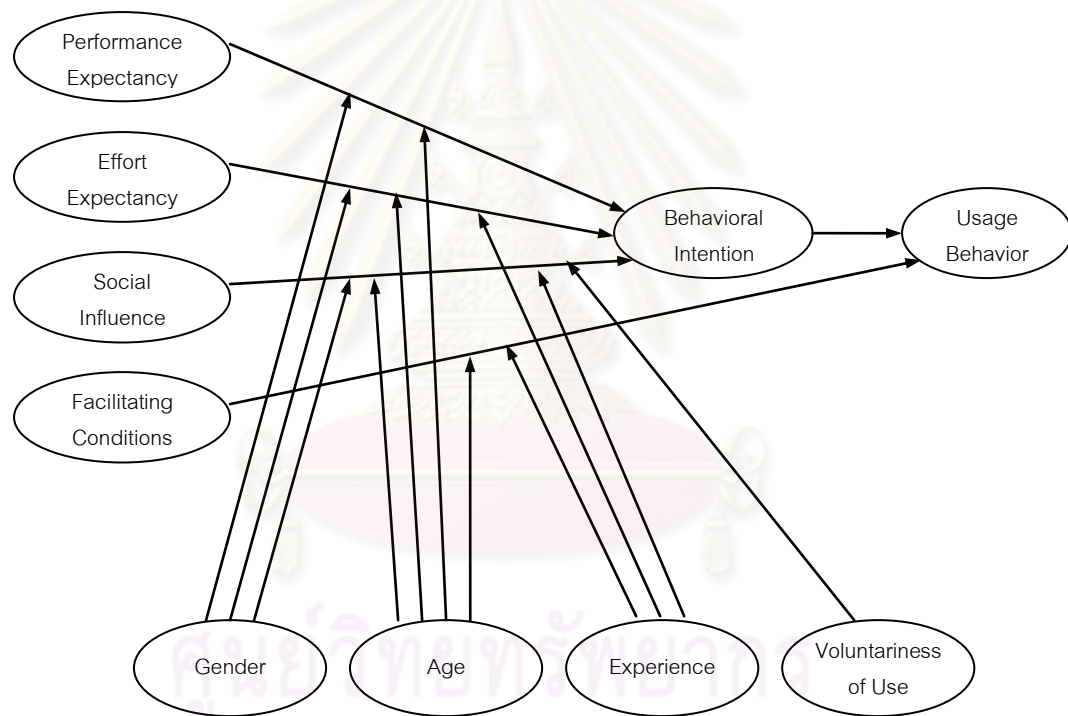
Figure 3 Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

2.2 User acceptance within an ERP Context: A Mandatory Use Environment

Enterprise resource planning (ERP) can be defined as a business software system that allows an organization to share common data and practice across business functions (Marnewick and Labuschagne, 2005). It consists of several generic modules such as finance, human resources, supply chain management, supplier relationship management, customer relationship management, and business intelligence. One of the important components of ERP is the process flow since the ultimate goal of an ERP is, in general, the seamless integration. All business functions will be modeled and linked to create a smooth integration. Ultimately, data will be entered once into the system and shared across the entire organization. This helps to eliminate the problems of data inconsistencies and redundancies. On the other hand, it creates interdependencies among business functions using the same data. If data are not entered correctly or completely, it will disrupt the whole chain of business process. In this case where user tasks are integrated with other users, they are required to use the system in order to support other users' functions. Hence, the usage within an ERP context seems to be mandatory (Brown et al., 2002).

In view of technological diffusion, a model of the IT implementation process depicted the process as combining six stages; initiation, adoption, adaptation, acceptance, routinization, and infusion (Cooper and Zmund, 1990). The acceptance was defined as the process in which organizational members are encouraged to commit to system usage. Apparently, the sphere of research in TAM emphasized only the role of system usage. But in an ERP context where system usage is mandatory, it seems to be incomplete to place the usage as a dependent variable. In order for users to commit to system usage, the level of system usage is most likely to provide a limited view of user acceptance. To illustrate the problem of system usage as a dependent variable in a mandatory context, Brown et al. (2002) compared three theoretical models: parsimonious TAM (a user attitude construct excluded), original TAM, and TPB, in the context of mandated technology. It was hypothesized that attitude would play a crucial role in understanding mandated use settings. The relationships in parsimonious TAM

were found to be consistent with previous studies (Davis et al., 1989; King and He, 2006). PU and PEU were significantly related to a behavioral intention. When user attitude was included into TAM as a mediator between these two perceptions and behavioral intention, PU was not significantly correlated with an intention to use but it was a significant predictor of user attitude. In the case of TPB with subjective norm and perceived behavioral control included, the relationship between attitude and the behavioral intention was not significant. Only perceived behavioral control and subjective norm were found to be positively significant related to the behavioral intention.

The findings of this study showed a different pattern of relationships in the mandated usage context, as previous research had suggested (Venkatesh and Davis, 2000; Venkatesh et al., 2003). The authors of this study argued that users could possibly use a mandated system without positive attitudes or satisfaction. They could have negative attitudes which could negatively affect outcomes of individuals or an organization. Another study concerning the issues in predicting and explaining usage behaviors with TAM and TPB in a mandatory context conducted by Rawstorne et al. (2000) also found similar results. With the inclusion of attitude, subjective norm, and perceived behavioral control, TPB tended to be marginally better than TAM in terms of predicting the behavioral intention and actual behaviors.

The appropriateness of the system usage as a dependent variable in a mandated usage environment seems to be skeptical. Rawstorne et al. (1998) argued that measuring user intention in this particular setting would be unusable and unsuitable. In the situation where user intention, which is actual adoption, does not seem to be tenable, symbolic adoption was hypothesized to be more pertinent (Karahanna, 1999; Rawstorne et al., 1998). This reflects a mental acceptance process where users agree to an idea of using a system (Klonglan and Coward, 1970). Having been argued to be justifiable as a dependent variable in a mandatory environment, symbolic adoption will be used as a proxy in determining user acceptance (Rawstorne et al., 1998). When usage is mandated, it would be a nuisance to measure the system usage, as the level

would be unrealistically high. It would be provocative to have the system usage represent the level of user acceptance.

A new system introduced to an organization can be viewed as an innovation. Assuming that an innovation has two components, the idea about innovation and its artifact, the adoption process will involve at least two decisions: whether to accept the idea and whether to use the innovation (Klonglan and Coward, 1970). This provides an alternative view of user acceptance of IS implementation. In a mandated use environment, users have no control over the decision whether to use the system, but they have full authority to either welcome or deny the idea of the new system. Hence, symbolic adoption seems to provide a complementary view in this unique environment. It was defined as the degree to which users mentally accept the idea of the new system implemented voluntarily when they are required to use the system involuntarily (Karahanna, 1999; Nah et al., 2004). Users with a positive attitude are most likely to accept the idea regarding the new system. Nah et al. (2004) empirically tested the model by employing symbolic adoption as a dependent variable for measuring user acceptance in an ERP context. Survey data showed that symbolic adoption and user attitude were two different constructs where symbolic adoption was determined by attitude.

2.3 Resistance to IS Implementation

When organization members anticipate an undesirable outcome from a change initiative, they will endeavor to hinder the organizational change process. Like any change initiative, an implementation of an information system is most likely to bring a change into an organization. This change can affect the organization at different levels. At an individual level, a new system can improve job performance. On the other hand, it can be a threat to some individuals. Undesirable outcomes will prompt individuals to impede the implementation process.

Resistance to IS implementation has been recognized as a main barrier to the success of the system. IS researchers have recognized the importance to

understand this phenomenon. Heretofore, only five models have been proposed to provide theoretical explanations of this so-called resistance phenomenon (Joshi, 2005; Lapointe and Rivard, 2005; Marakas and Hornik, 1996; Markus, 1983 ; Martinko, Henry, and Zmud, 1996). The following section will examine definitions of resistance discussed in these five models in order to conceptualize the concept of resistance to IS implementation. Despite the fact that there have been a few studies regarding resistance to IS implementation in IT and IT-related journals, resistance to change in general has been studied to a great extent in the stream of organizational change research. Thus, definitions of resistance to change described in organizational theories will be discussed to gain a broader perspective and to shed light on the understanding of this concept. After reviewing definitions of resistance in the context of IS implementation in its specific form and organizational change in general, resistance to IS implementation will be conceptualized in order to develop a research framework for this research.

Markus (1983), in her pioneer work of resistance to IS implementation, evaluated three basic types of resistance theories with data of a single case. Three divergent types of theories are: people-determined theory, system-determined theory, and interaction theory. The underlying assumption of a people-determined theory is that people resist change because of factors internal to them, such as characteristics, cognitive style, and so on. However, a system determined theory suggests technical factors. From the standpoint of this theory, people perceiving a system with technical flaws will resist change. An interaction theory assumes the causes of resistance differently. An interaction between characteristics of people and characteristics of systems causes people to resist change.

Since there are many aspects of interaction theory, Markus' study (1983) focuses only on a political variant caused by an IS implementation. When a new system is implemented, it could alter the distribution of power in an organization horizontally and vertically. When organization members feel the loss of power, they tend to resist the new system implemented. A single case of an implementation of a financial information

system was used to validate the aforementioned theories in her study. The comparison between resisters and non-resisters revealed no difference in their cognitive or psychological styles. Although a non-resister was rotated into a position of resisters, resistance did not disappear as predicted by the people-determined theory. The implemented financial system was initially criticized of having technical problems. Later, changes in technical functions were made to resolve the problems. Even though all technical problems were fixed, resistance still persisted. By no means did rotating people or technical improvement reduce resistance since it was found that this financial system modified the power distribution by causing gain and loss of power among groups of employees. It was the political variant that caused the resistance among employees. In the light of the interaction theory, it appeared that this theory better explained events of resistance in this organization.

Joshi (1991) introduced an equity-implementation model (EIM) built upon equity theory, a well-defined theoretical framework concerning judgment of fairness in a social context. He argues that an individual or a user is likely to evaluate the change that the system implementation brings to them at three levels: self, self and the employer, and self and other users. It is believed that the greater the inequity, the greater the distress and vice versa. This model implies that individuals will evaluate most changes before they begin to resist a change. This is to say, individuals will adopt changes and later resist changes perceived unfavorable. At the first level of this model, users determine a net change in an equity status of self by comparing outcomes and inputs required by a new system. They welcome a change with the positive net gain (Δoutcomes - Δinputs) and decline a change which they perceive to be inequitable. Possible inputs regarding an information system implementation include workload, skills, cognitive or mental effort, time, learning and so forth. Possible outputs are job satisfaction, work environment, job security, job performance, power in an organization, etc.

At the second level of this model, users compare relative outcomes of self with their employers since they are likely to feel that the gains should be shared

fairly in proportion to expected deservingness of each party. Deservingness is defined as weighted average of outcome expected based upon criteria such as contributions, merit, equality, or other criteria. Users would decline a change if their employer was considered to gain greater relative outcomes compared to them.

At the third level, users would compare self with other users in their reference group in terms of relative outcomes. A perception of fairness would determine an assessment of change consequences. Users would evaluate whether benefits were shared fairly among user groups. When they felt that some groups of users obtained greater benefits even though they had not benefited much, they would not welcome a change and would resist it. Joshi's (1991) model provides insights into how users evaluate a change in terms of its impact on their equity status. The evaluation of net gains determined by changes in their inputs and outcomes and a comparison between self and the employer and the other users will lead users to resist the change if they perceive the loss of their equity.

Marakas and Hornik (1996) posited that resistance can manifest itself in a covert manner and may not be motivated by either criminal intent or personal gain. On the other hand, resistance to change can be a recalcitrant, covert behavior resulting from the fear and stress that challenge users' status quo. The authors defined this form of resistance to change as Passive Resistance Misuse (PRM). Passive-aggressive (P-A) behavioral theory and action science's espoused theories vs. theories in use are two theoretical foundations supporting their claims. P-A behaviors represent actions intending to be insubordinate or refusing to follow orders. These behaviors are considered as a pattern of active-ambivalence to gain social or occupational performance through passive resistance behaviors such as procrastination, stubbornness, and so forth. In a model of P-A behavior proposed by Fine et al. (1992), five elements including rigidity, resentment, resistance, reactance and reversed reinforcement are believed to interact as a continuum. Rigidity and resentment are assumed to lead to resistance and reactance, consequently leading to reversed reinforcement. This model suggests that individuals with rigidity and resentment will be

likely to express resistance and show reactance behaviors. Finally, they will try to achieve reversed reinforcement by causing problems in order to gain a sense of power and gratification.

Despite a large majority of studies viewing resistance behaviors as expressed overtly, one possible alternative to expressing anger and frustration may be cover resistance according to the concept of this model. This can happen since individuals may act differently from what they say they do. Users might extensively participate with all activities in an IS implementation project but covertly resist an implementation. In the light of the theory of action, espoused theories are what individuals claim to follow and theories-in-use are what they do. It is possible for these two theories to be inconsistent. Marakas and Hornik (1996) stated that these inconsistencies are a conscious decision of a recalcitrant user, of which espoused theories are covert actions while theories-in-use are covert actions. Although the form of passive resistance behaviors is difficult to be observed, it should be recognized as a factor affecting the success of IS implementation.

Martinko et al. (1996) proposed the attributional model of reactions to information technology (AMRIT) building upon concepts of attribution theory and learned helplessness (LH). Attribution theory suggests that individuals' beliefs about their outcomes are most likely to determine their subsequent behaviors. LH theory is one aspect of attribution theory found to be relevant to the issues of actions to an IS implementation. LH is defined as passive behaviors resulting from prior failure. Individuals' future behaviors are determined by their attributions regarding their prior failures and successes. The ARMIT model proposes that external and internal influences would affect individuals' casual attribution process, which, in turn, influences behavioral and affective reactions to information system through expectations. According to the model, individuals are possibly influenced by their co-workers and supervisors, technology characteristics, and management support. Moreover, individual differences about their past experiences and attributional style are stimulate attributions regarding the anticipated outcomes with IS implementation. The model adopted the

most-accepted attribution framework combining locus of causality and stability as two dimensions of individuals' beliefs about their potential achievement. The anticipation of future outcomes would lead not only to behavioral reactions classified into three categories; acceptance, resistance, and reactance, but affective reactions as well. The relationship between the casual attributions and reactions is medicated by expectations referring to individuals' beliefs about their ability to accomplish a task. These expectations can be both efficacy expectation and outcome expectations. Even though the AMRIT model has not yet been empirically validated, an extensive set of possible variables are included into the model in an attempt to open the black box of resistance phenomenon.

Applying the theory of resistance to IS implementation, Lapointe and Rivard (2005) summarized definition of resistance in IT literature as shown in Table 1. From these definitions, they used semantic analysis to define resistance to IS implementation. The analysis indicated five basic primitives: resistance behaviors, an object of resistance, perceived threats, initial conditions, and a subject of resistance. Employing case study, their study discovered the pattern of resistance to change as the emergence process of group resistance behavior. The model of resistance to IT implementation proposed in this study suggested that the interaction between initial conditions and an object of resistance would result in perceived threats inducing resistance behaviors.

It can be posited that resistance occurs when the implementation of a new system provokes a change which then alters routine behaviors of individuals. If the change is undesired, an individual will try to maintain the status quo by exhibiting various forms of behaviors ranging from covert activities to aggressive actions. Resistance behaviors can vary greatly from ignorance, negligent or avoidance to aggressive resistance behaviors such as strikes, boycotts, or sabotage, etc. Definitions shown in Table 1 suggest behaviors are a key aspect of resistance.

Since the concept of resistance to IS implementation was adapted from other disciplines, the literature in organizational change is included to gain a much

broader perspective in understanding this phenomenon. Some representative sampling views of resistance to change are shown in Table 2. In general, resistance refers to any attempts that try to slow, impede, hinder or reject change in order to maintain the status quo. Despite the fact that resistance was mostly seen as individuals' actions or responses, some researchers apprehended it differently. Although many studies are behavior research in nature, organizational change research offers the attitudinal aspect of resistance to change.

The components of attitude have been empirically investigated to explain why individuals resist change. The attitudinal aspect of resistance to change could enlighten understanding resistance to change since resistance behaviors might not be able to be directly observed. A view that reflects resistance to change beyond individual behaviors could capture the complexity of this phenomenon and provide more understanding about how individuals respond to change (Piderit, 2000).

With the complex nature of the resistance to change, Piderit (2000) argued that resistance to change should be conceptualized as combining three important components of attitudes. Resistance to change was defined as multidimensional attitudes responding to change which include cognitive, affective and intention.

As a cognitive component, individuals are not ready for change and hold negative thoughts about the change. Argyris (1997) described an obstacle to change as cognitive impairment which is the result of a striving for control to legitimize power. It is defensive reasoning that limits learning and action. In general, individuals tend to develop faulty, irrational ideas or a negative schema (Bovey and Hede, 2001b). As a consequence, their interpretation of change is likely to be the process of cognitive distortion. For instance, they select ideas that are consistent with their expectation and tend to overgeneralize their knowledge.

Table 1 Definition of Resistance in IT literature (Adopted from Lapointe and Rivard (2005))

Source	Definition
Keen (1981)	The tactical approach to implementation sees resistance as a signal from a system in equilibrium that the costs of change are perceived as greater than they likely benefits
Markus (1983)	Behaviors intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives
DeSanctis and Courtney (1983)	Resistance to the MIS sometimes occurs when people experience Changes in the content of their jobs and their relative power
Joshi (1991)	Equity theory suggests that the greater the inequity or decline the net gain, the greater the resulting distress would be, individuals who experiences the distress of inequity are likely to resist it by attempting to minimize their inputs and outers' outcomes as well as attempting to increase others' inputs
Ang and Pavri (1994)	Resistance to change is a normal psychological reaction when the perceived consequences (e.g., loss of power) are negative
Martinko et al. (1996)	User resistance to the implementation of IT can take on a wide variety of behavioral forms
Marakuas and Hornik (1996)	A recalcitrant, covert behavior resulting from both fear and stress stemming from the intrusion of the technology into the previously stable world of the user
Lee and Clark (1996/1996)	The resistance may be nothing more than inertia, but it also stems from a healthy suspicion of new and unproved market systems. Furthermore, parties affected adversely by the change are expected to fight reengineering efforts
Enns et al. (2003)	Resistance is displayed when the target avoids performing the requested action by arguing, delaying, etc.

Table 2 Various views of Resistance to Change

Source	Description
Costee (1999)	Opposed energies and powers aimed to impede, decline, or stop change for positive or negative purposes
Labianca et al. (2000)	Cognitive barriers to any attempt trying to increase power sharing among employees and management
Piderit (2000)	Attitude towards change consisting of three components – cognitive, affective, and intention
Bovey and Hede (2001a)	Physical actions or mental process engaging in either supporting or resisting organizational change
George and Jones (2001)	Results of dynamic interplay between cognition and affect during individual change process
Ford et al. (2002)	Responses to change as social constructed reality derived from past successes and failures
Zell (2003)	Needs of human systems to keep the existing order to avoid powerful feelings triggered by change
Val and Fuentes (2003)	Any efforts or inertia trying to maintain the status quo or hindering change

As an affective component, individuals feel frustrated and anxious when experiencing the change. It is generally a mental process that cannot be seen or heard (Bovey and Hede, 2001a). They process new information based on pre-existing knowledge or prior expectations (George and Jones, 2001). The discrepancies between the new information and their beliefs trigger an emotional reaction such as fear and anxiety. Change often brings anger, sadness, and anxiety to individuals.

As an intention component, individuals behave undesirably against the change. Undesirable behaviors are considered as physical actions that can be seen or heard (Bovey and Hede, 2001a). Individuals may openly express or conceal them.

During organizational transformation, they can avoid, ignore or engage in activities, ranging from peaceful boycotts and strikes to sabotage and terrorism (Coetsee, 1999).

According to Fishbein and Ajzen (1975) in their renowned work, the theory of reasoned action and the theory of planned behavior, it is believed that individual attitudes will determine their course of actions. It is reasonable to posit that the attitudinal aspect allows researchers to understand how individuals form their attitudes which will eventually develop into resistance behaviors. Thus, in this study, resistance to IS implementation is defined as attitude towards an implementation of a system within an organization consisting of cognitive, affective, and behavioral attitudes which aim to impede the implementation for positive or negative purposes.

Piderit (2000) asserted that a view reflecting resistance to change beyond individual behaviors could capture the complexity of this phenomena and provide more understanding about how individuals response to change. The multidimensional view of resistance to IS implementation will reflect individuals' responses to an IS implementation in both physical actions and mental processes. Thoughts and feelings can be examined to show individual intention to resist the implementation. With a multidimensional approach, the complexity of how users respond to the implementation can be examined in broader meaning.

2.4 User Attitudes

Attitude appears to be a central argument in TAM and resistance to IS implementation. It refers to a summary of evaluation of a psychological object (Ajzen, 2001). Based on TRA, user attitude in TAM was hypothesized as the attitude towards using the system which would affect behavioral intention to use (Davis et al., 1989). It appears that user attitude in TAM refers a system usage to a psychological object. When users evaluate system usage during the course of an IS implementation, they seem to evaluate the functionality of the system since no actual usage is available. On the other hand, a psychological object of resistance to IS implementation can be patterns of interaction or new routines introduced by the system, input and output of

change process, and characteristics of the system (Lapointe and Rivard, 2005). To gain a richer meaning of the role of attitude, two psychological objects are conceptualized as two main drivers in determining user acceptance and user resistance. Hence, there are two attitude-based constructs to be examined in this study, including attitude towards system usage and resistance attitude. TAM generally refers to object-based attitude (Wixom and Todd, 2005). Thus, resistance to IS implementation symbolizes context-based attitude.

Even though it was suggested that attitude should include three main components: cognition, affect, and intention, in TAM literature, a behavioral intention was separated as being a main construct (Davis et al., 1989; Venkatesh et al., 2003; Yanga and Yoo, 2004). In this current study, behavioral intention is also treated separately from user attitude since its concept is close to an actual behavior. It could be controversial to treat a behavioral intention as one of user attitude components. And user attitude will include only cognitive and affective elements.

2.5 Phases of ERP Implementation Life-Cycle

This research focuses specifically on the ERP implementation process. In a practical way, users learn about the idea of the system through training sessions or participation in the implementation process. Based on existing life cycle models, vendor implementation methodologies, and previous studies, Ahituv et al. (2002) proposed a generic model for ERP implementation life cycle. This included four important phases: selection phase, definition phase, implementation phase, and operation phase. These four phases are explained in greater detail below.

2.5.1 The Selection Phase

This phase is the process of selecting and identifying the ERP package most suitable for an organization for which it has identified the objectives of ERP adoption. ERP has proved to bring a wide array of benefits to an organization. Shang and Seddon (2000) have provided a comprehensive framework in understanding ERP

benefits. It is believed that ERP benefits can be categorized into five dimensions: operational, managerial, strategic, IT infrastructure, and organizational.

1. Operational benefits: ERP may help to automate business processes and allow process changes which, in turn, reduce cost, reduce cycle time, improve productivity, improve quality, and improve customer services.

2. Managerial benefits: With the ability to integrate and centralize data, management will have timely and complete information to better manage resources, plan and make decisions wisely, and improve organizational performance.

3. Strategic benefits: ERP can also support an organization strategically by offering a new opportunity for executing strategies such as business growth, business innovations, cost leadership, product differentiation, and external linkages.

4. IT infrastructure benefits: The ERP infrastructure is believed to provide business flexibility for current and future changes, reduce IT costs, and increase IT infrastructure capability.

5. Organizational benefits: ERP can potentially support organizational changes, facilitate business learning, empower organization members, and lead to common visions.

An organization will seek prospective ERP vendors and consulting firms. Information about ERP and the implementation process will initially be acquired during this process. The vendors and consulting firms will be required to submit their proposal. They will be evaluated based on the criteria preferred by the organization. Mostly, technological, economical, and organizational aspects are three focuses in the evaluation process. When the organization considers the ERP implementation feasible and the most suitable ERP has been identified, the implementation project will be awarded to the selected vendor and consulting firm. Finally, contracts are negotiated and signed by all parties involved.

2.5.2 The Definition Phase

This phase includes all preparatory tasks for the implementation. It begins with the scope definition. The scope of work in the project is defined and the implementation method selected. Further, this phase covers the formation of the implementation team. The ERP implementation involves a considerable number of parties. Somers and Nelson (2004) identified the key players that have a vital role during ERP implementation, including:

1. Top management – it is widely known that management support is one of the most critical success factors determining the success of ERP implementation (Gargeya and Brady, 2005). The support and commitment from top management define the level of resources. They can also direct the view of users.

2. Project champion – the role of project champion helps to promote the success of implementation by leading, facilitating, and marketing the implementation project and the system.

3. Steering committee – Consisting of senior management from different business functions and key stakeholders, a steering committee is involved from the selection phase and then also plays a pivotal role in monitoring project activities.

4. Implementation consultants – In general, outside consultants are hired to install and implement the ERP system. It is suggested that positive relationships with consultants lead to the success of ERP implementation (King, 2005).

5. Project team – Skills and knowledge of project team members are crucial to the ERP implementation success. The team should be a good mixture between business professionals and technological experts.

6. Vendors – There are various aspects of vendors affecting the ERP implementation. A good partnership between the software vendor and the

organization contributes to the project success. Additionally, vendor support ensures long-term success, as the organization will requires technical assistance, maintenance, or updating in the near future.

In addition, for team mobilization implementation teams are trained in order to work in forthcoming activities with adequate skills and knowledge. Even though this phase is probably the shortest of all phases, it lays a good foundation for the later phases of the implementation since it sets forth the scope of work for an implementation project. Efforts for the project are estimated, and if the amount of effort is underestimated, it could lead to resource shortage or project delay, for instance.

2.5.3 The Implementation Phase

This is the main phase of the life cycle establishing the ERP system into an organization. Within the implementation phase, nine important steps are identified.

1. Gap analysis – this is the process to identify the gap between the existing process and the process recommended by the ERP system. After the gaps are detected, a recommendation is given to handle the gaps.

2. Business process reengineering – it is not mandatory to reengineer the business process when ERP is implemented. However, the implementation tends to bring drastic change to the organization and leads to business process reengineering.

3. Identification complementary solutions – It is quite impossible for ERP to fulfill every need of an organization. Sometimes, it may need additional development, acquisition of further modules, or additional manual work processes.

4. Construction of a prototype – A prototype helps to illustrate the designed work flow of the new ERP system. It indicates to the users of the new business processes whether their expectations are matched.

5. Data conversion – During the implementation process, data from the old system is converted into the format corresponding with the new ERP. This is generally a painstaking process.

6. Definition of work procedures – Work procedures need to be updated to match with the new ERP system. A work procedure manual is recommended to be developed for users.

7. Full implementation of the system – After the completion of previous activities, the full-scale implementation is executed.

8. Training of users – In order to be able to use the system effectively, users are provided with various kinds of training, for example, classroom training, on-the-job training, and so on.

9. User acceptance test – Actual data are used to test the system to ascertain whether it is performing up to the desired level. The acceptance test is normally conducted using test cases or real business scenarios.

2.5.4 The Operation Phase

The last phase is the operation phase where ERP is used to support the operation of an organization. There are five steps included in this phase:

1. Establishment of support centers – Support centers are established to facilitate users with learning materials and technical assistance.

2. Performance of changes and enhancements – Change seems to be inevitable for an organization. ERP is refined to cope with changes that will visit the organization.

3. Upgrading the system – Mostly, a maintenance agreement is available for the organization in order to keep the ERP updated with the new technology.

4. System audit – An audit is performed periodically to ensure that the system meets users' requirements.

5. System termination – The organization can decide to terminate the ERP system when the system is no longer useful or the cost of operation is higher than the replacement or termination cost.

2.6 The Stage of ERP Implementation in Thailand

Chandrachai et al. (2006) conducted a survey of the stages of ERP implementation in Thailand. The survey covered 471 companies listed in the Stock Exchange of Thailand in 2004 and 571 companies were known to have adopted an ERP system. A total of 170 companies returned the questionnaire providing information about the investment, usage, and success of ERP systems. Key findings of this study are shown below in Figure 4 - Figure 7.
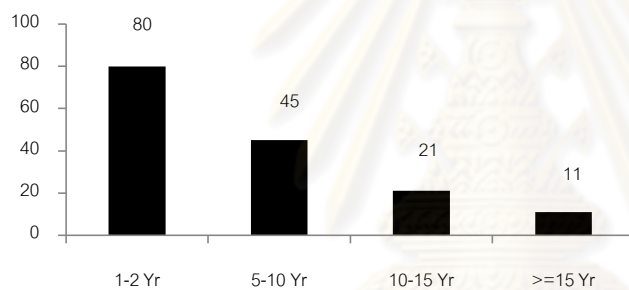
Figure 4 Years of ERP usage
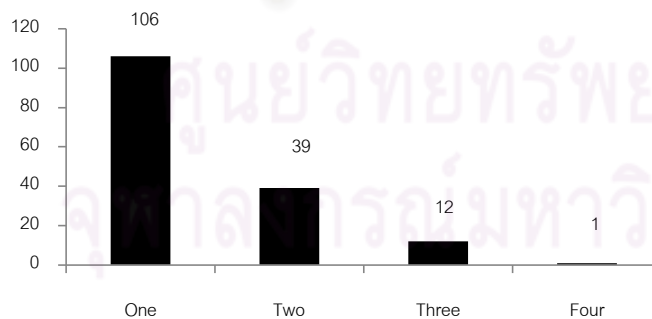
Figure 5 No. of ERP(s)
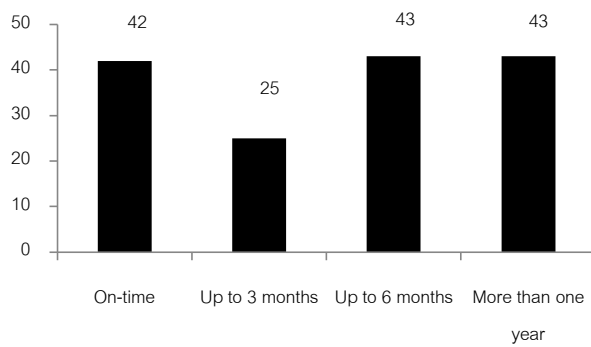
Figure 6 No. of projects delayed
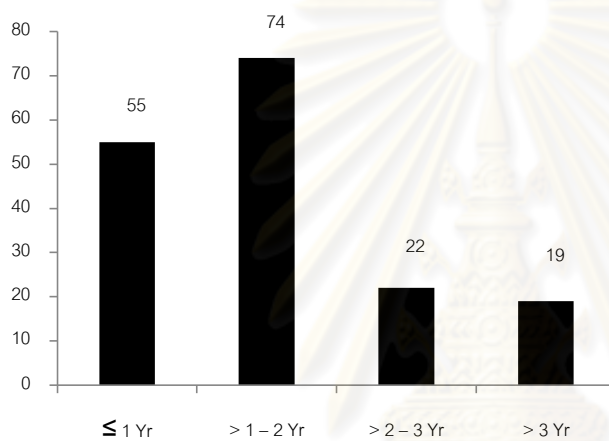
Figure 7 Years of implementation

Evidently, a large number of companies in Thailand had already implemented ERP and had used the system during a certain period. Interestingly, despite the fact that most of the ERP projects followed the well-proven implementation methodologies, the survey data show a high rate of projects delayed - around 82.5%. Further, the findings show that more than a half of responding companies took more than one year to implement the ERP system.

2.7 Conceptual Framework

Derived from prior works in different areas of research, including user acceptance, resistance to change, and organization theories discussed previously, the framework for this research is conceptualized as shown in Figure 8.
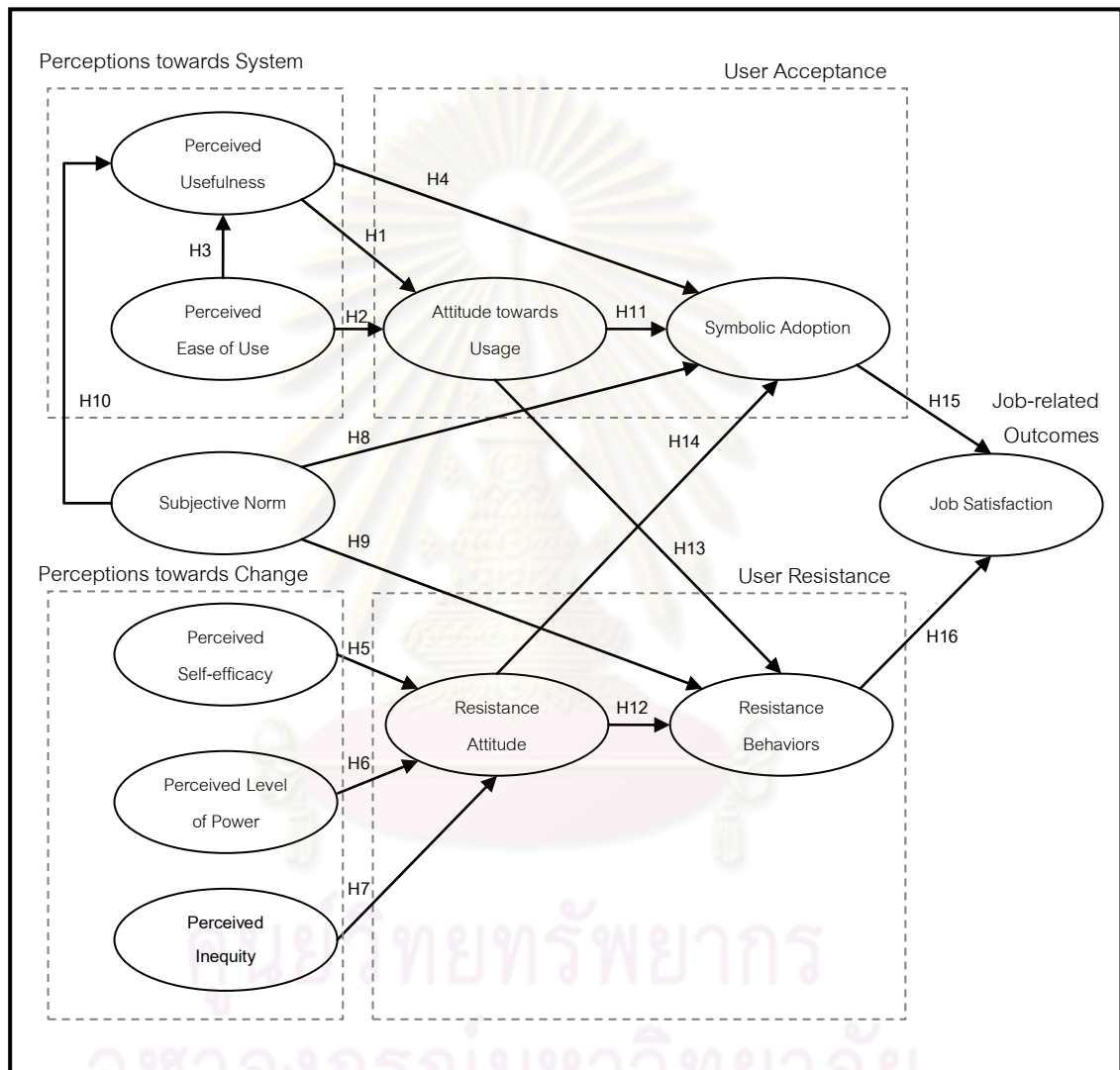
Figure 8 A theoretical model linking user acceptance and user resistance in a mandatory use environment

This model represents the linkage between user acceptance and user resistance in a mandatory-use context. The essence of this model involves the two sets of attitudes important to users in this particular setting, namely, attitude towards usage and resistance attitude. Users with a positive attitude towards usage will be more

accepting, whereas users with a high resistance attitude will exhibit resistance behaviors. This models all occurrences in which an individual possesses a positive attitude towards usage and has a high resistance attitude, because user acceptance and user resistance are not conceptualized to be located on opposite ends of a continuum.

Attitude towards usage would be determined by perceptions towards system. On the other hand, resistance attitude would be affected by perceptions towards change. Consequently, these two attitudes together with subjective norm will influence symbolic adoption and resistance behaviors, representing user acceptance and user resistance, respectively. Expectedly, the consequences of user acceptance and resistance would impact job-related outcomes.

2.7.1 Perceptions towards System

PU and PEU are the salient beliefs that have been found to determine user attitude during IS implementation. PU is defined as "…the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context…" (Davis et al., 1989). PEU refers to "…the degree to which the prospective user expects the target system to be free of effort…" (Davis et al., 1989). According to TAM, PU and PEU are two object-based beliefs predicting behavioral dispositions by influencing attitude towards a system (Davis et al., 1989; Nah et al., 2004; Wixom and Todd, 2005). This represents the way in which users evaluate a system. It primarily focuses on its characteristics. Users perceiving a new system to be useful and easy to use will develop a good attitude towards the system. Most studies have found a significant relationship between PU and user attitude in both voluntary and involuntary settings (Davis, 1993; Venkatesh and Davis, 2000; Venkatesh et al., 2003). On the other hand, the results indicating a relationship between PEU and attitude were found to be inconsistent. A meta-analysis conducted by King and He (2006) concluded that the major effect of PEU is mostly through PU rather than directly on behavioral intention. However, the study suggested

that the sample size may have accounted for the inconsistencies of the findings. Hence, to retest previous findings, this study hypothesizes:

Hypothesis 1:   Perceived usefulness will have a positive direct effect on attitude towards usage.

Hypothesis 2:   Perceived ease of use will have a positive direct effect on attitude towards usage.

Hypothesis 3:   Perceived ease of use will have a positive direct effect on perceived usefulness.

In addition, PU was originally hypothesized to influence intention to use. When symbolic adoption substitutes the behavioral intention to use, the relationship has not been tested. Thus,

Hypothesis 4:   Perceived usefulness will have a positive direct effect on symbolic adoption.

2.7.2 Perceptions towards Change

Self-efficacy was considered as an important variable affecting beliefs and behaviors (Igbaria and Iivari, 1995). It refers to the comprehensive summary of perceived capability to mobilize the motivation, cognitive resources, and courses of action needed to perform a specific task (Gist and Mitchell, 1992). While expectations are believed to be a theoretical underlying foundation of research on user acceptance (Davis et al., 1989; Fishbein and Ajzen, 1975), self-efficacy was predicted to affect individuals' outcome expectation. Based on empirical data, Compeau and Higgins (1995a) argued that self-efficacy influenced individuals' expectations regarding performance outcomes and personal outcomes. Calvert (2006) argued that an ERP user who has a lack of self-efficacy might not accept the system (See also; Compeau and Higgins, 1995a; Venkatesh and Morris, 2000). This indicates that ERP users with a low level of perceived self-efficacy could develop resistance attitude which would lead them

to resist the ERP implementation. Although it could be argued that perceived self-efficacy could be one of resistance antecedents, there have been only a few studies attempting to versify this argument. Thus to examine the role of perceived self-efficacy as an antecedent to resistance to IS implementation, this study hypothesizes:

Hypothesis 5: Perceived self-efficacy will have a negative direct effect on resistance attitude.

Various causes of resistance to IS implementation have been identified by previous research. Of all the studies focused on the resistance phenomenon, most employed a qualitative research method and identified various causes of resistance behaviors. Given the paucity of research in this area, there is scarce empirical evidence of the relationship between causes of resistance and resistance behaviors. Despite the diverse reasons why users resist the implementation, resistance occurs because users perceive threats brought by a system (Klaus, Wingreen, and Blanton, 2007; Lapointe and Rivard, 2005). In general, users will perceive threats in the situation where they anticipate negative outcomes (Lapointe and Rivard, 2005; Martinko et al., 1996) such as a loss of power (Markus, 1983) or a loss of equity (Joshi, 1991). Perceived threats can be defined as the degree to which the prospective users consider that the system being implemented will yield negative outcomes. Bhattacherjee and Hikmet (2007) proposed the dual-factor model theorizing the perceived threats to be a determinant of user resistance. The empirical data showed a positive significant relationship between perceived threats and resistance to change.

In this study, two main threats identified from previous studies in IS literature are loss of power (Markus, 1983) and loss of equity (Joshi, 1991). An introduction of a new system could possibly modify the distribution of power in an organization. Markus (1983) illustrated the case of organization members with a high level of power affected by the change brought by the new system implemented. They were identified as resisters. It could be reasonable to expect that an individual with a high level of power in an organization would be most likely to resist IS implementation. In addition, Joshi (1991) argued that organization members will evaluate fairness derived

from changes in their inputs and outcomes. Moreover, they will compare net changes between self and the employer and others. If the result of the evaluation is perceived to be inequity, resistance to change is most likely to occur. Therefore, this study hypothesizes:

Hypothesis 6:   A high level of power in an organization will have a positive direct effect on resistance attitude.

Hypothesis 7:   Perceived inequity will have a positive direct effect on resistance attitude.

2.7.3 Subjective Norm

Subjective norm is defined as a perception of social pressure to perform the specific behavior (Ajzen, 1991). Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) theorized subjective norm as a determinant of a behavioral intention. It implies that users will evaluate the judgment of people who are important to them in order to use the system. If these people think that they should use the system, they will be persuaded to do so. TAM, which was developed based on these two theories, also included subjective norm into the model in order to explain individual intention to use a system (Venkatesh and Davis, 2000; Venkatesh et al., 2003). Even though a survey of literature in TAM revealed the inconsistencies in the role of subjective norm as the antecedent of intention (Sun and Zhang, 2006), studies in the context of a mandatory usage environment found a significant role of subjective norm in a user acceptance process (Venkatesh and Davis, 2000; Venkatesh et al., 2003). Generally, subjective norm will influence behavioral intention whether through compliance, internalization, or identification process.

In this study, although behavioral intention to use was excluded, symbolic adoption was substituted. Rawstorne et al. (1998) suggested that subjective norm would influence individual symbolic adoption. However, there was no empirical

evidence to support the claim. It is probable that social influence would lead ERP users to agree more with the idea of using the system. Hence, to verify this:

Hypothesis 8:   A high level of subjective norm will have a positive direct effect on symbolic adoption.

In addition, resistance behaviors, as mentioned previously, are also expected to be affected by subjective norm. Through the compliance process, the normative pressure would keep users restrained from resistance behaviors if people who are important to them think that they should use ERP. Subjective norm would cause a mechanism influencing an individual to comply with the ERP adoption decision. Thus, the study hypothesizes:

Hypothesis 9:   A high level of subjective norm will have a negative direct effect on resistance behaviors.

Furthermore, the effect of subjective norm on perceived usefulness was found significant in a mandatory setting (Venkatesh and Davis, 2000). It was explained that users internalized social influences which, in turn, promote usefulness perceptions. This lead to:

Hypothesis 10:   A high level of subjective norm will have a direct effect on perceived usefulness.

2.7.4 User Attitude

With the aim to investigate the role of user attitude in predicting user acceptance and user resistance, there are two sets of user attitudes in attention: attitude towards usage and resistance attitude. Nah et al. (2004) conducted an empirical investigation on user acceptance of an ERP system. The results of their work showed that attitude towards usage was a key determinant of symbolic adoption. Through a process of internalizing perceptions related to an ERP system, attitude towards usage was formed and predicted a degree of symbolic adoption. Therefore:

Hypothesis 11:   A high level of user attitude towards usage will have a direct effect on symbolic adoption.

Following TRA theoretical ground, resistance attitude would be expected to predict resistance behaviors. Fishbein and Ajzen (1975) postulated attitude as a predictor of behaviors in evaluation. Bovey and Hede (2001b) found that the relationship between attitude components and intention to resist was significant in their study on organizational change. Irrational ideas and emotion would lead an individual to resist a change. An individual with a high level of resistance attitude would be most likely to express resistance behaviors. Hence:

Hypothesis 12:   Resistance attitude will have a direct effect on Resistance behaviors.

As mentioned earlier, one of the main aims in this study is to explore the connection between user acceptance and user resistance through the role of user attitude. Since there has been a lack of empirical evidence showing that attitude towards usage affects resistance behaviors or resistance attitude would negatively influence symbolic adoption, this study empirically assesses these two relationships. Since symbolic adoption and resistance behaviors are hypothesized to be influence by their attitudinal predictors, it could be possible that attitude construct of user acceptance could affect user resistance behaviors and vice versa. Based on conceptualization of TRA that an attitude is a theoretical predictor of behaviors, this study follows this precept by arguing that high attitude towards usage will decrease resistance behaviors. On the other hand, high resistance attitude will decline a level of symbolic adoption. Thus, this study hypothesizes:

Hypothesis 13:   A high level of attitude towards usage will have a negative direct effect on resistance behaviors.

Hypothesis 14:   Resistance attitude will have a negative direct effect on symbolic adoption.

2.7.6 Job-related Outcomes

Brown et al. (2002) argued for the need for the right dependent variable for a mandated IS use environment and also indicated that user negative attitudes potentially influence individual perception of job and organization such as job satisfaction and loyalty towards the organization. As well, Venkatesh et al. (2003) encouraged future research to pay more attention to the link between user acceptance and job-related outcomes, for instance, organizational commitment. Oreg (2006) empirically tested consequences of resistance to change on job satisfaction, intention to leave the organization, and organizational continuance commitment, finding that the effects of resistance to change on these particular outcomes were significant. As with the research in the IS context, attention paid to the effects of information system on job-related outcomes has been increasing. Joshi and Rai (2000) developed and tested a causal model of the relationship between IS characteristics and users' job-related outcomes. Job satisfaction was used to determine the level of impact on users' job. It was believed that ERP would potentially change the jobs of employees (Davenport, Javenpaa, and Beers, 1996; Mullarkey et al., 1997). Potentially, ERP would affect users' job-related outcomes. Job satisfaction and organizational commitment are theoretical constructs that have been used extensively in the organizational behavior literature (Anderson, Coffey, and Byerly, 2002; Boswell, Boudreau, and Tichy, 2005; Cuong and Swierczek, 2008; Kankaanranta et al., 2007; Tett and Meyer, 1993; for instance). This current study investigates how ERP affects job-related outcomes of users' new job using ERP. It is expected that the alteration of individual job by ERP will impact on job satisfaction. Job satisfaction refers to one's affective attachment to the job (Tett and Meyer, 1993). The authors viewed the level of analysis as a particular job which an individual was contracted to do by the organization. This job was believed to be immediate, local, and concrete source of experience. Therefore, job satisfaction will be adopted to be job-related outcomes to examine the individual impact at job level.

Symbolic adoption and resistance behaviors are conceptualized to be dependent variables of user acceptance and user resistance, respectively, in this

proposed model. These two constructs present the degree to which individuals accept and resist a new IS being implemented. In order to assess the individual impact on job-related outcomes, this study hypothesizes:

Hypothesis 15: A high level of symbolic adoption will have a positive direct effect on job satisfaction.

Hypothesis 16: Resistance behaviors will have a negative direct effect on job satisfaction.

2.8 Summary of Chapter II

Research in the two lines of literature has been reviewed to provide the theoretical background for the present research. User acceptance and user resistance were seen to share common theoretical fundamentals. Then, the theoretical framework is proposed with the aim to examine the linkage between these two research paradigms as well as their effects on job-related outcomes. The next section will discuss the research methodology employed to validate the proposed model.

Chapter III

Research Methodology

This study employed quantitative analysis to investigate the user acceptance process of mandated IS implementation. ERP implementation is chosen to be the context of the study since it presents a unique environment where users are required to use a system in order to perform their routines and to proceed along the business process (Brown et al., 2002; Marnewick and Labuschagne, 2005; Nah et al., 2004). Quantitative research methodology is employed to empirically test the conceptual model proposed in this study.

The objectives have been set forth in chapter 1; this chapter is organized as follows. The following section discusses the research methodology used to reach these goals. The proposed research framework is recapitulated, after which the research method and sampling frame are described. Finally, the research instruments are defined.

3.1 Proposed Research Framework

The research framework proposed in this study represents the interplay between user acceptance and user resistance in a mandatory-use context. All the hypothesized relationships are presented in Figure 9. Relationships between perception and attitude are examined. The linkage between user acceptance and user resistance is tested. In addition to that, the effect of the two phenomena on job satisfaction is assessed. There are 16 hypotheses derived from this proposed framework listed in Table 3. The next section will describe the research methodology undertaken in this study to test this proposed framework.
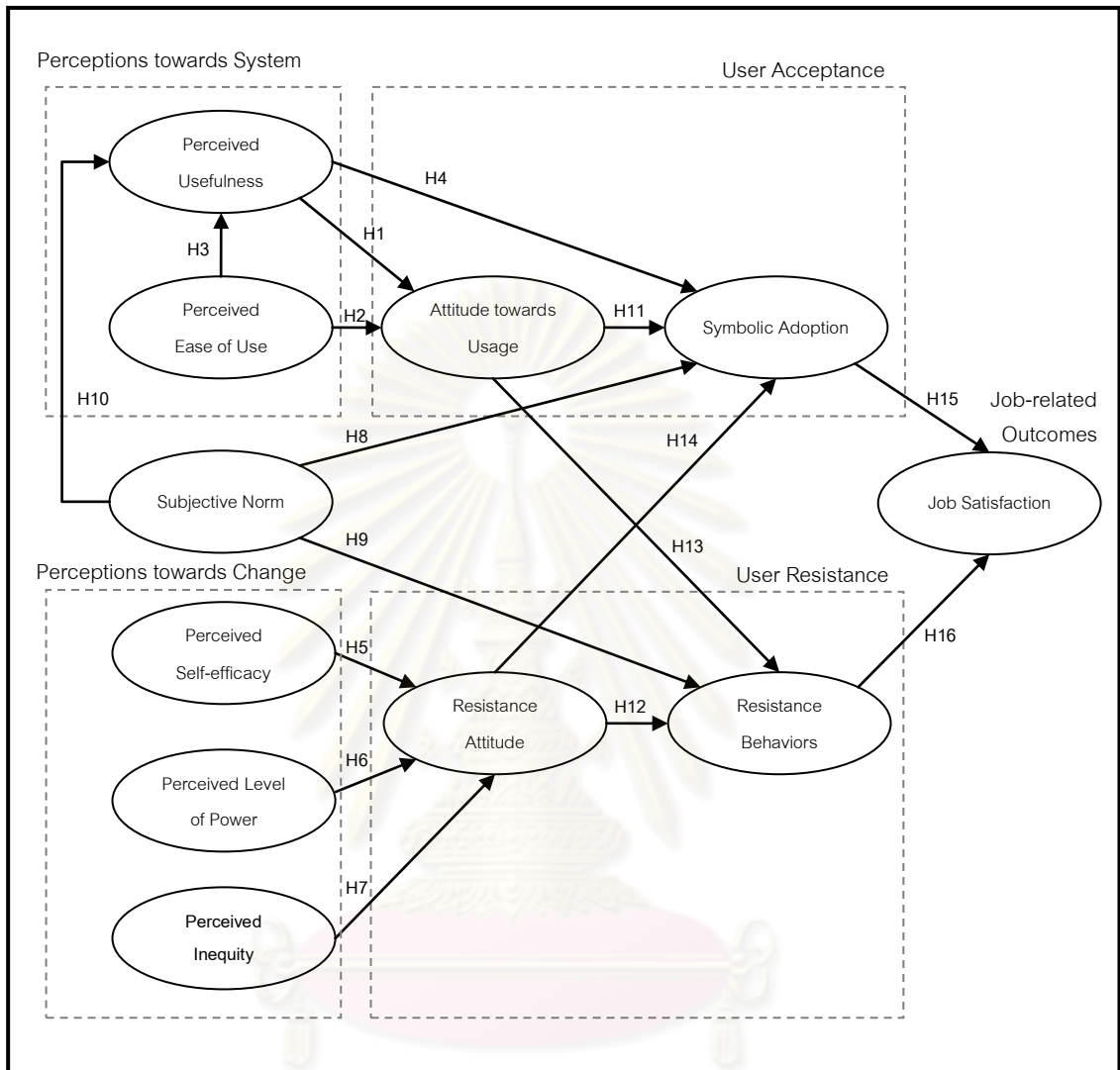
Figure 9 The proposed research framework

Table 3 List of hypotheses

Hypothesis	Description
H1	Perceived usefulness will have a positive direct effect on attitude towards usage
H2	Perceived ease of use will have a positive direct effect on attitude towards usage
H3	Perceived ease of use will have a positive direct effect on perceived usefulness
H4	Perceived usefulness will have a positive direct effect on symbolic adoption
H5	A high level of self-efficacy will have a negative direct effect on resistance attitude
H6	A high level of power in an organization will have a positive direct effect on resistance attitude
H7	Perceived inequity will have a positive direct effect on resistance attitude
H8	A high level of subjective norm will have a positive direct effect on symbolic adoption
H9	A high level of subjective norm will have a negative direct effect on resistance behaviors
H10	A high level of subjective norm will have a direct effect on perceived usefulness
H11	A high level of user attitude towards usage will have a direct effect on symbolic adoption
H12	Resistance attitude will have a direct effect on Resistance behaviors
H13	A high level of attitude towards usage will have a negative direct effect on resistance behaviors
H14	Resistance attitude will have a negative direct effect on symbolic adoption

Hypothesis	Description
H15	A high level of symbolic adoption will have a positive direct effect on job satisfaction
H16	Resistance behaviors will have a negative direct effect on job satisfaction

3.2 Research Methodology

This section describes the details of the research methodology for the current research. Since this research emphasizes the nature of user acceptance and resistance to change in the ERP implementation process, the unit of analysis is at the individual level. A case study is employed to gain insightful information (Chen and Lou, 2002; Eisenhardt, 1989). A case study allows researchers to have access to a real natural setting (Benbasat, Goldstein, and Mead, 2002). Thus, researchers can study how the relationship between factors was established, and then pursue further possible explanations of the relationship (Gillham, 2000).

Kaplan and Duchon (1988) presented examples of how quantitative and qualitative research methods can be employed together in case study research. The combination of the two research approaches can prompt researchers to potential errors as well as lead to new insights. Mingers (2001) provided practical guidelines derived from published works in the IS literature that adopted a pluralist methodology. In principle, it can be any type of research design. The current study follows this pluralist methodology as the predominant research design. Quantitative and qualitative research methods are considered to be sound and reasonable to test existing beliefs. In the exploratory stage of the research, qualitative data allow the researcher to understand the background of the ERP implementation and the organization where the ERP is implemented. Quantitative data are used to test hypothesized relationships in the proposed research framework. A fair amount of previous research has adopted the quantitative approach in studying TAM with a relative degree of validity and reliability

(Jackson, Chow, and Leitch, 1997; Karahanna, 1999; Legris et al., 2003; Rai, Lang, and Welker, 2002; Venkatesh and Davis, 2000).

Although most research on resistance to change tends to employ qualitative methodology (Diego Maria, Maria Rita, and Fabiola, 2002; Labianca et al., 2000; Lapointe and Rivard, 2005; Markus, 1983 ; Trader-Leigh, 2002), survey has proved to help researchers understand the relationship between resistance to change with other variables (Bovey and Hede, 2001a, 2001b; Oreg, 2006; Stanley, Meyer, and Topolnytsky, 2005). Hypotheses are tested with empirical data. Survey is used for data elicitation instead of experiments. The reason is that this research attempts to examine individuals' attitudes which could be disguised under experimental settings. People tend to behave differently if they are being studied. For example, in the Hawthorne experiment, subjects under this experiment performed differently because they knew that they were experimental subjects (Franke and Kaul, 1978). With the nature of attitudes that are not directly observable, survey is seen to be appropriate for this research by assuming attitudes as hypothetical construct (Zikmund, 2002). In addition to quantitative data, qualitative data were also used in the current study to provide insights into each case. Informants were asked for consent, were informed about the objectives of the study, and were assured of their anonymity. They were asked about the background of a project in general and questions related to the questionnaire survey. These qualitative data were used to explore the background of each case

Yin (1984) suggested four types of case study designs based on the number of cases and the number of units of analysis. A study can be single-case or multiple-case design depending on the nature of the case. The single-case design seems to be appropriate for a critical case, an extreme or unique case, or a revelatory case. On the other dimension of case study design, if a case study involves only one unit of analysis, it is called a holistic case study design. A study with multiple units of analysis is called an embedded case study design. From the literature, the nature of user acceptance and resistance in the ERP context tends to be prevalent. This current study follows a holistic multiple-case design.

Of the four phases of ERP implementation identified earlier, data were collected from three phases by combining the first two phases as one single phase: selection/definition phase, implementation phase and operation phase. This is because the selection phase and definition phases are somewhat alike in terms of impacts of a change on users because the first two phases involve high-level activities. It appears to impact users only a little. Users start to discern the change brought about by the implementation in the implementation phase.

Three organizations in Thailand known to implement the ERP system were chosen as the three cases with ERP users as the unit of analysis. Three cases appear to be adequate to pursue three different patterns of user acceptance and resistance to change. These three organizations comprised a large state-owned enterprise providing services to a large area. This large organization had a considerable number of business units employing numerous human resources. One organization was at the beginning of the implementation, a second organization had begun to implement ERP but was facing the delay of the project, and the third organization had finished the ERP implementation and continued to use it for a certain period. These three are thus titled: POSTAL, ENERGY, and WATER, respectively. Each is described in greater detail below.

POSTAL is a large organization with the total of approximately 20,000 employees and workers. Its services include postal and monetary services covering areas nationwide. The structure of the organization consists of seven departments: Marketing and Business Development, Finance and Accounting, Administration and Property Management, Human Resources, Information System, Operations, and International Affairs. POSTAL planned to commence the ERP implementation before the end of year 2008, but unfortunately, it suffered from the cancellation of three bid solicitations. The implementation project was thus delayed. The fourth bid was announced during the middle of 2010 which is the time when data were collected.

ENERGY is the largest power producer in Thailand, including various business operations. Currently, there are eight command lines:1) Policy and Planning, 2)

Account and Finance, 3) Administration, 4) Development, 5) Generation, 6) Fuel, 7) Transmission System, and 8) System Control. Work procedures in ENERGY appear to be decentralized. This presented a challenge for the ERP implementation. Although the number of employees was approximately 24,000 headcounts, not all of them were intended to become ERP users. Encountering many obstacles, the progress of the implementation was behind the original plan. It was in the process of the integration test to be followed by user trainings, at which time ERP users would be identified. During the final training sessions around the mid of 2009, data were collected.

WATER is another state-owned enterprise providing water supply to residences, businesses, and industries in Bangkok, Nonthaburi, and Samut Prakan. There are six departments including 1) Aministration, 2) Finance, 3) Planning, 4) Engineering, 5) Services, and 6) Distribution. ERP had been implemented and was in operation since 2001. The number of personnel was approximately 4,000. Data were collected at the beginning of 2010.

Data were collected using questionnaire survey at different phases; a selection/definition phase, an implementation phase, and an operation phase as illustrated in Figure 10. Data from the three organizations can be compared and thus provide a vista of the user acceptance throughout the ERP implementation process. Although it is hard to argue that data collection based on this research methodology would be prospective by nature, data captured at the point where it actually happened can be seen to reflect close to what truly occurred in that period. Moreover, data acquired from different time frames can be compared to provide a better understanding.

There were data collection methods in the present study. Interviews were conducted to explore the case background and learn about the ERP implementation at each particular organization. Number of ERP users was obtained by asking representative of each organization. This sets as a sampling frame for this study. Questionnaires were distributed to the organization members related to ERP implementation.
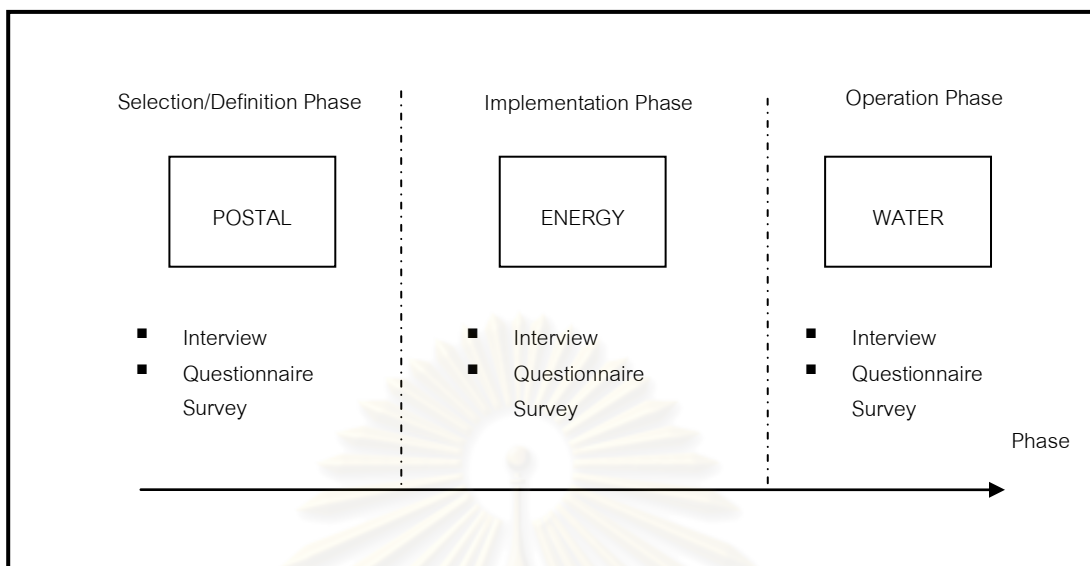
Figure 10 Data collection strategy

3.3 Survey Instruments

Survey instruments were developed based on previous research. The language used in the questionnaires was Thai, after which the method of back translation was used. In greater detail, the researcher translated all items from English to Thai, and then a well-known English teacher in Thailand translated it back to English. The translations were checked with the original items to ensure that there would be no discrepancies. Questionnaires were rephrased to match a phase of implementation for each case.

3.3.1 Perceived Usefulness (PU)

Original items of perceived usefulness were adopted from Davis (1989), as shown below. This set of items had been used by previous studies (Chau, 1996; Dishaw and Strong, 1999; Szajna, 1996; for instance). The selected items of PU were found have an acceptable level of internal consistency (greater than 0.90). A 5-point Likert scale was used to measure this construct, from Totally disagree (+1) to Totally agree (+5). The items included:

1. Using ERP in my job would enable me to accomplish tasks more quickly.
2. Using ERP would improve my job performance.
3. Using ERP in my job would increase my productivity.
4. Using ERP would enhance my effectiveness on the job.
5. I would find ERP useful in my job.
6. Using ERP improves the quality of work I do.

3.3.2 Perceived Ease of Use (PE)

Legris et al. (2003) summarized the items used to measure PEU in the TAM studies. There were four common items and Davis (1989) later included two more items to build a solid measurement for PEU. The items were measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

1. Learning to operate ERP would be easy for me.

2. I would find it easy to get ERP to do what I want it to do.

3. My interaction with ERP would be clear and understandable.

4. I would find ERP to be flexible to interact with.

5. It would be easy for me to become skillful at using ERP.

6. I would find ERP ease to use.

3.3.3 Subjective Norm (SN)

Items measuring subjective norm followed items cited in Venkatesh et al. (2003) using a 5-point Likert scale, Totally disagree (+1) to Totally agree (+5). The items included:

1. People who influence my behavior think that I should use ERP.

2. People who are important to me think that I should use ERP.

3.3.4 Perceived Self-efficacy (PSC)

Items measuring self-efficacy, developed by Compeau and Higgins (1995b) and used in estimating UTAUT (Venkatesh et al., 2003), were used to assess the degree to which users perceived the level of their self-efficacy. A 5-point Likert scale was used to measure the items, from totally disagree (+1) to totally agree (+5).

1. I could complete a job or task using ERP if there is no one around to tell me what to do as I go.

2. I could complete a job or task using ERP if I could call someone for help if I get stuck.

3. I could complete a job or task using ERP if I have a lot of time to complete the job for which ERP is provided.

4. I could complete a job or task using ERP if I have just the built-in help facility for assistance.

3.3.5 Perceived Level of Power (PP)

Items measuring perceived threats stemming from the impact of power distribution alteration followed the items recommended by Greenhalgh and Rosenblatt (1984) and Ashford et al. (1989). The respondents were asked to indicate the level of power which they perceived from a new job using ERP. Items were measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

1. I have enough power in this organization to control events that might affect my job.
2. In this organization, I can prevent negative things from affecting my work situation.
3. I understand this organization well enough to be able to control things that affect me.

3.3.6 Perceived Inequity (PI)

Perceived threats from the loss of equity were measured by perceived inequitable employment relationship items used in Geurts (1999) and previous studies (Schaufeli, Van Dierendonck, and Van Gorp, 1996; Van Dierendonck, Schwartz, and Buunk, 1996). Items were also measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

1. I invest more in my work than I get out of it.
2. I exert myself too much considering what I get back in return.
3. For the efforts I put into the organization, I get much in return. (reversed)
4. If I take into account my dedication, the organization ought to give me a better practical training.
5. In general, the benefits I receive from the organization outweigh the effort I put into it (reversed).

3.3.7 Attitude towards Usage (ATU)

Items for measuring attitudes towards system usage were adopted from Venkatesh et al. (2003). All items were also measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

Cognitive Attitude towards Usage (ATUC):

1. I think that using ERP is a good idea.
2. I think that using ERP is a wise idea.

Affect Cognitive Attitude towards Usage (ATUA):

1. I like the idea of using ERP.
2. Using ERP is pleasant.

3.3.8 Intention to Use (IU)

Although intention to use is not of interest in this study, it was used to compare TAM in two different versions of a dependent variable: an intention to use and symbolic adoption. Items for measuring intention to use were adopted from Venkatesh et al. (2003). All items were also measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

1. I intend to use the system.
2. I predict I would use the system.
3. I plan to use the system.

3.3.9 Symbolic Adoption

Symbolic adoption was measured using the scales used in the study conducted by Nah et al. (2004). Items measuring an intention to use were adopted from Venkatesh et al. (2003). All items were also measured using a 5-point Likert scale, from totally disagree (+1) to totally agree (+5).

1. I am enthusiastic about using ERP.

2. I am excited about using ERP in my workplace.

3. It is my desire to see the full utilization and deployment of ERP.

3.3.10 Resistance Attitude (RTA)

Items for measuring resistance attitude including cognitive and affective elements were adopted from Oreg's (2006). All items were also measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

Cognitive Resistance Attitude (RTAC):

1. I believe that ERP implementation would harm the way things are done in the organization.

2. I think that it is a negative thing that we are going through ERP implementation.

3. I believe that ERP implementation would make my job harder.

Affective Resistance Attitude (RTAA):

1. I am afraid of ERP implementation.

2. I have a bad feeling about ERP implementation.

3. ERP implementation makes me upset.

4. I am stressed by ERP implementation.

3.3.11 Resistance Behaviors (RTB)

Items measuring resistance behaviors were adopted from Oreg's (2006). These items were measured using a 5-point Likert scale, from Totally disagree (+1) to Totally agree (+5).

1. I look for ways to prevent ERP implementation.

2. I protest against ERP implementation.

3. I complain about ERP implementation to my colleagues.

4. I present my objections regarding ERP implementation to management.

5. I speak rather highly of ERP implementation to others.

3.3.12 Job Satisfaction (JS)

There have been various sets of job satisfaction items used, such as the Happock Job Satisfaction Scale, the Job-in-General Faces Scale, Job Descriptive Index, Minnesota Satisfaction Questionnaire (MSQ) and so forth. Among these, MSQ appears to cover a broader content area (Scarpello and Campbell, 1983). Therefore, a short version of MSQ was used to measure satisfaction of a user's new job using ERP. There were 20 items covering a broad range of content including: Ability Utilization, Achievement, Activity, Advancement, Authority, Company Policies, Compensation, Co-workers, Creativity, Independence, Security, Social Service, Social Status, Moral Values, Recognition, Responsibility, Supervision—Human Relations, Supervision—Technical, Variety, and Working Conditions - as shown in the following. Respondents were asked to indicate how satisfied they were with a new job using ERP based on 5-point scale, Very dissatisfied (+1), Dissatisfied (+2), Neither dissatisfied nor satisfied (+3), Satisfied (+4), and Very satisfied (+5).

On my new job using ERP, this is how I feel about …

1. Being able to keep busy all the time

2. The chance to work alone on the job

3. The chance to do different things from time to time

4. The chance to be "somebody" in the community

5. The way my boss handles his/her workers

6. The competence of my supervisor in making decisions

7. Being able to do things that don't go against my conscience

8. The way my job provides for steady employment

9. The chance to do things for other people

10. The chance to tell people what to do

11. The chance to do something that makes use of my abilities

12. The way company policies are put into practice

13. My pay and the amount of work I do

14. The chances for advancement on this job

15. The freedom to use my own judgment

16. The chance to try my own methods of doing the job

17. The working conditions

18. The way my co-workers get along with each other

19. The praise I get for doing a good job

20. The feeling of accomplishment I get from the job

3.4 Data Collection

The data collection process was planned to follow the ERP implementation plan of each organization chosen as a case. To verify the phase of ERP implementation in each organization, the researcher contacted IT directors/managers to inform them of the objectives of the research and inquire about their progress of the ERP implementation project. At the time of the contact, November 2008, each organization was in the phase of ERP implementation according to the plan of the research methodology described in the earlier section. POSTAL had announced a bid solicitation for ERP software and implementation and was in the process of bidding. ENERGY was in the phase of implementation and already faced a delay. WATER had been using ERP for almost 10 years. Even though there was a plan to upgrade the current system, it was still not finalized. These organizations, POSTAL, ENERGY, and WATER, thus represent the three phases of ERP implementation: Selection/Definition phase, Implementation phase, and Operation phase, respectively.

Number of ERP users were identified by asking IT directors/managers or ERP implementation team. Nevertheless, the exact number of ERP users could not be determined from any organization. In order to identify the frame of this study, the estimated number of ERP users was determined instead. The number of ERP users of POSTAL, ENERGY, and WATER was estimated to be 250, 700, and 200 respectively. Survey questionnaires were sent to each organization and distributed internally to ERP-related personnel. The number of returned questionnaires were 107, 483, and 100 from

POSTAL, ENERGY, and WATER respectively as provided in Table 4. Details of data collection at each organization are provided in the following section.

Table 4 Estimated No. of ERP users and No. of Returned Questionnaires

	Estimated No. of ERP Users	No. of Returned Questionnaires	Response Rate
POSTAL	250	107	42.8%
ENERGY	700	483	69.0%
WATER	200	100	50.0%
Total	1,150	690	60.0%

3.4.1 Data Collection at POSTAL

Shortly after the verification of the ERP implementation progress, the researcher contacted POSTAL in order to acquire permission to collect data. The request was denied because data collection was seen to affect the vendor selection process. A few months later, the ERP project was postponed. However, the plan for the next bid solicitation was scheduled for 4-6 months after the last bid was called off. The researcher was asked to wait until the bid solicitation was completed before data collection could be conducted. During this period there was a plan to find other organizations for substitution but there were no organizations with culture and size similar to the other two cases in the progress of an ERP implementation. After ten months, the bid was announced and later cancelled with the plan to re-bid within six months.

After the long period of waiting, POSTAL finally announced the official procurement plan of an ERP implementation. With several attempts of a request for permission to collect data, the researcher finally obtained an informal approval. The researcher sent the official letter to the president of POSTAL asking for permission to collect data and the request was approved. Even though the result of ERP bid solicitation was not officially announced, it was assumed that users were aware and learned about the forthcoming implementation and had adequate understanding about

the ERP system. This is because users had been through a long period of postponements. They had learned about the new ERP system from several bidding processes, for instance, from meetings, internal communication, or system demonstrations.

The letter was sent to the department of secretary for official approval. Questionnaire distribution was facilitated by the department of secretary. The approval letter was sent along with a set of questionnaires to departments related to ERP. A secretary of each department was informed about the objectives of the research and given questionnaire instructions. The number of questionnaires was determined by the department to be 250 based on the headcount and the appropriateness. A total number of 107 questionnaires were returned (42.8% approximately). The case background was acquired from eight interview sessions with ERP users. The data collection spanned 19 months. This makes POSTAL the last organization from which data were completely collected.

3.4.2 Data Collection at ENERGY

After the phase of ERP implementation in each organization was verified to conform to the research methodology, the researcher requested permission to collect data. ENERGY was the first organization to permit the researcher to conduct a survey and interviews. The permission was approved without much effort because the researcher had conducted a longitudinal study with another researcher there since the early phase of the implementation. The data collection to be taken was the continuing stream of data collection of a larger research project.

The ERP Change management team was assigned to facilitate the researcher in collecting data. A questionnaire was sent to this team to verify the content. Questions were checked to ensure that respondents would have correct understanding. No major revision was requested. Questionnaire distribution was scheduled during the period of user training. However, the plan for the system to go ahead was delayed from

the original timeframe for approximately 6 months due to the delay of the implementation. The survey was temporarily suspended.

At the same time, interviews were conducted to collect qualitative data. The change management team helped to identify key persons in the ERP implementation project to serve as informants. A total of 28 key users and 9 consultants representing all 14 modules were interviewed. Questions related to the research framework, and informants were asked to provide information about the background to the implementation project. In addition to interviewing data, there were company documents, news and informal interviews that were included to enhance the researcher's understanding about the case.

After the suspension period of the survey, questionnaires were distributed to ERP users in the meeting before the system was officially deployed. The change management team instructed users to answer the questionnaires. Even though the total number of users was estimated to be around 2,000 at the beginning, the actual number of end users at the time of data collection was reduced to around 700 users. This was because the number was overestimated and there were budget constraints due to ERP user licenses. A total of 700 questionnaires were distributed with 483 questionnaires returned (69% response rate).

3.4.3 Data Collection at WATER

WATER was the second organization from which data were collected. The researcher contacted the IT department to obtain permission to conduct the research and to learn about ERP usage in the organization. ERP was implemented only in core financial modules. In order to begin collecting data, an official letter stating the purpose of research objectives was set to the IT director for approval. The letter was approved and the data collection process began. A secretary of the IT director helped in facilitating the questionnaire distribution. Secretaries of each department were given a set of questionnaires for distribution. They were informed about the research objectives and were given questionnaire instructions.

A total number of ERP users were estimated to be 200. Questionnaires were first distributed to staff working at headquarter. A total of 60 questionnaires were returned. The number of respondents from WATER differed from that of ENERGY because of the scope of ERP implementation. Unlike ENERGY, WATER chose to implement only core module. Another reason was that some users were not located at the head office. The researcher attempted to gain permission to collect more data from users in different branches located around Bangkok. A total of 40 questionnaires were returned. Thus, the total number of returned questionnaires is 100. With limited access to data collection, a case background was learned by interviewing eight users.

3.5 Characteristics of Survey Respondents

This section provides the details of the 690 returned survey questionnaires from POSTAL, ENERGY, and WATER (107, 483, and 100, respectively). The characteristics of all respondents from the three organizations are summarized in Tables 5 to 11.

As evident in Table 5, the number of respondents of ENERGY is much higher than that of the other two cases because of the larger scope of the implementation, as previously mentioned. The majority of the respondents from ENERGY had worked for their organization for more than 10 years (66.23%). Respondents from POSTAL and WATER were mixed, with different periods of years working for their organizations.

Table 5 Characteristics of respondents: Number of years working for the organization

	< 5 years	5 to 10	10 to 20	>20	N/A	Total
POSTAL	22	19	23	22	21	107
	20.56%	17.76%	21.50%	20.56%	19.63%	100.00%
ENERGY	41	24	152	213	53	483
	8.49%	4.97%	31.47%	44.10%	10.97%	100.00%
WATER	37	11	25	22	5	100
	37.00%	11.00%	25.00%	22.00%	5.00%	100.00%
Total	100	54	200	257	79	690

Table 6 shows that the age of the respondents was rather high, i.e., the majority of being over 40 years accounted for 57.75%. Respondents from POSTAL were distributed almost equally in different age groups. In the case of ENERGY, the distribution is skewed to the high age portion, while the age of WATER respondents was distributed normally.

Table 6 Characteristics of respondents: Age (Years)

	20 - 29	30 - 39	40 - 49	>50	N/A	Total
POSTAL	28	32	25	16	6	107
	26.17%	29.91%	23.36%	14.95%	5.61%	100.00%
ENERGY	43	77	168	140	55	483
	8.49%	4.97%	31.47%	44.10%	10.97%	100.00%
WATER	15	41	26	13	5	100
	15.00%	41.00%	26.00%	13.00%	5.00%	100.00%
Total	86	150	219	169	66	690

Table 7 presents the distribution of level in an organization. The three organizations used different career level systems. Thus, the comparison seems to be inapplicable.

Table 7 Characteristics of respondents: Level in an organization

Level	POSTAL		ENERGY		WATER		Total
	n	%	n	%	n	%	
1	23	21.50%	40	8.28%	27	27.00%	90
2	12	11.21%	23	4.76%	19	19.00%	47
3	17	15.89%	40	8.28%	26	26.00%	76
4	15	14.02%	102	21.12%	5	5.00%	143
5	8	7.48%	89	18.43%	1	1.00%	102
6	1	0.93%	46	9.52%			47
7	1	0.93%	36	7.45%			37
8			6	1.24%			6
9			2	0.41%			2
10	1	0.93%			1	1.00%	2
11	1	0.93%					1
N/A	28	26.17%	99	20.50%	21	21.00%	148
Total	107	100.00%	483	100.00%	100	100.00%	690

From Table 8 to Table 11, it is clear that most respondents were working with the modules related to accounting and finance. The respondent profiles of POSTAL and WATER are similar to the majority of respondents from the accounting and finance modules. Respondents from ENERY cover the large area of modules from financial modules to modules related to engineering.

Table 8 Characteristics of POSTAL respondents: Department

Department	N	%
Accounting	43	40.19%
Finance	35	32.71%
Procurement	2	1.87%
Others	20	18.69%
N/A	7	6.54%
Total	107	100.00%

Table 9 Characteristics of ENERGY respondents: Department

Department	N	%
Planning	9	1.87%
Accounting and Finance	71	14.70%
Management	33	6.83%
Development	106	21.95%
Engineering	124	25.67%
Fuel	11	2.28%
Logistics	63	13.04%
Control	6	1.24%
N/A	60	12.42%
Total	483	100.00%

Table 10 Characteristics of WATER respondents: Department

Department	N	%
Planning	2	3.28%
Finance	45	73.77%
Management	5	8.20%
N/A	9	14.75%
Total	61	100.00%

Table 11 Characteristics of respondents: Module (Multiple Response)

Module	POSTAL		ENERGY		WATER	
	N	%	N	%	N	%
Budgeting and Planning	12	11.21%	66	13.66%	19	27.54%
Account Payable	51	47.66%	19	3.93%	0	0.00%
Account Receivable	29	27.10%	4	0.83%	2	2.90%
Asset Management	8	7.48%	3	0.62%	0	0.00%
Finance	6	5.61%	15	3.11%	0	0.00%
Managerial Accounting	7	6.54%	7	1.45%	9	13.04%
Human Resource Management	0	0.00%	48	9.94%	6	8.70%
Supplier Relationship Management	1	0.93%	20	4.14%	3	4.35%
Inventory Management	1	0.93%	22	4.55%	2	2.90%
Production Management	1	0.93%	7	1.45%	0	0.00%
Project Management	0	0.00%	52	10.77%	2	2.90%
Maintenance	5	4.67%	102	21.12%	16	23.19%
Sales and Distribution	2	1.87%	18	3.73%	4	5.80%
Executive Information System	3	2.80%	12	2.48%	6	8.70%

3.6 Qualitative Data Collection

Qualitative data were also solicited by interviewing organization members experienced with the ERP implementation. In-depth interviews were used to collect qualitative data from key informants. Interviews were semi-structured. The questions were phrased to match with the phases of implementation. Questions used in the interview process are as follows.

1. What do you think about ERP implementation?

2. How do the ERP implementation progress?

3. Do you agree with the idea of ERP adoption? Why?

4. Are there any obstacles found during the implementation process?

5. What factors contribute to the success of the implementation? Why?

6. How do you feel about using ERP?

7. Is there be any change brought by the ERP implementation?

8. Are these changes affecting you and your job? What are the effects? To what extent?

9. Have you ever resist to the idea of using ERP? Why? Or Why not?

10. Is there any person resisting to the ERP implementation? Or Is there any resistance when the ERP is implemented?

11. How do you feel about your job and your organization after the implementation?

In order to obtain a broad range of stories and information from the entire implementation process, the key informants should represent the entire population. Informants were selected to cover key players in the ERP implementation, as mentioned previously.

The researcher contacted three organizations during the period of survey data collection to gain permission for interviewing ERP users. After permission was granted, informants were identified by the contact person of each organization. In addition, chain referral sampling or snowball sampling, a technique well-suited for social research (Biernacki and Waldorf, 1981), was used. This technique was used to identify additional key informants that could provide in-depth information, for instance: the

progress of a new implementation at POSTAL, the direct experiences of end users at ENERGY, the history of the implementation at WATER, the resistance experiences, and so forth. Table 12 presents the profiles of informants who participated in the in-depth interviews.

Table 12 Informant profile

Organization	Role	No. of Informants	Key Characteristics
POSTAL	Prospect users	5	Current staff who were to be ERP users. They were currently working with an old version of ERP. Most of them had been working with POSTAL for a long time.
	Working team	2	Current staff who participated in developing business requirements and setting the scope of the implementation. The team consisted of young generation.
	IT team	1	IT team did not involve much in the process of the scope definition. The role of the team was to support during the operation phase. External consultants would be responsible for the implementation.
ENERGY	Key users	28	Selected groups of people who were responsible for providing business requirements to the ERP implementer. They were highly in contact with prospect users and the implementers.
WATER	Original users	3	Current ERP users who participated in the implementation project and had been using ERP since the system was deployed.

Organization	Role	No. of Informants	Key Characteristics
	New users	3	New staff who recently joined WATER. They had no direct experiences about the ERP implementation.
	IT team	2	IT team who took charge of supporting the ERP system.

Each interview session began with the researcher explaining the objectives of the study and assuring the interviewee regarding the anonymity and the confidentiality of the information, that is, the interviewees were specifically informed that their names would be kept confidential and that the information acquired from the interviews would be used for academic research purposes solely. Then, interview questions listed previously were asked. Recorders and short notes were used to capture the information. The results of the interview were concluded shortly after each interview session in order to ensure integrity of the information acquired. Interview sessions lasted from 15 minutes to one and a half hours.

3.7 Summary of Chapter III

This chapter has described the research methodology employed in the current study. Quantitative and qualitative research methods were used to empirically validate the proposed theoretical framework. With the extensive efforts to collect data, the total 690 questionnaires were returned along qualitative data acquired from 44 interview sessions. The results of data analysis will be provided in the next chapter.

Chapter IV
Data Analysis

This chapter provides the analysis of the quantitative data. Case background will be firstly provided. A brief summary of the data analysis approach is described, including the statistical techniques employed. Next, the reliability and validity analysis of the survey instruments are presented. The results of the statistical analysis are discussed next. Finally, the case background is given with the summary of the findings. The set of acronyms used for the rest of this chapter is listed in Table 13.

Table 13 Acronyms of constructs

Construct Group	Acronym	Construct
User Acceptance	PU	Perceived Usefulness
	PEU	Perceived Ease of Use
	SN	Subjective Norm
	ATUC	Cognitive Attitude towards Usage
	ATUA	Affective Attitude towards Usage
	ATU	Attitude towards Usage
	IU	Intention to Use
	SA	Symbolic Adoption
User Resistance	PP	Perceived Level of Power
	PI	Perceived Inequity
	PSE	Perceived Self-efficacy
	RTAC	Cognitive Resistance Attitude
	RTAA	Affective Resistance Attitude
	RTA	Resistance Attitude
	RTB	Resistance Behaviors
Job-related Outcomes	JS	Job Satisfaction

4.1 Case background

Qualitative data were derived mainly from the interview sessions, with the additional information from news and documents. Data were summarized to illustrate the background of the case study. This will help to clarify the discussion of the results.

4.1.1 POSTAL Case Background Summary: A selection/definition phase

POSTAL is a large state-owned enterprise with the mission to provide postal and monetary services to the entire country. It was corporatized from another state-owned enterprise according to the policy of public reform. But before that, the first postal service in Thailand was introduced in 1883. With over a century of operation, the number of employees working for POSTAL was over 20,000. The services continued to serve the nationwide satisfactorily until the advancement of technology posed threats to the traditional services. The impact of technological change was clearly visible to POSTAL. People were offered with various choices of communication methods. They started to rely more on more advanced communication technologies such as e-mail rather than the conventional postal services. Notwithstanding the decline rate of customers, POSTAL strengthened the efficiency and reliability of services, as well as introduced new services for business and individual customers. Yummy Post was one of the examples. It is the service delivering Thai delicacies to any house in Bangkok, from all over Thailand. The reputation of POSTAL seemed to be better. It appeared that organizational change was not new to POSTAL, as it had been through radical transformation. This change was widely considered to be successful by others.

In the year 2008, there was an initiative to replace the old system with a new ERP package. The first attempt of the procurement was officially announced to the public in order to find a company to implement the new system. Unfortunately, the procurement was cancelled and postponed. Later, there were two consecutive attempts to procure the new ERP implementation, but both of the attempts were cancelled and postponed again. Finally, the fourth attempt was announced in May 2010. The data were collected shortly after the procurement was officially announced to the public. In spite of

lacking direct experience with the new implementation, they were aware of the forthcoming project. The old system being used was seen as providing benefits to the organization.

4.1.2 ENERGY Case Summary: An implementation phase

The history of ENERGY, the other state-owned enterprise that served as a case in this study, began in the 1880s. With a long history of operation, organizational culture would present an obstacle to any change initiative. Change was also not new to this organization. In the year 1998 during the reign of Thaksin, there was an attempt at privatization. However, the idea of privatization was met with strong resistance from all quarters, particularly from labor unions. Strong resistance was demonstrated implicitly and explicitly. Despite the strong criticism against this change, the plan continued. After the exiled Prime Minister Thaksin was overthrown, the plan ceased. The consequential outcomes of privatization still yielded some benefits to ENERGY. An IT master plan was developed during the time of the privatization plan being executed. One of the IT initiatives was to implement an ERP project that could integrate all chains of commands in ENERGY as one unified system. In the year 2007, the ERP project began with the aim to integrate and streamline the working processes of all key functions. This was a big challenge to ENERGY since the organizational culture seemed to be a main barrier to the implementation. ENERGY had been operating in a form of a silo organization. There was no mutual standard of practice. Having operated under different principles for a long period of time, every business unit seemed to have different ideas in devising the new system. During the requirement definition phase, business blueprints were required to be developed as a new design of the integrated business process according to ASAP methodology. One of the milestones of this implementation project was business blueprints, for which users were to approve the design. When the due date of this milestone was approaching, there were disagreements from users with the new design. Users declined to sign off on the blueprint, causing a major delay of the entire project. A lot of effort was made to reconcile the disagreements. Although time limitation was enforced on users in dealing with the issues regarding the blueprint sign off, this

enforcement yielded controversial results. The progress of the project that seemed to be on hold for a certain period was pushed forward and the momentum of the project seemed to be recovered. Some groups of users agreed with this forceful approach, but others did not.

4.1.3 WATER Case Summary: An operation phase

WATER, the state-owned enterprise founded in 1909, had the mission to provide good quality water supply to residences, businesses, and industries in Bangkok and the perimeter. Unlike the other two cases, no radical change was evidently identified close to the period of ERP implementation. The implementation of ERP had been completely finished for almost 10 years. The ERP was implemented within the original timeframe. Since the scope of the implementation was limited to only financial modules, it was viewed to be the reason that the implementation was finished on-time.

Only a few modules in accounting and finance were chosen to be implemented although ERP had been in use for a long period. Although there was a plan to upgrade the system to a new version, there still was no official plan to replace their older version of ERP. Users were familiar with the system, and the system usage became routine in this organization. Since it had been in operation quite long, the experiences from the implementation appeared not to affect the current usage although a few informants could remember what had happened during the implementation. Users acknowledged the benefits of using ERP. However, they thought that other modules should be implemented to cover more parts of business operations.

4.2 An approach to data analysis

The use of Structural Equation Modeling (SEM) has become more popular, since it incorporates several different statistical techniques including confirmatory factor analysis (CFA), path analysis, multiple regression analysis, and analysis of variance (ANOVA) (Bollen, 1995). The benefits of SEM overcome some limitations posed by traditional techniques. SEM can effectively deal with reciprocal relationships between constructs. Moreover, it allows a valid analysis of a model with latent variables. There are certain types of parameter estimation techniques used in SEM software: a covariance-based and component-based analysis (Chin, 1998a). In his comments on the use of SEM, Chin (1998a) suggests that a relatively large sample size should be considered in order for a model to provide sufficient statistical validity for a covariance-based approach to SEM as adopted in SEM software such as EQS and LISREL. Mainly, normal distributions of variables and the use of interval scale measures are assumptions that many of these approaches require.

Partial Least Squares (PLS) is a component approach to SEM distinct from the traditional factor-based covariance approaches (Chin, 1998a). It is seen to be a soft-modeling approach since few distribution assumptions are required (Tenenhaus et al., 2005). The use of PLS for estimating parameters in SEM is becoming more popular in IS research, as evidenced by the growing number of published articles in top-tier journals that employ the framework of TAM (e.g.,Gefen and Straub, 1997; Saadé and Bahli, 2005; Venkatesh and Morris, 2000; Venkatesh et al., 2003; Wixom and Todd, 2005). The reason underlying the growing popularity of SEM techniques is probably owing to the fact that this analytical approach is more useful when data size is comparatively small and multivariate normal distribution assumption is not achieved. In comparison to a covariance-based approach, assumptions in a PLS approach tend to be less restrictive (Henseler, Ringle, and Sinkovics, 2009; Tenenhaus et al., 2005).

Previous studies have informatively explained the details regarding the algorithm of PLS path models (Chin, 1998b; Henseler et al., 2009; Tenenhaus et al., 2005). In brief, path models are formally identified by the inner and outer models which

are often referred to as structural and measurement models. In an inner model, there are theorized pathways and relationships between unobserved or latent constructs. The relationships between a construct and the observed items are defined in a measurement model. After the PLS path models are defined, latent variable scores are estimated by an iterative procedure. At this stage, inner and outer weights are estimated in order to determine latent variable scores. The iteration process is terminated when the change in outer weights is less than the predefined threshold. Finally, loadings and inner regression coefficients are determined using a linear regression.

With all the benefits discussed above, it can be posited that PLS is a justified alternative choice for empirical research in IS. Theoretical models underpinning the theoretical framework proposed in this research comprise both structural and measurement models. Even though TAM can be seen to be a well-tested robust model, user resistance still lacks robust empirical validation and can be seen to be in the exploratory stage. Hence, in this study, a PLS approach to SEM was chosen for some justifiable reasons. smartPLS (Ringle, Wende, and Will, 2005) was used for this data analysis task. First, the sample size of this study is not relatively large. Second, some measures are not normally distributed. Third, this study aims to assess how effectively the proposed theories can predict and explain symbolic adoption and resistance to change, as well as job-related outcomes.

The steps in using PLS estimation for testing empirical data in the present study followed what is suggested by Henseler, et al. (2009). The measurement models were assessed for their reliability. Next, hypothesized relationships among theoretical constructs were tested. Data acquired from the three cases were used for model testing. To provide an exhaustive view of theory testing, theoretical models drawn from previous studies were empirically examined. These included TAM, Resistance to Change, and the proposed framework.

4.3 Reliability and Validity of Survey Instruments

Although there are no goodness-of-fit indices provided in a PLS approach to SEM, two primary criteria to assess the models have been recommended by Chin (1998b). The measurement reliability and validity should satisfy the cut-off criteria. The path models in this study were reflective measurement models, as all latent variables were measured by a combination of observed variables rather than the collective set of variables (Henseler et al., 2009). In this section, three sets of composite reliability and AVE (Average Variance Extracted) were obtained from three sets of data acquired from different cases in order to test the reliability and validity separately (for the detailed calculation of composite reliability and AVE, please see Henseler et al. (2009).

Composite reliability was primarily used to determine the degree of reliability of survey instruments adopted in this research instead of Cronbach's alpha, as the alpha was seen to underestimate the internal consistency reliability of latent variables in PLS path models. This follows what is suggested in the work of Henseler, et al. (2009) that summarizes previous studies related to PLS. The authors also recommend the criteria for assessing reflective measurement models. Composite reliability should not be lower than 0.6. When the composite reliability is low, an item can be excluded only if the exclusion substantially improves composite reliability.

Table 14 to Table 16 present composite reliability and AVE and Cronbach's alpha used to assess the reliability and validity of scales in path models from the three cases. All constructs from TAM passed the criterion suggested. However, some constructs from user resistance and job-related outcomes appear to have insufficient degree of reliability and validity in some cases.

For PI, the value of composite reliability was below 0.60 and the value of AVE was less than 0.50, in the case of POSTAL and WATER. PSE did not satisfy the cut-off criteria in the case of POSTAL and ENERGY. Furthermore, to provide a higher degree of reliability assessment, outer loadings of each item were reported in Table 17. It was

recommended that the value of loadings should be greater than 0.70 (Henseler et al., 2009).

Table 14 Summary of Composite Reliability and AVE: POSTAL

Construct Group	Acronym	Composite Reliability	AVE	Cronbach's Alpha
User Acceptance	PU	0.940	0.722	0.881
	PEU	0.914	0.641	0.841
	SN	0.972	0.946	0.925
	ATUC	0.958	0.920	0.911
	ATUA	0.941	0.888	0.874
	ATU	0.954	0.839	0.936
	IU	0.940	0.838	0.932
	SA	0.878	0.707	0.791
User Resistance	PP	0.904	0.759	0.833
	PI	0.096	0.330	0.119
	PSE	0.255	0.199	0.798
	RTAC	0.907	0.765	0.841
	RTAA	0.968	0.884	0.956
	RTA	0.959	0.769	0.948
	RTB	0.716	0.509	0.703
Job-related Outcomes	JS	0.954	0.518	0.947

Table 15 Summary of Composite Reliability and AVE: ENERGY

Construct Group	Acronym	Composite Reliability	AVE	Cronbach's Alpha
User Acceptance	PU	0.939	0.718	0.920
	PEU	0.927	0.678	0.893
	SN	0.961	0.925	0.894
	ATUC	0.970	0.942	0.909
	ATUA	0.968	0.938	0.896
	ATU	0.968	0.885	0.957
	IU	0.955	0.875	0.914
	SA	0.946	0.853	0.854
User Resistance	PP	0.926	0.806	0.840
	PI	0.833	0.503	0.455
	PSE	0.690	0.384	0.737
	RTAC	0.908	0.767	0.794
	RTAA	0.952	0.832	0.917
	RTA	0.946	0.717	0.933
	RTB	0.820	0.491	0.669
Job-related Outcomes	JS	0.982	0.735	0.945

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Table 16 Summary of Composite Reliability and AVE: WATER

Construct Group	Acronym	Composite Reliability	AVE	Cronbach's Alpha
User Acceptance	PU	0.951	0.765	0.935
	PEU	0.947	0.747	0.904
	SN	0.978	0.957	0.945
	ATUC	0.967	0.935	0.912
	ATUA	0.969	0.941	0.920
	ATU	0.972	0.895	0.950
	IU	0.964	0.900	0.932
	SA	0.933	0.822	0.858
User Resistance	PP	0.951	0.867	0.885
	PI	0.227	0.449	0.777
	PSE	0.899	0.748	0.821
	RTAC	0.960	0.856	0.788
	RTAA	0.942	0.702	0.937
	RTA	0.786	0.435	0.922
	RTB	0.933	0.775	0.728
Job-related Outcomes	JS	0.966	0.593	0.948

Table 17 Outer loadings of each item

Constructs	Items	Loadings		
		POSTAL	ENERGY	WATER
PU	PU1	0.847	0.830	0.867
	PU2	0.795	0.888	0.903
	PU3	0.839	0.874	0.911
	PU4	0.877	0.805	0.934
	PU5	0.860	0.839	0.878
	PU6	0.875	0.847	0.741
PEU	PEU1	0.830	0.812	0.843
	PEU2	0.875	0.840	0.848
	PEU3	0.850	0.839	0.897
	PEU4	0.764	0.800	0.910
	PEU5	0.669	0.841	0.850
	PEU6	0.798	0.809	0.836
SN	SN1	0.974	0.962	0.979
	SN2	0.971	0.962	0.978
ATUC	ATUC1	0.959	0.970	0.967
	ATUC2	0.959	0.971	0.967
ATUA	ATUA1	0.942	0.969	0.971
	ATUA2	0.943	0.968	0.969
ATU	ATUC1	0.918	0.930	0.949
	ATUC2	0.929	0.953	0.940
	ATUA1	0.904	0.944	0.959
	ATUA2	0.913	0.936	0.936
IU	IU1	0.899	0.934	0.932
	IU2	0.948	0.943	0.962
	IU3	0.900	0.930	0.952

Constructs	Items	Loadings		
		POSTAL	ENERGY	WATER
SA	SA1	0.875	0.941	0.922
	SA2	0.879	0.928	0.922
	SA3	0.764	0.902	0.875
PP	PP1	0.899	0.887	0.935
	PP2	0.934	0.915	0.945
	PP3	0.773	0.891	0.913
PI	PI1	0.627	0.723	-0.749
	PI2	0.674	0.871	-0.686
	PI3	-0.563	0.624	0.544
	PI4	0.417	0.698	-0.518
	PI5	-0.557	0.599	0.652
PSE	PSE1	0.761	0.619	0.876
	PSE2	0.396	0.629	0.898
	PSE3	0.104	0.260	0.855
	PSE4	-0.216	0.832	0.893
RTAC	RTAC1	0.778	0.855	0.825
	RTAC2	0.925	0.916	0.920
	RTAC3	0.913	0.855	0.847
RTAA	RTAA1	0.936	0.901	0.911
	RTAA2	0.940	0.932	0.946
	RTAA3	0.945	0.945	0.907
	RTAA4	0.939	0.868	0.937
RTA	RTAC1	0.778	0.867	0.632
	RTAC2	0.925	0.903	0.866
	RTAC3	0.913	0.904	0.781
	RTAA1	0.936	0.832	0.880

Constructs	Items	Loadings		
		POSTAL	ENERGY	WATER
	RTAA2	0.940	0.733	0.922
	RTAA3	0.945	0.847	0.857
	RTAA4	0.939	0.830	0.893
RTB	RTB1	0.636	0.447	0.382
	RTB2	0.637	0.827	0.800
	RTB3	0.645	0.801	0.680
	RTB4	0.578	0.816	0.680
	RTB5	-0.750	0.512	0.681
JS	JS1	0.394	0.671	0.619
	JS2	0.501	0.743	0.419
	JS3	0.720	0.839	0.736
	JS4	0.790	0.861	0.725
	JS5	0.583	0.837	0.736
	JS6	0.683	0.826	0.638
	JS7	0.552	0.839	0.817
	JS8	0.612	0.866	0.752
	JS9	0.785	0.881	0.844
	JS10	0.811	0.880	0.827
	JS11	0.842	0.902	0.818
	JS12	0.373	0.870	0.818
	JS13	0.714	0.900	0.826
	JS14	0.800	0.888	0.748
	JS15	0.689	0.875	0.731
	JS16	0.789	0.886	0.726
	JS17	0.845	0.878	0.905
	JS18	0.858	0.881	0.858

Constructs	Items	Loadings		
		POSTAL	ENERGY	WATER
	JS19	0.871	0.889	0.815
	JS20	0.863	0.895	0.898

As is evident from Tables 14 to 17, overall, the PI, PSE, and RTB did not satisfy the criteria of the reliability and validity of measurement models. Items with low loadings were dropped from the measurement models used in the three cases in order for the models to be applicable for comparison. These included PI3, PI4, PI5 from PI, PSE3, and PSE4 from PSE, and RTB5 from RTB as shown in Table 18.

Table 18 Decisions on dropping items

Construct	Items	English Questions	Thai Questions	Decision
PI	PI1	I invest more in my work than I get out of it.	ฉันลงทุนในงานของฉันมากกว่าที่ฉันได้จากงาน	Kept
	PI2	I exert myself too much considering what I get back in return.	ฉันทุ่มเทตัวเองมากเกินไปพิจารณากับสิ่งที่ฉันได้ตอบแทนกลับมา	Kept
	PI3	For the efforts I put into the organization, I get much in return. (reversed)	สำหรับความพยายามที่ฉันได้ทุ่มเทไปกับองค์กรนี้ ฉันได้ผลตอบแทนกลับมามาก	Dropped
	PI4	If I take into account my dedication, the organization ought to give me a better practical training.	ถ้าฉันนำความทุ่มเทมาพิจารณา องค์กรนี้ควรที่จะให้การฝึกอบรมที่ดีกว่านี้	Dropped

Construct	Items	English Questions	Thai Questions	Decision
	PI5	In general, the benefits I receive from the organization outweigh the effort I put in it (reversed).	โดยทั่วไป ผลตอบแทนที่ฉันได้รับจากองค์กรนี้มีน้ำหนักมากกว่าสิ่งที่ฉันทุ่มเทลงไป	Dropped
PSE	PSE1	I could complete a job or task using ERP if there is no one around to tell me what to do as I go.	ฉันสามารถทำงานหรือภารกิจให้สำเร็จโดยใช้ ERP ถึงแม้ว่าไม่มีใครอยู่ใกล้ที่จะบอกฉันว่าฉันจะต้องทำอะไร	Kept
	PSE2	I could complete a job or task using ERP if I could call someone for help if I get stuck.	ฉันสามารถทำงานหรือภารกิจให้สำเร็จโดยใช้ ERP ถ้าฉันสามารถเรียกถามคนอื่นถ้าฉันใช้งานติดขัด	Kept
	PSE3	I could complete a job or task using ERP if I have a lot of time to complete the job for which ERP is provided.	ฉันสามารถทำงานหรือภารกิจให้สำเร็จโดยใช้ ERP ถ้าฉันมีเวลามากมายเพื่อทำงานที่จะต้องทำให้สำเร็จใน ERP	Dropped
	PSE4	I could complete a job or task using ERP if I have just the built-in help facility for assistance.	ฉันสามารถทำงานหรือภารกิจให้สำเร็จโดยใช้ ERP ถ้าฉันมีสิ่งอำนวยความสะดวกช่วยเหลือติดตั้งไว้สำหรับการสนับสนุน	Dropped
RTB	RTB1	I look for ways to prevent ERP implementation.	ฉันมองหาหนทางที่จะป้องกันการพัฒนาระบบ ERP	Kept
	RTB2	I protest against ERP implementation.	ฉันต่อต้านการพัฒนาระบบ ERP	Kept

Construct	Items	English Questions	Thai Questions	Decision
	RTB3	I complain about ERP implementation to my colleagues.	ฉันบ่นเกี่ยวกับการพัฒนาระบบ ERP กับเพื่อนร่วมงานของฉัน	Kept
	RTB4	I present my objections regarding ERP implementation to management.	ฉันเสนอความคิดคัดค้านเกี่ยวกับการพัฒนาระบบ ERP	Kept
	RTB5	I speak rather highly of ERP implementation to others.	ฉันพูดเกี่ยวกับการพัฒนาระบบ ERP ในด้านดีกับผู้อื่น	Dropped

After the exclusion of the items (details provided in Table 18), the models show improvement in the composite reliability and AVE, as shown in the Table 19. It may appear that the exclusion of the items would decrease the content validity. As these items were developed from other settings, they may not be applicable when used with this particular setting. The three organizations chosen for this study were state-owned enterprises providing infrastructure services. Members of this type of organization exhibited a particular type of behavior. In conclusion, all measurement models were considered to have satisfied the reliability.

Table 19 Summary of Composite Reliability and AVE: WATER

Constructs	CASE	Composite Reliability		AVE	
		Before Exclusion	After Exclusion	Before Exclusion	After Exclusion
PI	POSTAL	0.096	0.886	0.330	0.795
	ENERGY	0.833	0.888	0.503	0.754
	WATER	0.227	0.938	0.449	0.883
PSE	POSTAL	0.255	0.852	0.199	0.744
	ENERGY	0.690	0.819	0.384	0.700
	WATER	0.933	0.910	0.776	0.836
RTB	POSTAL	0.716	0.890	0.509	0.671
	ENERGY	0.820	0.853	0.491	0.598
	WATER	0.786	0.881	0.435	0.654

Henseler et al. (2009) further recommend the assessment of validity. Convergent validity was assessed using Average Variance Extracted (AVE). A value of AVE should be higher than 0.5 for adequate convergent validity. Discriminant validity can be assessed by Fornell-Larcker criterion and cross-loadings. It was suggested that the AVE of each latent variable should be greater than the highest square of the latent variable to any other latent variable. As for the cross-loadings, an observed item should correlate higher with its latent variable than with others.

Table 20 to 22 present latent variable correlations and AVE on the diagonal. All constructs appear to have sufficient convergent validity since AVEs are greater than 0.50. Table 23 to 25 show cross-loadings. Most items are correlated highest with their particular latent variable. There are only two items that seem to be a problem. However, the highest cross-loadings of the problematic items to other latent variable were not much different from their loadings with their own latent variable. Therefore, it can be concluded that all constructs have adequate discriminant validity. In summary, all constructs satisfy the validity assessment.

Table 20 Latent variable correlations with AVE on the diagonal: POSTAL

	PU	PEU	SN	ATU	IU	SA	PSE	PP	PI	RTA	RTB	JS
PU	0.722											
PEU	0.844	0.641										
SN	0.714	0.737	0.946									
ATU	0.659	0.639	0.556	0.839								
IU	0.442	0.470	0.373	0.659	0.838							
SA	0.613	0.620	0.565	0.792	0.649	0.707						
PSE	0.472	0.417	0.381	0.639	0.548	0.584	0.744					
PP	0.046	0.186	0.201	0.194	0.217	0.201	0.269	0.759				
PI	0.086	0.091	0.014	0.153	0.054	0.159	0.137	0.496	0.795			
RTA	-0.094	0.081	0.140	-0.107	-0.161	0.022	-0.105	0.415	0.304	0.769		
RTB	-0.137	-0.012	0.029	-0.063	0.071	-0.008	0.115	0.361	0.276	0.494	0.671	
JS	0.453	0.486	0.568	0.702	0.577	0.756	0.650	0.306	0.216	0.170	0.208	0.518

Table 21 Latent variable correlations with AVE on the diagonal: ENERGY

	PU	PEU	SN	ATU	IU	SA	PSE	PP	PI	RTA	RTB	JS
PU	0.718											
PEU	0.732	0.678										
SN	0.523	0.578	0.925									
ATU	0.451	0.347	0.302	0.885								
IU	0.491	0.448	0.350	0.581	0.875							
SA	0.384	0.316	0.274	0.776	0.553	0.853						
PSE	0.370	0.422	0.262	0.406	0.504	0.369	0.700					
PP	0.249	0.260	0.184	0.283	0.231	0.303	0.252	0.806				
PI	0.131	0.141	0.163	0.282	0.187	0.327	0.224	0.361	0.754			
RTA	-0.142	-0.145	0.004	0.018	-0.175	0.122	-0.024	0.231	0.259	0.717		
RTB	-0.047	-0.032	0.026	-0.062	-0.015	-0.021	0.038	0.291	0.128	0.562	0.598	
JS	0.321	0.273	0.268	0.499	0.330	0.586	0.289	0.347	0.304	0.253	0.115	0.735

Table 22 Latent variable correlations with AVE on the diagonal: WATER

	PU	PEU	SN	ATU	IU	SA	PSE	PP	PI	RTA	RTB	JS
PU	0.765											
PEU	0.787	0.747										
SN	0.605	0.637	0.957									
ATU	0.435	0.340	0.211	0.895								
IU	0.496	0.501	0.414	0.522	0.900							
SA	0.442	0.437	0.281	0.805	0.452	0.822						
PSE	0.315	0.402	0.340	0.104	0.137	0.224	0.867					
PP	0.354	0.405	0.340	0.279	0.257	0.319	0.657	0.883				
PI	0.399	0.405	0.336	0.340	0.357	0.336	0.340	0.307	0.836			
RTA	-0.159	-0.164	-0.096	0.028	-0.188	0.148	0.298	0.186	-0.118	0.702		
RTB	0.046	0.037	-0.015	-0.079	0.157	-0.043	0.305	0.230	-0.156	0.495	0.654	
JS	0.551	0.482	0.450	0.618	0.535	0.629	0.289	0.382	0.522	0.079	0.132	0.593

Table 23 Cross-loadings: POSTAL

	PU	PEU	SN	UA	IU	SA	PSE	Power	Inequity	RC	RTC	JS
PU1	0.847	0.686	0.470	0.603	0.319	0.468	0.325	0.083	0.155	-0.124	-0.068	0.323
PU2	0.795	0.627	0.467	0.391	0.250	0.314	0.250	-0.023	0.045	-0.158	-0.169	0.164
PU3	0.840	0.713	0.702	0.505	0.400	0.515	0.408	0.014	0.014	-0.069	-0.136	0.440
PU4	0.877	0.750	0.587	0.555	0.372	0.528	0.432	0.005	0.065	-0.112	-0.112	0.360
PU5	0.860	0.742	0.687	0.636	0.462	0.622	0.481	0.046	0.069	-0.083	-0.130	0.539
PU6	0.875	0.766	0.683	0.624	0.408	0.609	0.461	0.090	0.087	0.035	-0.099	0.410
PEU1	0.743	0.830	0.588	0.549	0.456	0.494	0.417	0.198	0.054	-0.006	-0.057	0.425
PEU2	0.780	0.875	0.654	0.559	0.383	0.539	0.301	0.119	0.033	0.024	-0.065	0.397
PEU3	0.693	0.850	0.621	0.537	0.472	0.575	0.345	0.143	0.088	0.028	-0.062	0.460
PEU4	0.603	0.764	0.560	0.455	0.335	0.383	0.237	0.084	0.013	0.061	0.020	0.282
PEU5	0.564	0.669	0.523	0.375	0.147	0.374	0.236	0.139	0.175	0.328	0.166	0.291
PEU6	0.643	0.798	0.587	0.567	0.414	0.583	0.445	0.206	0.094	0.020	-0.006	0.453
SN1	0.710	0.749	0.974	0.556	0.368	0.562	0.387	0.187	0.008	0.113	0.021	0.552
SN2	0.679	0.684	0.971	0.525	0.356	0.537	0.353	0.206	0.020	0.159	0.036	0.552
ATUA1	0.585	0.580	0.486	0.904	0.648	0.755	0.615	0.171	0.123	-0.164	-0.111	0.598
ATUA2	0.697	0.688	0.583	0.912	0.608	0.741	0.586	0.167	0.133	-0.021	-0.018	0.715
ATUC1	0.607	0.555	0.471	0.919	0.606	0.689	0.531	0.138	0.114	-0.178	-0.079	0.568
ATUC2	0.522	0.514	0.494	0.929	0.552	0.717	0.610	0.236	0.192	-0.032	-0.025	0.689
IU1	0.419	0.462	0.368	0.537	0.901	0.542	0.485	0.161	-0.005	-0.157	0.091	0.518
IU2	0.431	0.443	0.397	0.654	0.947	0.635	0.559	0.237	0.053	-0.104	0.078	0.581
IU3	0.364	0.389	0.259	0.612	0.899	0.601	0.459	0.192	0.094	-0.186	0.028	0.485
SA1	0.560	0.555	0.489	0.658	0.523	0.880	0.491	0.181	0.136	0.116	-0.032	0.593
SA2	0.437	0.480	0.455	0.682	0.573	0.884	0.420	0.268	0.185	0.055	-0.010	0.659
SA3	0.550	0.528	0.481	0.656	0.538	0.755	0.563	0.055	0.077	-0.114	0.021	0.650
PSE1	0.411	0.376	0.302	0.540	0.468	0.488	0.929	0.260	0.127	-0.108	0.095	0.566
PSE2	0.419	0.350	0.388	0.594	0.501	0.553	0.791	0.197	0.108	-0.066	0.111	0.578
PP1	-0.064	0.030	0.059	0.042	0.115	0.072	0.142	0.899	0.407	0.390	0.311	0.170
PP2	0.063	0.222	0.225	0.167	0.192	0.182	0.249	0.934	0.455	0.415	0.348	0.269
PP3	0.168	0.278	0.286	0.382	0.311	0.336	0.371	0.773	0.458	0.248	0.283	0.429
PI1	0.120	0.111	-0.028	0.170	0.075	0.095	0.149	0.419	0.860	0.229	0.188	0.168
PI2	0.045	0.059	0.044	0.113	0.028	0.178	0.103	0.463	0.923	0.304	0.292	0.213
RTAA1	-0.058	0.118	0.177	0.020	-0.083	0.065	-0.091	0.419	0.295	0.928	0.438	0.168
RTAA2	-0.096	0.072	0.159	-0.116	-0.194	0.021	-0.096	0.392	0.300	0.935	0.469	0.147
RTAA3	-0.083	0.050	0.125	-0.098	-0.099	0.035	-0.084	0.352	0.286	0.901	0.388	0.182
RTAA4	-0.045	0.082	0.118	-0.065	-0.080	0.057	-0.122	0.330	0.214	0.900	0.415	0.177
RTAC1	-0.017	0.125	0.103	-0.056	-0.134	0.062	0.005	0.256	0.198	0.694	0.395	0.115
RTAC2	-0.100	0.065	0.093	-0.126	-0.164	-0.034	-0.112	0.350	0.236	0.899	0.497	0.136
RTAC3	-0.163	-0.007	0.077	-0.213	-0.232	-0.059	-0.128	0.427	0.324	0.859	0.429	0.116
RTB1	0.064	0.178	0.113	0.118	0.339	0.119	0.286	0.447	0.151	0.263	0.719	0.240
RTB2	-0.191	-0.108	-0.026	-0.150	-0.054	-0.118	0.010	0.317	0.226	0.484	0.896	0.133
RTB3	-0.092	-0.065	0.065	-0.015	0.009	0.047	0.126	0.216	0.318	0.389	0.781	0.224
RTB4	-0.176	0.015	-0.025	-0.105	0.027	-0.028	0.021	0.251	0.200	0.449	0.871	0.116
JS1	0.162	0.217	0.192	0.240	0.187	0.284	0.118	0.196	0.455	0.294	0.217	0.401
JS2	0.183	0.235	0.289	0.240	0.171	0.280	0.270	0.179	0.308	0.293	0.189	0.505
JS3	0.347	0.319	0.554	0.483	0.270	0.519	0.447	0.162	0.101	0.196	0.110	0.721
JS4	0.363	0.395	0.546	0.540	0.431	0.720	0.421	0.282	0.172	0.208	0.165	0.795
JS5	0.147	0.256	0.218	0.292	0.311	0.338	0.300	0.398	0.361	0.356	0.251	0.587
JS6	0.335	0.305	0.247	0.497	0.377	0.565	0.465	0.208	0.258	0.048	0.094	0.684
JS7	0.171	0.257	0.203	0.363	0.312	0.459	0.311	0.251	0.156	0.195	0.133	0.556
JS8	0.140	0.213	0.256	0.350	0.239	0.398	0.370	0.108	0.075	0.147	0.175	0.612
JS9	0.435	0.485	0.530	0.662	0.549	0.632	0.478	0.185	0.100	0.140	0.117	0.785
JS10	0.337	0.391	0.534	0.534	0.391	0.575	0.465	0.193	0.098	0.202	0.128	0.813
JS11	0.340	0.385	0.494	0.502	0.346	0.598	0.556	0.227	0.091	0.113	0.125	0.842
JS12	0.128	0.208	0.208	0.194	0.301	0.228	0.238	0.322	0.158	0.169	0.394	0.380
JS13	0.365	0.346	0.417	0.561	0.589	0.551	0.537	0.147	0.026	-0.046	0.103	0.711
JS14	0.458	0.461	0.539	0.584	0.533	0.672	0.562	0.259	0.234	0.044	0.133	0.799
JS15	0.391	0.394	0.402	0.506	0.521	0.568	0.532	0.255	0.095	0.016	0.084	0.686
JS16	0.380	0.405	0.468	0.539	0.470	0.560	0.564	0.320	0.120	0.063	0.160	0.787
JS17	0.353	0.331	0.429	0.601	0.458	0.560	0.562	0.169	0.117	0.106	0.150	0.840
JS18	0.356	0.361	0.430	0.643	0.477	0.631	0.563	0.257	0.193	0.067	0.139	0.855
JS19	0.448	0.460	0.522	0.668	0.557	0.649	0.640	0.246	0.136	0.101	0.213	0.869
JS20	0.377	0.383	0.400	0.689	0.540	0.687	0.627	0.156	0.152	0.059	0.156	0.861

Table 24 Cross-loadings: ENERGY

	PU	PEU	SN	UA	IU	SA	PSE	Inequity	Power	RC	RTC	JS
PU1	0.831	0.573	0.391	0.392	0.344	0.385	0.297	0.209	0.162	-0.083	-0.026	0.270
PU2	0.888	0.629	0.371	0.449	0.333	0.485	0.329	0.206	0.110	-0.160	-0.043	0.262
PU3	0.874	0.625	0.368	0.432	0.299	0.375	0.300	0.232	0.092	-0.113	-0.060	0.264
PU4	0.805	0.522	0.381	0.372	0.350	0.377	0.263	0.246	0.170	-0.090	-0.030	0.310
PU5	0.839	0.670	0.425	0.520	0.329	0.477	0.332	0.171	0.063	-0.163	-0.045	0.278
PU6	0.847	0.686	0.354	0.482	0.302	0.386	0.355	0.209	0.078	-0.107	-0.034	0.249
PEU1	0.619	0.812	0.254	0.421	0.264	0.340	0.364	0.236	0.117	-0.122	0.000	0.197
PEU2	0.638	0.840	0.316	0.466	0.302	0.375	0.351	0.209	0.099	-0.146	-0.037	0.244
PEU3	0.582	0.839	0.301	0.466	0.256	0.388	0.350	0.212	0.147	-0.170	-0.052	0.257
PEU4	0.561	0.800	0.248	0.480	0.228	0.367	0.299	0.160	0.062	-0.065	-0.037	0.194
PEU5	0.620	0.841	0.284	0.487	0.254	0.374	0.359	0.246	0.099	-0.090	0.013	0.203
PEU6	0.592	0.809	0.307	0.536	0.252	0.373	0.360	0.216	0.173	-0.120	-0.049	0.250
SN1	0.383	0.277	0.930	0.262	0.698	0.542	0.371	0.242	0.245	0.000	-0.066	0.429
SN2	0.443	0.340	0.953	0.301	0.721	0.554	0.387	0.257	0.243	0.018	-0.022	0.454
ATUA1	0.501	0.560	0.301	0.962	0.266	0.340	0.257	0.194	0.157	-0.014	0.025	0.266
ATUA2	0.506	0.551	0.279	0.962	0.260	0.332	0.248	0.159	0.157	0.021	0.025	0.249
ATUC1	0.424	0.330	0.277	0.944	0.730	0.535	0.395	0.268	0.288	0.031	-0.068	0.478
ATUC2	0.445	0.354	0.294	0.936	0.767	0.555	0.374	0.296	0.284	0.017	-0.078	0.515
IU1	0.338	0.277	0.698	0.231	0.941	0.517	0.333	0.293	0.324	0.131	-0.011	0.549
IU2	0.341	0.291	0.701	0.260	0.929	0.502	0.342	0.291	0.277	0.124	0.026	0.515
IU3	0.385	0.306	0.747	0.267	0.900	0.511	0.347	0.257	0.304	0.083	-0.071	0.558
SA1	0.468	0.425	0.555	0.321	0.523	0.933	0.479	0.240	0.179	-0.173	-0.036	0.311
SA2	0.463	0.414	0.543	0.332	0.496	0.940	0.477	0.177	0.151	-0.180	-0.026	0.296
SA3	0.446	0.419	0.532	0.329	0.529	0.933	0.459	0.230	0.194	-0.140	0.017	0.319
PSE1	0.341	0.385	0.352	0.224	0.302	0.449	0.974	0.255	0.193	-0.026	0.057	0.247
PSE2	0.313	0.369	0.413	0.279	0.435	0.475	0.673	0.141	0.232	-0.008	-0.041	0.307
PP1	0.179	0.221	0.201	0.143	0.219	0.194	0.225	0.887	0.345	0.227	0.299	0.297
PP2	0.229	0.214	0.265	0.172	0.274	0.213	0.218	0.915	0.311	0.205	0.251	0.306
PP3	0.272	0.269	0.306	0.183	0.334	0.217	0.237	0.891	0.314	0.187	0.228	0.336
PI1	0.181	0.192	0.269	0.142	0.328	0.251	0.223	0.363	0.827	0.147	0.063	0.261
PI2	0.087	0.096	0.251	0.153	0.282	0.129	0.195	0.312	0.956	0.283	0.145	0.286
RTAA1	-0.094	-0.072	0.060	0.037	0.133	-0.131	-0.019	0.222	0.213	0.868	0.506	0.255
RTAA2	-0.153	-0.148	-0.034	-0.041	0.047	-0.181	-0.050	0.189	0.198	0.903	0.506	0.194
RTAA3	-0.134	-0.144	0.011	-0.036	0.077	-0.208	-0.079	0.186	0.211	0.904	0.478	0.199
RTAA4	-0.110	-0.146	-0.015	0.067	0.068	-0.166	-0.078	0.130	0.177	0.833	0.463	0.150
RTAC1	-0.031	-0.046	0.092	0.033	0.145	-0.068	0.079	0.241	0.239	0.732	0.424	0.229
RTAC2	-0.145	-0.120	-0.044	-0.003	0.124	-0.150	0.029	0.234	0.267	0.846	0.499	0.217
RTAC3	-0.165	-0.178	0.047	-0.027	0.130	-0.126	-0.017	0.171	0.235	0.830	0.448	0.259
RTB1	0.180	0.217	0.167	0.225	0.135	0.300	0.229	0.318	0.105	0.191	0.528	0.215
RTB2	-0.056	-0.025	-0.096	-0.008	-0.084	-0.084	0.040	0.228	0.089	0.496	0.866	0.077
RTB3	-0.127	-0.142	-0.115	0.013	-0.066	-0.034	-0.026	0.146	0.073	0.479	0.820	0.030
RTB4	-0.028	-0.022	-0.034	-0.033	0.032	-0.058	-0.014	0.285	0.144	0.486	0.832	0.113
JS1	0.157	0.124	0.284	0.251	0.336	0.146	0.151	0.176	0.254	0.299	0.162	0.670
JS2	0.182	0.149	0.360	0.157	0.395	0.219	0.271	0.225	0.286	0.233	0.081	0.744
JS3	0.230	0.204	0.460	0.192	0.514	0.286	0.241	0.239	0.295	0.238	0.053	0.839
JS4	0.255	0.251	0.430	0.248	0.512	0.291	0.286	0.359	0.311	0.264	0.129	0.862
JS5	0.268	0.191	0.408	0.208	0.444	0.244	0.230	0.263	0.304	0.248	0.104	0.836
JS6	0.239	0.198	0.434	0.196	0.478	0.288	0.304	0.262	0.262	0.232	0.108	0.825
JS7	0.215	0.192	0.409	0.203	0.446	0.219	0.237	0.288	0.251	0.270	0.123	0.839
JS8	0.241	0.209	0.422	0.167	0.491	0.265	0.208	0.277	0.247	0.248	0.148	0.865
JS9	0.253	0.197	0.447	0.179	0.543	0.309	0.226	0.247	0.283	0.199	0.090	0.881
JS10	0.287	0.239	0.437	0.254	0.529	0.300	0.250	0.322	0.251	0.196	0.085	0.880
JS11	0.300	0.225	0.448	0.226	0.548	0.311	0.230	0.283	0.279	0.199	0.064	0.902
JS12	0.304	0.252	0.503	0.238	0.582	0.340	0.249	0.292	0.240	0.170	0.057	0.871
JS13	0.316	0.280	0.438	0.270	0.538	0.307	0.244	0.341	0.251	0.263	0.126	0.901
JS14	0.338	0.305	0.446	0.312	0.536	0.312	0.265	0.351	0.261	0.220	0.098	0.889
JS15	0.301	0.297	0.407	0.292	0.505	0.269	0.238	0.376	0.236	0.198	0.110	0.875
JS16	0.326	0.299	0.423	0.271	0.535	0.295	0.253	0.322	0.258	0.188	0.080	0.886
JS17	0.322	0.268	0.454	0.208	0.534	0.335	0.299	0.306	0.263	0.197	0.055	0.878
JS18	0.293	0.248	0.422	0.211	0.491	0.265	0.233	0.317	0.210	0.190	0.091	0.880
JS19	0.293	0.229	0.432	0.244	0.508	0.293	0.262	0.356	0.259	0.197	0.132	0.889
JS20	0.319	0.263	0.448	0.253	0.509	0.306	0.268	0.311	0.242	0.156	0.102	0.894

Table 25 Cross-loadings: WATER

	PU	PEU	SN	UA	IU	SA	PSE	Inequity	Power	RC	RTC	JS
PU1	0.867	0.622	0.475	0.392	0.393	0.320	0.255	0.225	0.329	-0.146	-0.196	0.433
PU2	0.903	0.660	0.504	0.415	0.387	0.393	0.236	0.304	0.237	-0.096	-0.118	0.460
PU3	0.911	0.757	0.547	0.368	0.485	0.392	0.337	0.357	0.340	-0.167	-0.274	0.526
PU4	0.934	0.766	0.544	0.436	0.491	0.443	0.285	0.298	0.400	-0.182	-0.254	0.499
PU5	0.878	0.711	0.586	0.358	0.485	0.413	0.312	0.284	0.307	-0.163	-0.261	0.576
PU6	0.741	0.593	0.516	0.310	0.342	0.346	0.213	0.188	0.207	-0.067	-0.202	0.390
PEU1	0.664	0.843	0.464	0.313	0.410	0.407	0.344	0.404	0.331	-0.089	-0.160	0.427
PEU2	0.727	0.848	0.548	0.329	0.432	0.395	0.326	0.322	0.349	-0.143	-0.219	0.399
PEU3	0.672	0.897	0.548	0.359	0.490	0.440	0.266	0.328	0.365	-0.194	-0.234	0.442
PEU4	0.693	0.910	0.621	0.306	0.471	0.415	0.462	0.305	0.316	-0.159	-0.253	0.422
PEU5	0.707	0.850	0.601	0.215	0.390	0.309	0.405	0.288	0.219	-0.141	-0.195	0.456
PEU6	0.607	0.836	0.516	0.229	0.398	0.285	0.278	0.251	0.283	-0.124	-0.109	0.348
SN1	0.594	0.635	0.979	0.213	0.428	0.280	0.327	0.263	0.293	-0.109	-0.211	0.440
SN2	0.589	0.611	0.978	0.200	0.382	0.270	0.338	0.248	0.293	-0.079	-0.180	0.445
ATUA1	0.405	0.326	0.194	0.949	0.501	0.788	0.079	0.353	0.389	-0.058	-0.385	0.586
ATUA2	0.398	0.320	0.215	0.940	0.463	0.742	0.071	0.346	0.355	0.039	-0.342	0.568
ATUC1	0.396	0.302	0.167	0.959	0.492	0.769	0.147	0.355	0.344	0.080	-0.306	0.578
ATUC2	0.449	0.338	0.224	0.936	0.518	0.745	0.095	0.355	0.302	0.045	-0.328	0.609
IU1	0.470	0.439	0.375	0.462	0.932	0.365	0.082	0.235	0.366	-0.217	-0.112	0.513
IU2	0.481	0.486	0.367	0.523	0.962	0.466	0.165	0.299	0.374	-0.134	-0.137	0.508
IU3	0.461	0.497	0.438	0.497	0.952	0.449	0.137	0.252	0.335	-0.192	-0.125	0.506
SA1	0.387	0.354	0.211	0.728	0.384	0.922	0.143	0.302	0.245	0.171	-0.246	0.610
SA2	0.384	0.449	0.276	0.688	0.408	0.922	0.297	0.324	0.289	0.168	-0.270	0.546
SA3	0.429	0.387	0.279	0.769	0.436	0.875	0.176	0.297	0.391	0.062	-0.422	0.554
PSE1	0.238	0.361	0.272	-0.017	0.097	0.133	0.935	0.507	0.215	0.309	0.183	0.173
PSE2	0.317	0.370	0.349	0.122	0.120	0.223	0.945	0.530	0.244	0.250	0.070	0.315
PP1	0.333	0.396	0.337	0.203	0.169	0.284	0.913	0.600	0.324	0.266	0.044	0.329
PP2	0.355	0.415	0.378	0.309	0.288	0.339	0.644	0.795	0.385	0.151	-0.005	0.428
PP3	0.317	0.355	0.275	0.226	0.206	0.270	0.598	0.716	0.316	0.193	0.093	0.303
PI1	0.411	0.463	0.368	0.288	0.343	0.328	0.261	0.445	0.876	-0.121	-0.330	0.488
PI2	0.306	0.251	0.230	0.342	0.307	0.273	0.188	0.428	0.898	-0.092	-0.451	0.466
RTAA1	-0.032	-0.104	-0.030	0.190	-0.118	0.212	0.192	0.227	0.073	0.632	0.061	0.186
RTAA2	-0.139	-0.154	-0.159	0.081	-0.130	0.115	0.234	0.203	-0.086	0.866	0.354	0.044
RTAA3	-0.100	-0.153	-0.024	0.088	-0.084	0.168	0.341	0.275	0.050	0.781	0.352	0.129
RTAA4	-0.014	0.001	0.027	-0.008	-0.131	0.155	0.337	0.210	-0.207	0.879	0.435	0.073
RTAC1	-0.176	-0.127	-0.134	-0.027	-0.168	0.100	0.235	0.185	-0.166	0.922	0.450	0.001
RTAC2	-0.222	-0.201	-0.058	0.010	-0.217	0.087	0.188	0.184	-0.097	0.857	0.415	0.065
RTAC3	-0.228	-0.229	-0.169	-0.115	-0.250	0.060	0.214	0.184	-0.154	0.893	0.465	-0.015
RTB1	0.191	0.181	0.021	0.074	0.315	0.165	0.346	0.207	0.009	0.222	0.382	0.112
RTB2	0.023	-0.018	0.000	-0.160	0.019	-0.099	0.271	0.148	-0.198	0.520	0.801	0.097
RTB3	-0.085	-0.077	-0.026	-0.054	0.155	-0.078	0.125	0.208	-0.132	0.397	0.680	0.146
RTB4	0.104	0.129	-0.035	-0.023	0.153	-0.018	0.314	0.273	-0.122	0.382	0.680	0.073
JS1	0.330	0.339	0.372	0.357	0.257	0.376	0.303	0.441	0.367	0.236	-0.138	0.619
JS2	0.190	0.175	0.004	0.233	0.194	0.193	0.203	0.348	0.236	0.227	0.078	0.419
JS3	0.478	0.427	0.341	0.549	0.346	0.528	0.156	0.364	0.377	-0.007	-0.164	0.736
JS4	0.295	0.337	0.172	0.429	0.286	0.462	0.316	0.401	0.288	0.159	-0.045	0.725
JS5	0.361	0.361	0.308	0.450	0.451	0.490	0.278	0.404	0.344	0.158	-0.175	0.736
JS6	0.298	0.287	0.303	0.270	0.301	0.300	0.165	0.308	0.349	0.071	-0.158	0.638
JS7	0.464	0.442	0.434	0.436	0.449	0.503	0.308	0.423	0.418	0.073	-0.161	0.817
JS8	0.522	0.400	0.369	0.454	0.340	0.543	0.270	0.267	0.288	0.077	-0.171	0.752
JS9	0.501	0.410	0.466	0.554	0.502	0.552	0.187	0.376	0.463	0.048	-0.272	0.844
JS10	0.471	0.353	0.336	0.534	0.474	0.513	0.225	0.341	0.353	0.086	-0.197	0.827
JS11	0.447	0.382	0.415	0.545	0.477	0.534	0.168	0.348	0.506	-0.006	-0.255	0.818
JS12	0.536	0.492	0.485	0.477	0.485	0.558	0.278	0.437	0.458	-0.078	-0.239	0.818
JS13	0.407	0.411	0.383	0.459	0.434	0.521	0.202	0.453	0.357	0.064	-0.183	0.826
JS14	0.437	0.353	0.279	0.521	0.401	0.453	0.244	0.422	0.446	-0.013	-0.228	0.748
JS15	0.417	0.341	0.209	0.440	0.404	0.448	0.261	0.302	0.348	0.079	-0.178	0.731
JS16	0.477	0.387	0.319	0.506	0.417	0.472	0.143	0.336	0.366	0.058	-0.199	0.726
JS17	0.418	0.367	0.406	0.550	0.455	0.548	0.236	0.472	0.470	0.074	-0.230	0.905
JS18	0.432	0.352	0.424	0.545	0.520	0.507	0.184	0.378	0.452	-0.039	-0.306	0.858
JS19	0.402	0.336	0.321	0.515	0.445	0.449	0.150	0.367	0.412	0.066	-0.222	0.815
JS20	0.471	0.376	0.398	0.542	0.480	0.546	0.189	0.382	0.399	0.021	-0.195	0.898

A summary of the latent mean of all constructs is shown in Table 26. More details of the mean comparison are furnished in Appendix B.

Table 26 Descriptive statistics of the three cases

Construct Group	Acronym	POSTAL (N = 107)	ENERGY (N=483)	WATER (N=100)
User Acceptance	PU	3.48	3.27	3.44
	PEU	3.15	2.93	2.97
	SN	3.15	3.01	3.03
	ATU	3.57	3.40	3.53
	IU	3.36	3.34	3.20
	SA	3.43	3.29	3.27
User Resistance	PSE	3.40	3.01	2.97
	PP	2.67	2.61	2.37
	PI	3.05	3.00	2.74
	RTA	2.42	2.37	2.21
	RTB	2.55	2.53	2.27
Job-related Outcomes	JS	3.26	3.05	3.21

4.4 Empirical Assessment of Theoretical Models

This section illustrates the results of the empirical assessment of the theoretical models pertinent to the research questions of this study: TAM, Resistance to Change, and the proposed model. Theoretical models were tested with data obtained from the three cases. A PLS approach to SEM with bootstrap sub-sampling (n = 1,000) was employed. First, two versions of TAM conceptualized with two different dependent variables were tested, namely, system usage and symbolic adoption. This was to examine the extent to which antecedents in TAM could predict symbolic adoption in mandatory-use context. Second, models with constructs derived from the resistance to change theories were tested. Lastly, the proposed models were empirically assessed.

4.4.1 Empirical Assessment of Technology Acceptance Model

To broadly examine how users react with a mandatory-use system, TAM with SN and ATU included was tested with data from the three organizations. This was to show the general application of the use of TAM in this particular setting. Even though the relationship between an intention to use and its determinants is statistically significant, TAM still offers limited explanations to the question related to user acceptance, as discussed in the previous chapters.

Postal

Most hypothesized paths were statistically significant at 0.01 level. ATU, one out of three, was found to be a statistically significant antecedent of IU (t = 5.716, p < 0.01). On the one hand, the other two antecedents with no statistical significant relationship were antecedents that were PU and SN (t = 0.101, p > 0.05 and t = 0.072, p > 0.05). These three constructs jointly explained the 43.6% of variance in Intention to use. Both PU and PEU were found to be a statistically significant determinant of ATU and explained 20.4% of the variance.

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
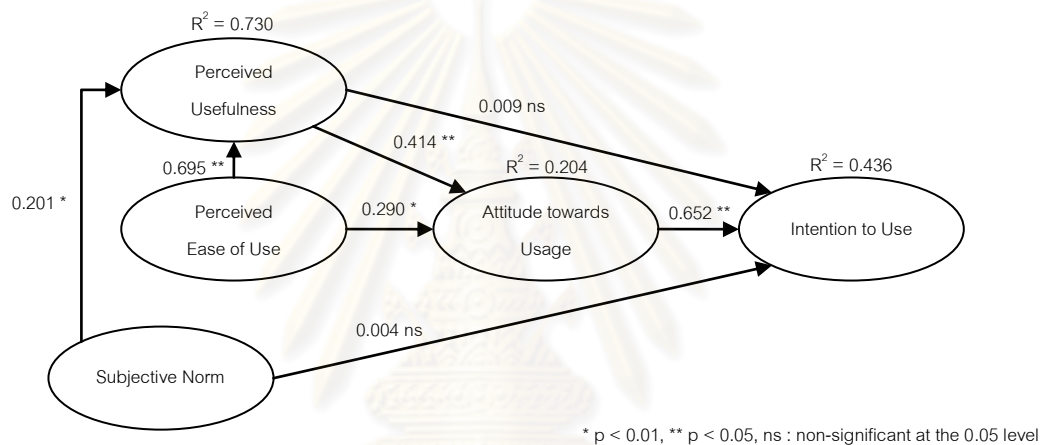
Energy

The results show that there were only two paths found not to be statistically significant: the path from PEU to ATU (t = 0.694, p > 0.05) and the other path from SN to IU (t = 1.734, p > 0.05). Other hypothesized relationships were statistically significant at 0.01 level. The 20.4% of the variance in ATU was explained by PEU and PU. ATU was a significant antecedent of IU (t = 5.677, p < 0.01) and together with SN explained 40.9% of the variance in IU.

$R^2 = 0.552$

Perceived Usefulness

$R^2 = 0.204$

Attitude towards Usage

$R^2 = 0.409$

Intention to Use

0.246 **

0.425 **

0.644 **

0.152 **

Perceived Ease of Use

0.035 ns

0.444 **

Subjective Norm

0.087 ns

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
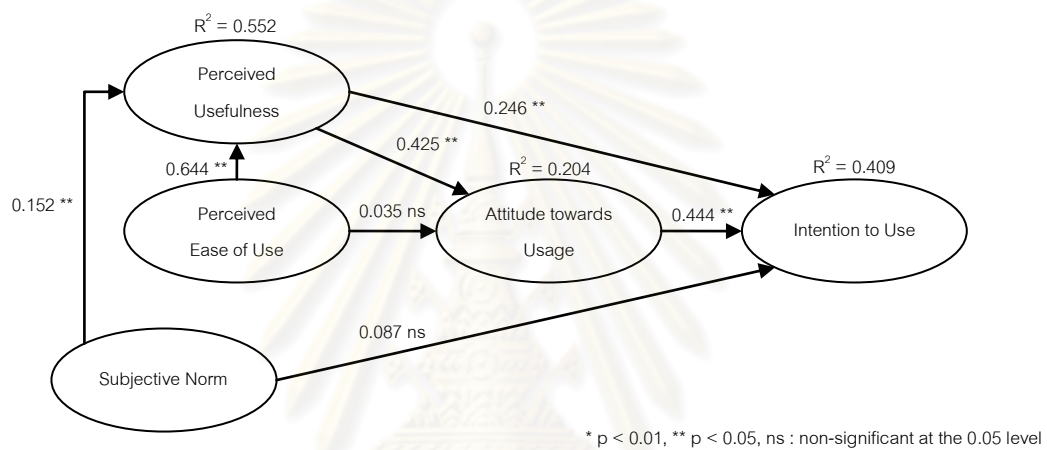
Water

The results of this empirical assessment in the case of WATER are somewhat different from the results of the previous two cases. ATU and SN appear to be a primary significant determinant of IU (t = 2.685, $p < 0.01$ and t = 2.079, $p < 0.05$). PU were not found to be a statistically significant antecedent of IU (t = 1.339, $p > 0.05$). The path from SN to PU was statistically significant (t = 1.966, $p < 0.05$). The variance in IU was explained by three theoretical constructs, about 39.0%. The 19.0% of variance in ATU was explained by PU and PEU.

* $p < 0.01$, ** $p < 0.05$, ns : non-significant at the 0.05 level
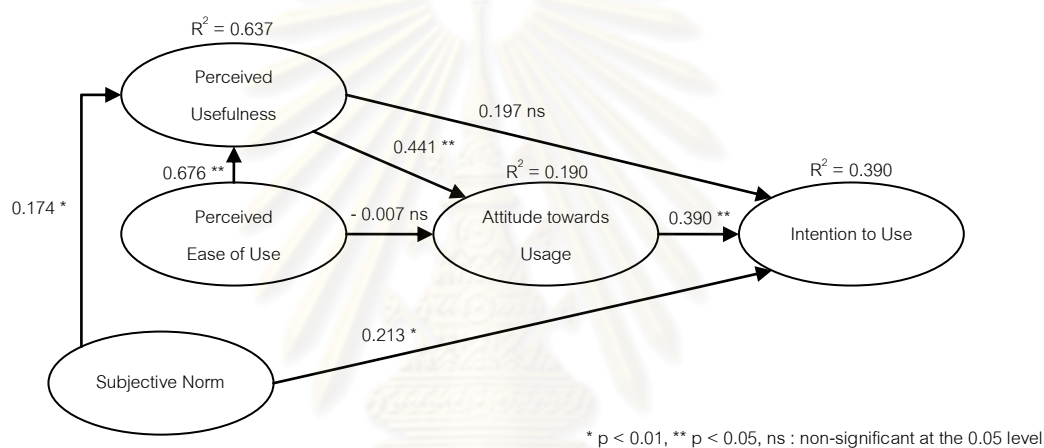
Summary of the Empirical Assessment of Technology Acceptance Model

Table 27 summarizes path coefficients, explained variance, and the statistical significance from three structural models. Overall, the results from three different set of empirical data are not greatly dissimilar. Each of the models explains a similar amount of variance in IU, about 40 – 45%. This suggests that TAM predicted IU to a similar extent in the different phases of the implementation. The predictive strength seems to weaken over time. It seems that ATU usage is a primary significant determinant of IU. The relationship between ATU and IU was relatively strong during the phase of ERP selection/definition, as evidenced by the case of POSTAL (b = 0.652, t= 5.717, p < 0.01). This relationship was somewhat moderate during the phase of ERP operation, as shown by the case of WATER (b = 0.390, t= 2.685, p < 0.01).

TAM theorized PEU and PU as theoretical antecedents of ATU. The results from this study partly support this argument. PU was found to have a direct, positive, significant relationship with ATU across the three cases. The path from PEU to ATU was not found to be statistically significant in two out of the three cases (ENERGY and WATER). Although ATU was excluded in most studies in TAM, the findings were inconsistent when it was included in the model. The literature review conducted by Sun and Zhang (2006) shows that 6 of 29 studies reported a non-significant relationship between PEU and ATU. Nevertheless, PEU still had an indirect effect on ATU via PU in the case where the direct effect was not significant. The strength of this indirect effect is 0.270 (0.414 x 0.652), 0.189 (0.425 x 0.444), and 0.171 (0.441 x 0.390) for POSTAL, ENERGY, and WATER, respectively).

The findings from previous research suggest that SN would have a significant effect on IU (Brown et al., 2002; Venkatesh et al., 2003). In this study, the results from the three cases are inconsistent. The results from two cases (POSTAL and ERNGY) show that the path between SN to IU was not statistically significant. Despite the fact that SN was not significantly related to IU, the effect of this social influence is most likely to enhance the level of PU.

In summary, the findings seem to confirm most of the results found in previous studies. Perceived usefulness is the primary determinant of an intention to use mediated by attitude towards the system usage. Since users might feel that ERP was quite difficult to operate, perceived ease of use did not directly influence attitude towards system usage but helped to improve the perception of usefulness.

Table 27 Summary of structural model path coefficients and explained variance of the empirical assessment of technology acceptance model

	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PEU → PU	0.695 **	0.644 **	0.676 **
SN → PU	0.201 *	0.152 **	0.174 *
PEU → ATU	0.290 *	0.035 ns	-0.007 ns
PU → ATU	0.414 **	0.425 **	0.441 **
PU → IU	0.009 ns	0.246 **	0.197 ns
ATU → IU	0.652 **	0.444 **	0.390 **
SN → IU	0.004 ns	0.087 ns	0.213 *
Variance explained in PU	73.0%	55.2%	63.7%
Variance explained in ATU	20.4%	24.6%	19.0%
Variance explained in IU	43.6%	40.9%	39.0%

4.4.2 Empirical Assessment of Technology Acceptance Model with Symbolic Adoption as a Dependent Variable

As the literature suggests, SA should be placed as a dependent variable when the usage is mandatory. Some researchers have shown that PU, PEU and ATU are significant determinants of SA (Nah et al., 2004). Following TAM conceptualization, these sub-models would be empirically assessed to explore to what extent TAM original determinants could predict SA. PU, PEU, and SN were hypothesized to predict a level of SA in the mandatory-usage setting.

Postal

Most hypothesized relationships were statistically significant at 0.01 level. Two out of three theorized determinants were not found to be a statistical significant determinant. SN was not found to be statistically significantly related with SA ($t = 1.323$, $p > 0.05$). The relationship between PU and SA was not statistically significant ($t = 0.711$, $p > 0.05$). This left ATU to be the only statistical significant determinant of SA ($t = 5.749$, $p < 0.01$). The three constructs, PU, ATU, and SN, jointly explained the 65.2% of variance in SA. The 20.4% variance of ATU were both explained and determined by PU and PEU ($t = 3.438$, $p < 0.01$ and $t = 2.302$, $p > 0.05$).

$R^2 = 0.730$
Perceived Usefulness
0.073 ns
0.417 **
0.695 **
$R^2 = 0.204$
Perceived Ease of Use
0.287 *
Attitude towards Usage
0.663 **
$R^2 = 0.652$
Symbolic Adoption
0.202 *
0.144 ns
Subjective Norm
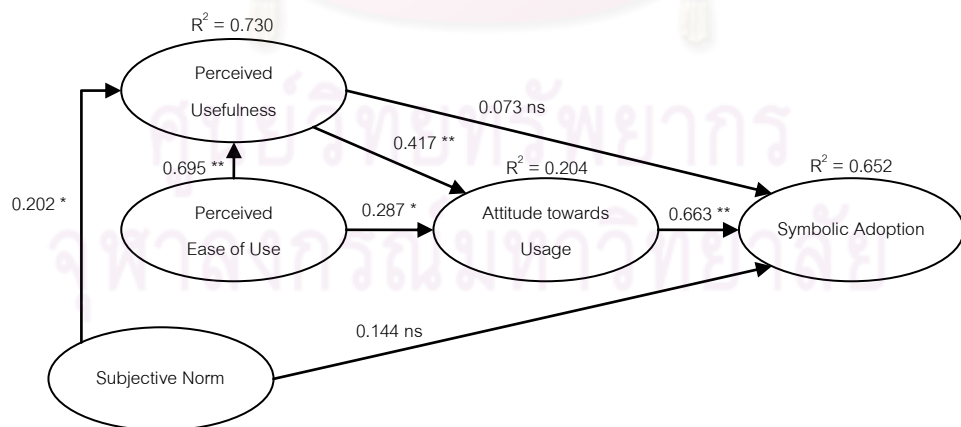
* $p < 0.01$, ** $p < 0.05$, ns : non-significant at the 0.05 level

Energy

Most hypothesized relationships were statistically significant at 0.01 level. Three paths were not found to be statistically significant. These include paths from PEU to ATU ($t = 0.685$, $p > 0.05$), from PU to SA ($t = 0.832$, $p > 0.05$), and from SN to SA ($t = 1.039$, $p > 0.05$). The relationship between ATU and SA appears to be relatively high ($b = 0.753$, $p < 0.01$). The 60.44% of the variance in SA was explained by PU, ATU, and SN.

$R^2 = 0.552$
Perceived Usefulness

0.028 ns

0.425 **

$R^2 = 0.204$

0.644 **

0.151 **

Perceived Ease of Use

0.035 ns

Attitude towards Usage

0.753 **

$R^2 = 0.604$
Symbolic Adoption

Subjective Norm

0.032 ns

* $p < 0.01$, ** $p < 0.05$, ns : non-significant at the 0.05 level
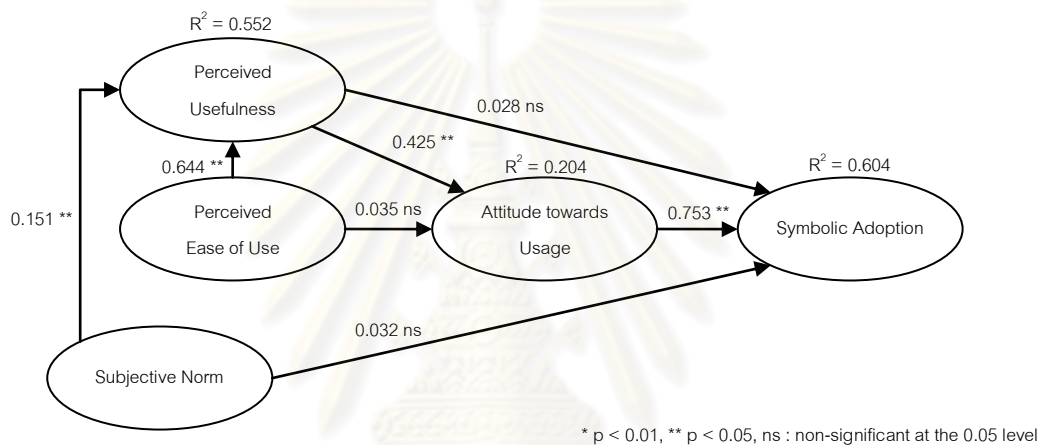
Water

The results obtained from the case of WATER are quite uncommon. There were only two statistically significant paths: the path from PEU to PU (t = 6.617, p < 0.01) and the path from ATU to SA (t = 6.231, p < 0.01). Apart from ATU, the other two theorized determinants, PU and SN, were not statistically significantly related with SA (t = 0.740, p > 0.05 and t = 1.211, p > 0.05, respectively). These three constructs together explained 68.1% of the variance in SA. In addition, ATU was not statistically significantly related with the two hypothesized antecedents; PU and PEU (t = 1.927, p > 0.05 and t = 0.222, p > 0.05, correspondingly).
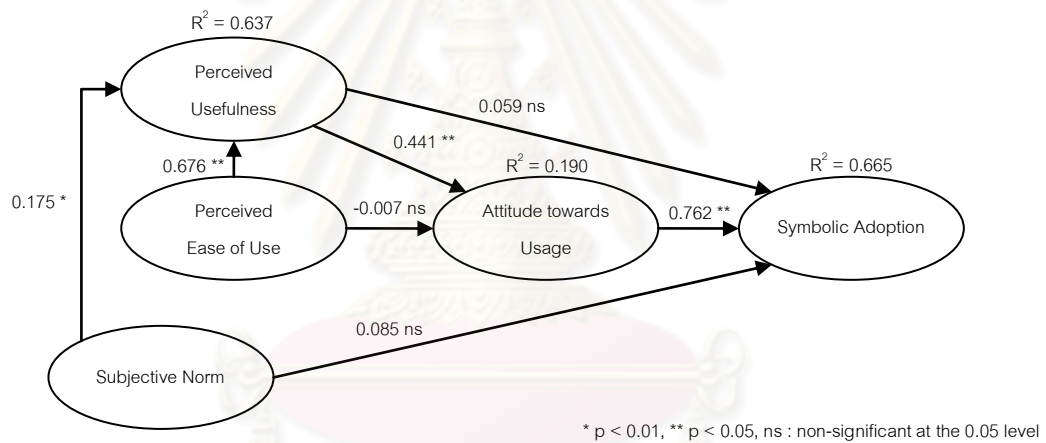
$R^2 = 0.637$

Perceived Usefulness

0.059 ns

0.441 **

$R^2 = 0.190$

0.676 **

0.175 *

Perceived Ease of Use

-0.007 ns

Attitude towards Usage

0.762 **

$R^2 = 0.665$

Symbolic Adoption

Subjective Norm

0.085 ns

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

Summary of the Empirical Assessment of Technology Acceptance Model with Symbolic
Adoption as a Dependent Variable

Path coefficients, explained variance, and statistical significance from three
structural models are summarized in Table 28. When intention to use was replaced by
SA, only one of the three theorized antecedents was statistically significantly related to
the dependent variable. ATU was relatively strongly related to SA and explained about
60% - 65% of its variance. The relationships between PU and SA in all three cases were
not statistically significant. SN was also not statistically significantly related with SA.

There appears to be an indirect effect of perceived usefulness on symbolic
adoption as attitude towards system usage tends to play a mediating role on this
relationship. The strength of the indirect effects of perceived usefulness on symbolic
adoption is 0.276 (0.417 x 0.663), 0.320 (0.425 x 0.753), and 0.336 (0.441 x 0.762) for
POSTAL, ENERGY, and WATER, respectively. Perceived usefulness and perceived ease
of use seems to play crucial roles in determining the degree of user acceptance
measured using symbolic adoption. Perceived usefulness appears to influence user
attitude towards system usage and is influenced by perceived ease of use. If users feel
that systems can be operated without much effort, they would perceive systems to be
more useful since they could use the system to handle most kinds of tasks adeptly. The
more benefits they could gain from the use of this system, the more they would develop
a positive attitude towards the use which, in turn, would influence them to support the
adoption of the system.

Table 28 Summary of structural model path coefficients and explained variance of the empirical assessment of technology acceptance model with symbolic adoption as a dependent variable

|	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PEU → PU	0.695 **	0.644 **	0.676 **
SN → PU	0.202 *	0.151 **	0.175 *
PEU → ATU	0.287 *	0.035 ns	-0.007 ns
PU → ATU	0.417 **	0.425 **	0.441 **
PU → SA	0.073 ns	0.028 ns	0.076 ns
ATU → SA	0.663 **	0.753 **	0.762 **
SN → SA	0.144 ns	0.032 ns	0.085 ns
Variance explained in PU	73.0%	55.2%	63.7%
Variance explained in ATU	20.4%	20.4%	19.0%
Variance explained in SA	65.2%	60.4%	66.5%

4.4.3 Empirical Assessment of Technology Acceptance Model with Symbolic Adoption predicting Job-Related Outcomes Variable

To address one of the research questions in this study: To what extent are job-related outcomes affected by user acceptance and user resistance in a mandatory-use context? The sub-models of TAM with SA predicting job-related outcomes were tested to examine the relationship between user acceptance and job-related outcomes.

Postal

There are two hypothesized paths that were not found to be statistically significant at 0.05 level. PU was not statistically positively significantly related to SA (t = 0.771, p > 0.05). And the relationship between SN and SA was not statistically significant (t = 1.522, p > 0.05). Thus, ATU was the primary determinant of SA (b = 0.665, t = 7.838, p < 0.01). The variance of SA was explained by the three variables, about 65.3%. The results suggest that SA was relatively highly related with JS (b = 0.759, t = 15.345, p < 0.01).

$R^2 = 0.731$

Perceived Usefulness

0.072 ns

0.425 **

$R^2 = 0.458$

$R^2 = 0.653$

$R^2 = 0.576$

0.695 **

0.759 **

Perceived Ease of Use

0.287 *

Attitude towards Usage

0.665 **

Symbolic Adoption

Job Satisfaction

0.202 *

0.145 ns

Subjective Norm

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
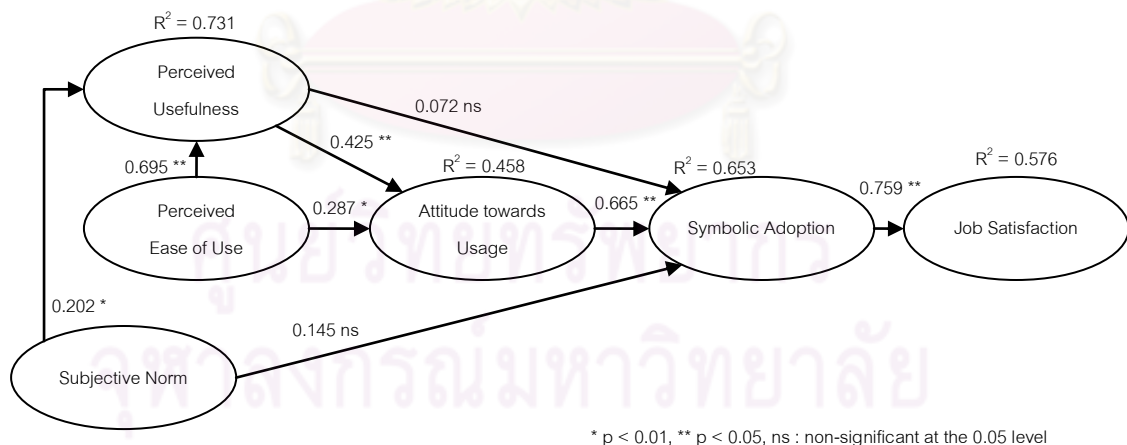
Energy

When symbolic adoption was hypothesized to have a positive direct effect on job satisfaction, the results show that both hypothesized paths were statistically significant (t = 8.760, p < 0.01). ATU seems to be a relatively strong determinant of SA (b = 0.754, t = 14.204, p < 0.01), while PU and SN were not statistically significantly related with SA (t = 0.641, p > 0.05 and t = 0.811, p > 0.05, respectively). ATU, PU, and SN together explained 60.4% of the variance in SA.

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
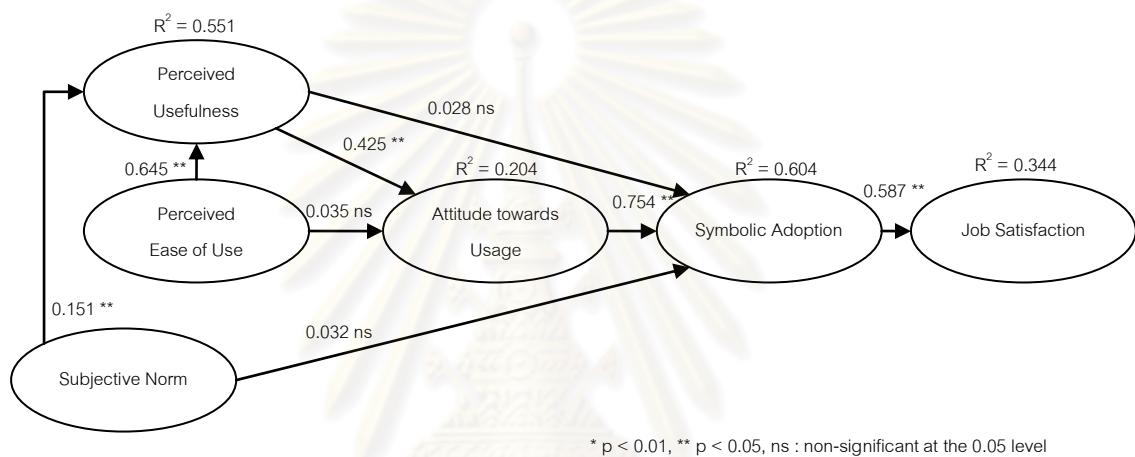
Water

The results suggest that ATU was a major determinant of SA. ATU is relatively highly correlated with SA at 0.01 statistically significant (b = 0.762, t = 6.635, p < 0.01), whereas the other two hypothesized determinants, PU and SN, were not found to be statistically significantly related with SA (t = 0.417, p > 0.05 and t = 1.238, p > 0.05, respectively). The 66.3% variance of SA was jointly explained by ATU, PU, and SN. Furthermore, SA was statistically significantly related with JS (t = 7.649, p < 0.01).
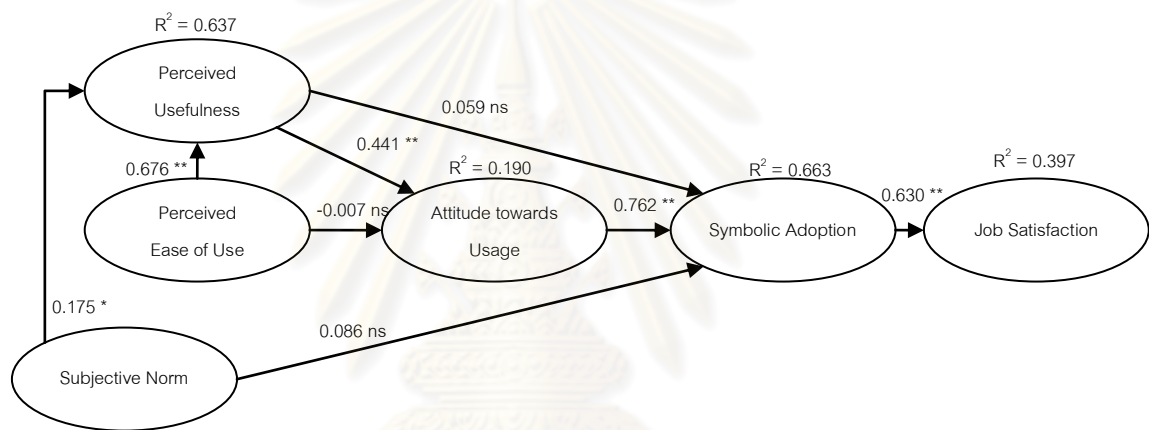
$* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level$

Summary of the Empirical Assessment of Technology Acceptance Model with Symbolic Adoption predicting Job-Related Outcomes

Table 29 presents path coefficients, explained variance, and statistical significance from the three structural models. When SA is conceptualized to predict job-related outcomes, the evidence from the three cases suggests that SA could significantly predict JS. The relationships between SA and JS are moderately high (the path coefficients range from 0.63 to 0.76, approximately). It is probable that an individual with a more positive attitude towards usage will have a higher degree of symbolic adoption. They will be more accepting of the idea of adopting this particular technology. With a high level of symbolic adoption, an individual will have high job satisfaction.

Table 29 Summary of structural model path coefficients and explained variance of the empirical assessment of technology acceptance model with symbolic adoption as a dependent variable predicting job-related outcomes

	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PEU → PU	0.695 **	0.645 **	0.676 *
SN → PU	0.202 *	0.151 **	0.175 *
PEU → ATU	0.287 *	0.035 ns	-0.007 ns
PU → ATU	0.425 **	0.425 **	0.441 *
PU → SA	0.072 ns	0.028 ns	0.059 ns
ATU → SA	0.665 **	0.754 **	0.762 **
SN → SA	0.145 ns	0.032 ns	0.085 ns
SA → JS	0.759 **	0.587 **	0.630 **
Variance explained in PU	73.1%	55.1%	63.7%
Variance explained in ATU	45.8%	20.4%	19.0%
Variance explained in SA	65.3%	60.4%	66.3%
Variance explained in JS	57.6%	34.4%	39.7%

4.4.4 Empirical Assessment of Resistance to IS implementation Model

Resistance to IS implementation sub-models was empirically assessed in order to examine what could potentially influence resistance to IS implementation. PSE, PP, and PI were hypothesized to influence resistance attitude which, in turn, jointly determine resistance behaviors with SN.

Postal

Only PP was statistically significantly related to RTA (t = 4.234, p < 0.01), whereas, PSE and PI were not a statistically significant determinant of RTA (t = 1.915, p > 0.05 and t = 1.165, p > 0.05, correspondingly). These three constructs jointly explained 23.6% variance in RTA. The relationship between RTA and RTB was statistically significant (t = 5.431, p < 0.01). However, SN was not found to be statistically significantly related to RTB (t = 0.376, p > 0.05). The 25.1% of variance in RTB was explained by RTA and SN.
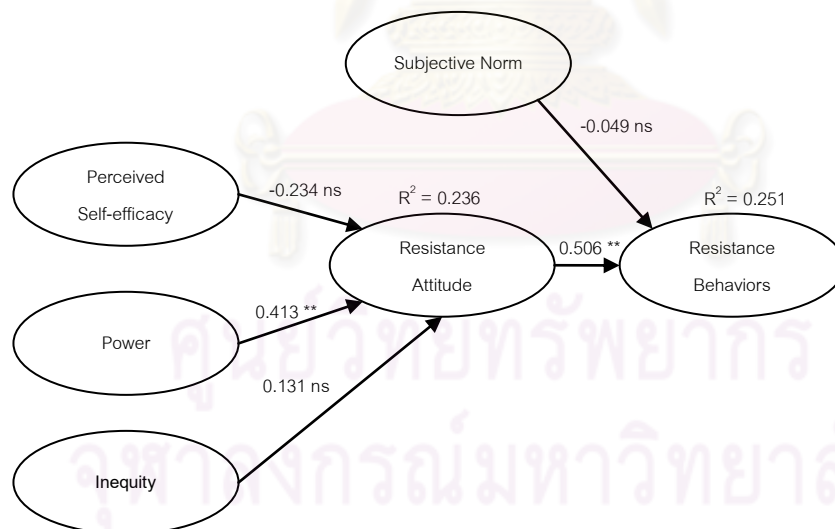
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

ENERGY

Two of three hypothesized antecedents of RTA were found to be statistically significant; PP and PI. The relationship between PSE and RTA was not statistically significant (t = 1.370, p > 0.05). These three antecedents jointly explained 10.2% of variance in RTA. The variance explained seems to be somewhat low. RTB were significantly related to only RTA (t = 12.075, p < 0.01). SN was not found to significantly influent RTB (t = 0.401, p > 0.05).
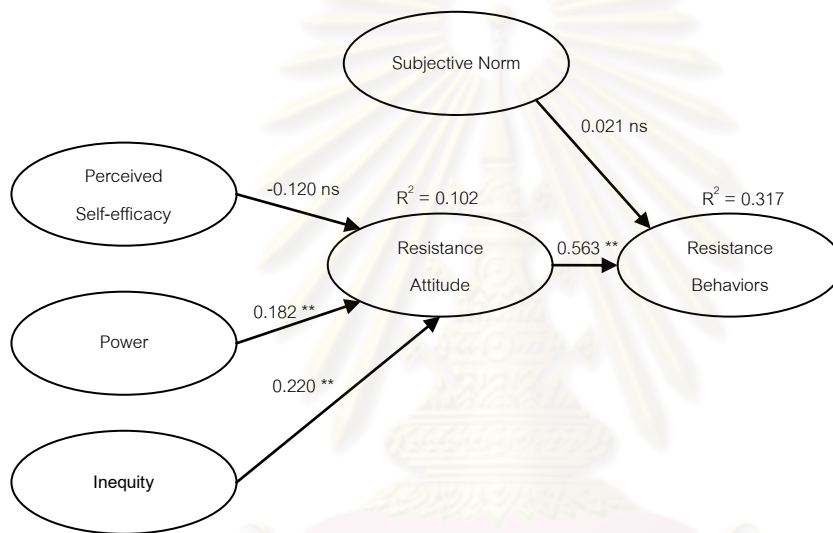
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

WATER

Two of the three hypothesized determinants of RTA were not found to be statistically significant (t = 1.191, p > 0.05 and t = 0.261, p > 0.05 for PSE and PI, respectively). PP was significantly related to RTA (t = 2.850, p < 0.01). There were two hypothesized antecedents of RTB: RTA and SN. RTA was moderately correlated with RTB at 0.01 statistical significant level (t = 5.381, p < 0.01), while SN was not statistically significantly related to RTB (t = 0.373, p > 0.05). 24.6% of the variance in RTB was explained by these two constructs.
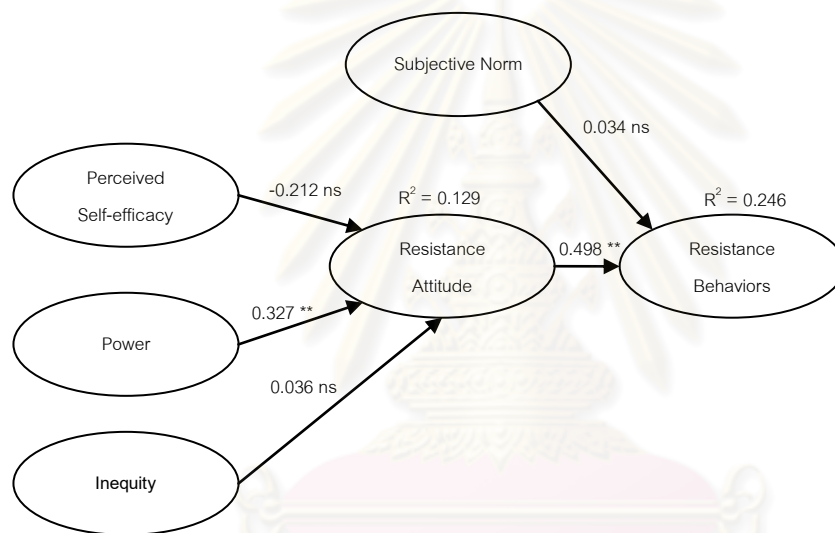
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

Summary of the Empirical Assessment of Resistance to IS implementation Model

Path coefficients, explained variance, and statistical significance from three structural models are shown in Table 30. PSE, PP, and PI were hypothesized to be determinants of RTA. It appears that PP statistically significantly determined RTA in all three cases. It could be assumed that an individual with a higher level of power in an organization tends to develop resistance attitude towards the system implementation.

Moreover, the perception of inequity would lead an individual to have a high resistance attitude during the phase of implementation. However, the variance in RTA jointly explained by these three constructs was approximately about 25% – 30%. The degree of explained variance was not very high.

Table 30 Summary of structural model path coefficients and explained variance of the empirical assessment of resistance to change model

	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PSE → RTA	-0.234 ns	-0.120 ns	-0.212 ns
PP → RTA	0.413 **	0.182 **	0.327 **
PI → RTA	0.131 ns	0.220 **	0.036 ns
SN → RTB	- 0.049 ns	0.075 ns	0.034 ns
RTA → RTB	0.506 **	0.563 **	0.498 **
Variance explained in RTA	23.6%	10.2%	12.9%
Variance explained in RTB	25.1%	31.7%	24.6%

4.4.5 Empirical Assessment of Resistance to Change Predicting Job-related Outcomes

One of the research objectives was to examine the consequences of user resistance in the context of mandatory-usage. Resistance behaviors were expected to negatively influence job-related outcomes. This will help to understand how resistance to IS implementation would affect job-related outcomes in this particular context.

POSTAL

JS was found to be positively directly related to RTB (t = 2.203, $p < 0.05$). The variance in JS was explained by RTB about 7.9%. SN was not directly related to RTB (t = 0.393, $p > 0.05$). Only RTA was found to be a primary determinant of RTB (t = 4.709, $p < 0.01$).Only PP, one of three hypothesized antecedents of RTA, was statistically significantly related to RTA (t = 4.503, $p < 0.01$).

* $p < 0.01$, ** $p < 0.05$, ns : non-significant at the 0.05 level
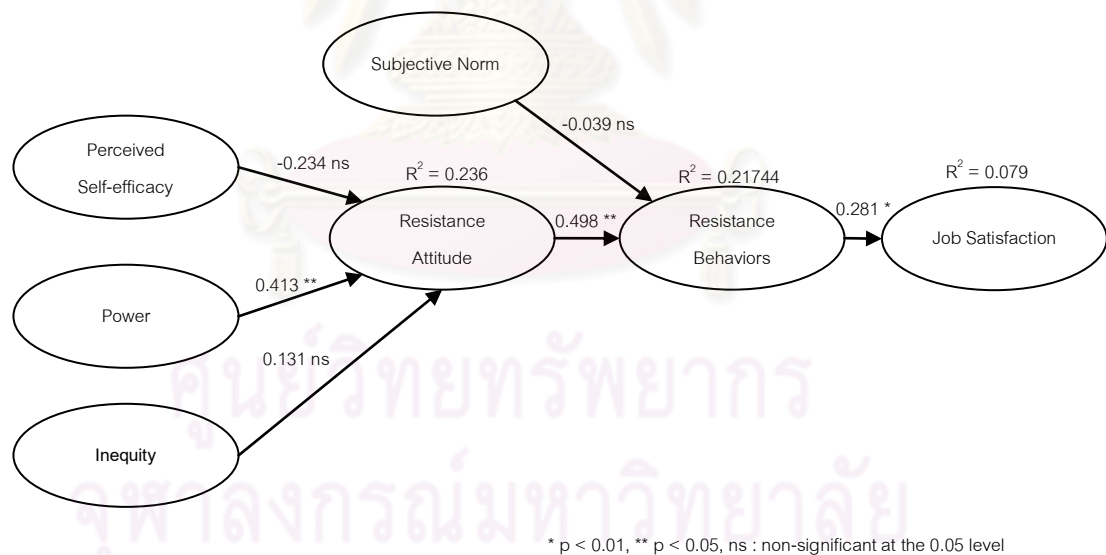
ENERGY

Similar to the results found in the case of POSTAL, RTB was not statistically significantly correlated with JS (t = 1.649, p > 0.05). RTB was statistically significantly determined only by RTA (t = 12.423, p < 0.01) since the relationship between SN and RTB was not significant (t = 0.526, p > 0.05). RTA was directly influenced by PP and PI (t = 2.774, p < 0.01 and t = 3.707, p < 0.01).

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
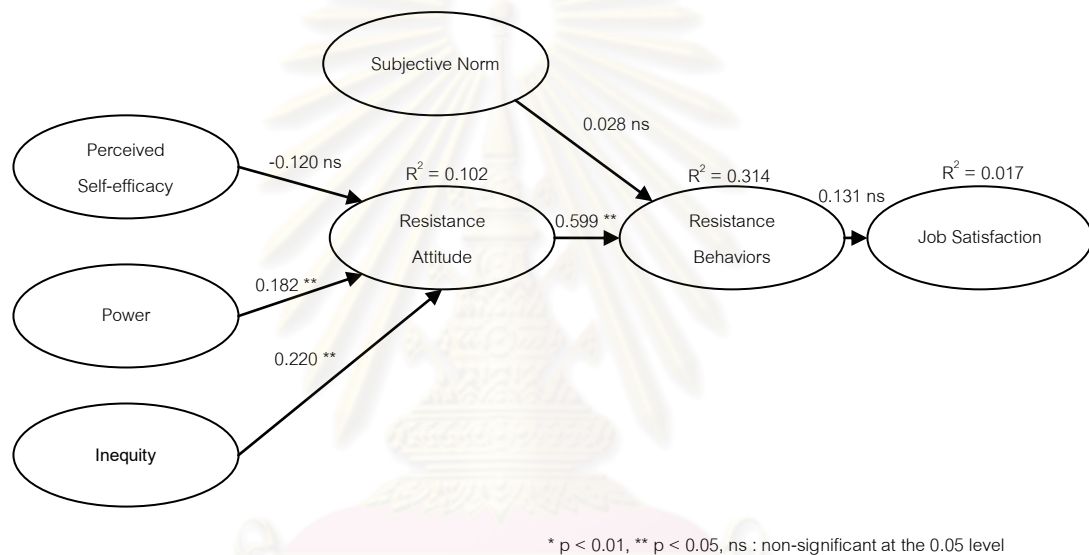
WATER

The relationship between RTB and JS was not statistically significant (t = 0.900, p > 0.05). About 2.3% of variance in JS was explained by RTB. The relationship between RTA and RTB was moderate (b = 0.496, t = 5.123, p < 0.01). SN was not statistically significantly related to RTB (t = 0.370, p > 0.05). Only PP was significantly correlated with RTA (t = 2.816, p < 0.01). However, PSE and PI, the other hypothesize determinants, did not significantly influence RTA (t = 1.179, p > 0.05 and t = 0.264, p > 0.05).
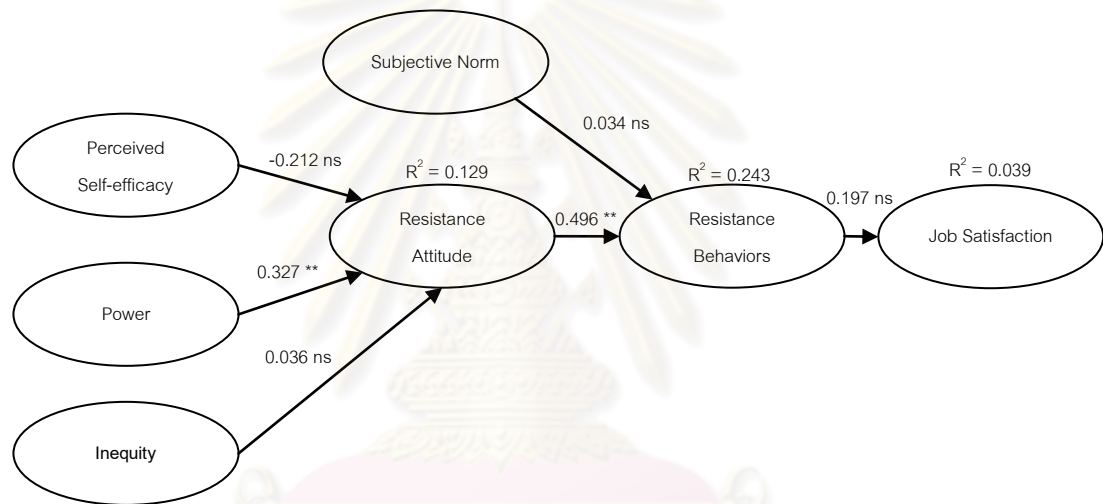
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

Summary of the Empirical Assessment of Resistance to Change Predicting Job-related Outcomes

Table 31 provides path coefficients, explained variance, and statistical significance from three structural models. The relationship between JS and RTB were insignificant in the case of ENERGY and WATER. However, when the link was significant in the case of POSTAL, RTB was positively related to JS. The interpretation derived from the results would lead to the idea that an individual who expresses resistance behaviors tends to have higher job satisfaction. This argument could provoke debate and encourage criticism. At this point, it would be inaccurate to presume the positive relationship between resistance to IS implementation and job-related outcomes. Further analysis will be conducted to examine this link.

Table 31 Summary of structural model path coefficients and explained variance of the empirical assessment of resistance to change predicting job-related outcomes

	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PSE → RTA	-0.234 ns	-0.120 ns	-0.212 ns
PP → RTA	0.413 **	0.182 **	0.327 **
PI → RTA	0.131 ns	0.220 **	0.036 ns
SN → RTB	-0.039 ns	0.028 ns	0.034 ns
RTA → RTB	0.498 **	0.559 **	0.496 **
RTB → JS	0.281 *	0.131 ns	0.187 ns
Variance explained in RTA	23.6%	10.2%	12.9%
Variance explained in RTB	24.4%	31.4%	24.3%
Variance explained in JS	7.9%	1.7%	3.9%

4.4.6 Empirical Assessment of the Proposed Model

This section presents the empirical assessment of the model proposed in this study. Three concepts, which are user acceptance, user resistance, and job-related outcomes, are linked together. This is to examine how user acceptance and user resistance are inter-related and jointly affect job-related outcomes. To examine the link between user acceptance and user resistance, the relationships between ATU and RTB, and between RTA and SA are statistically assessed.

POSTAL

ATU did not statistically significantly determine RTB (t = 0.174, p > 0.05). Neither did RTA statistically significantly affect SA (t = 1.242, p > 0.05). RTA and ATU explain the variance in SA and RTB, about 65.9% and 24.6%, respectively. SA and RTB were positively statistically significantly related to JS (t = 15.277, p < 0.01 and t = 3.429, p < 0.01).

$* p < 0.01, ** p < 0.05, ns :$ non-significant at the 0.05 level
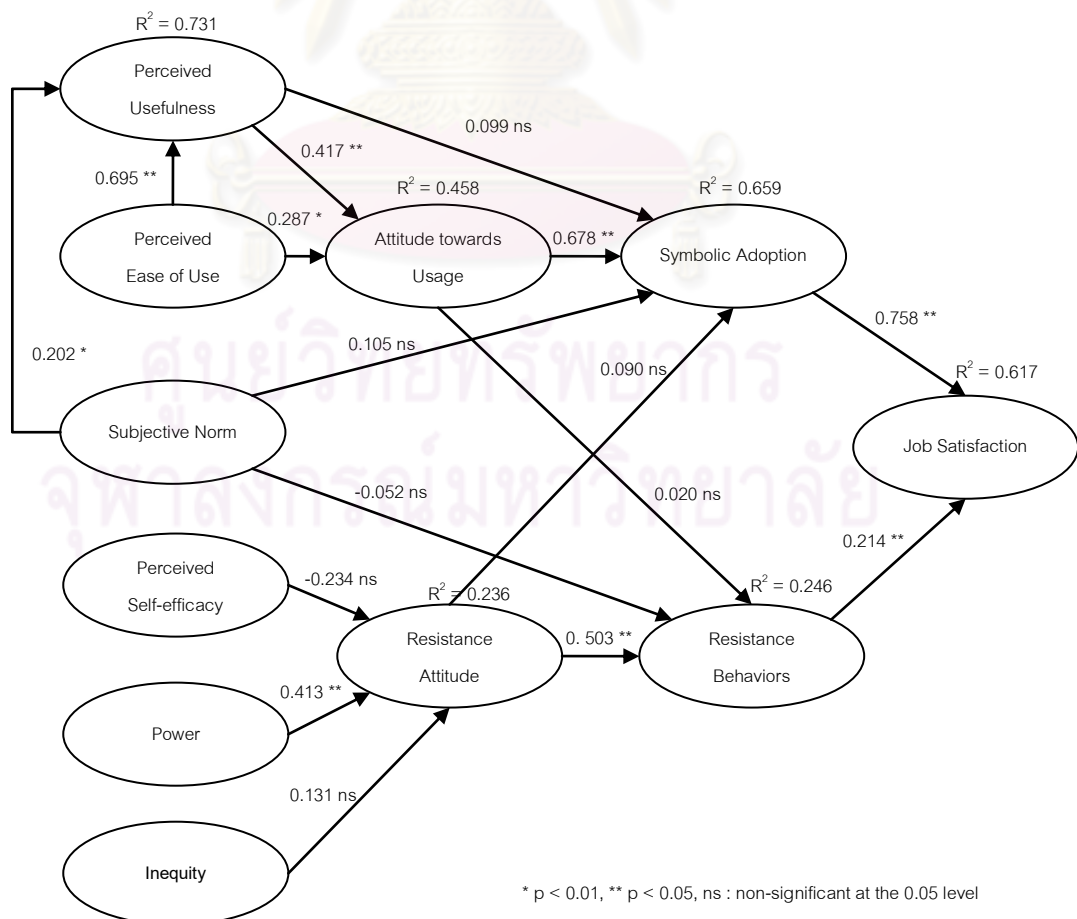
ENERGY

The relationship between ATU and RTB was not statistically significant (t = 1.167, p > 0.05). However, RTA was positively significantly related to SA (t = 2.654, p < 0.01). RTA and ATU explained the variance in SA and RTB, about 61.7% and 32.3%, respectively. Moreover, SA and RTB were positively statistically significantly related to JS (t = 9.172, p < 0.01 and t = 2.603, p < 0.01).
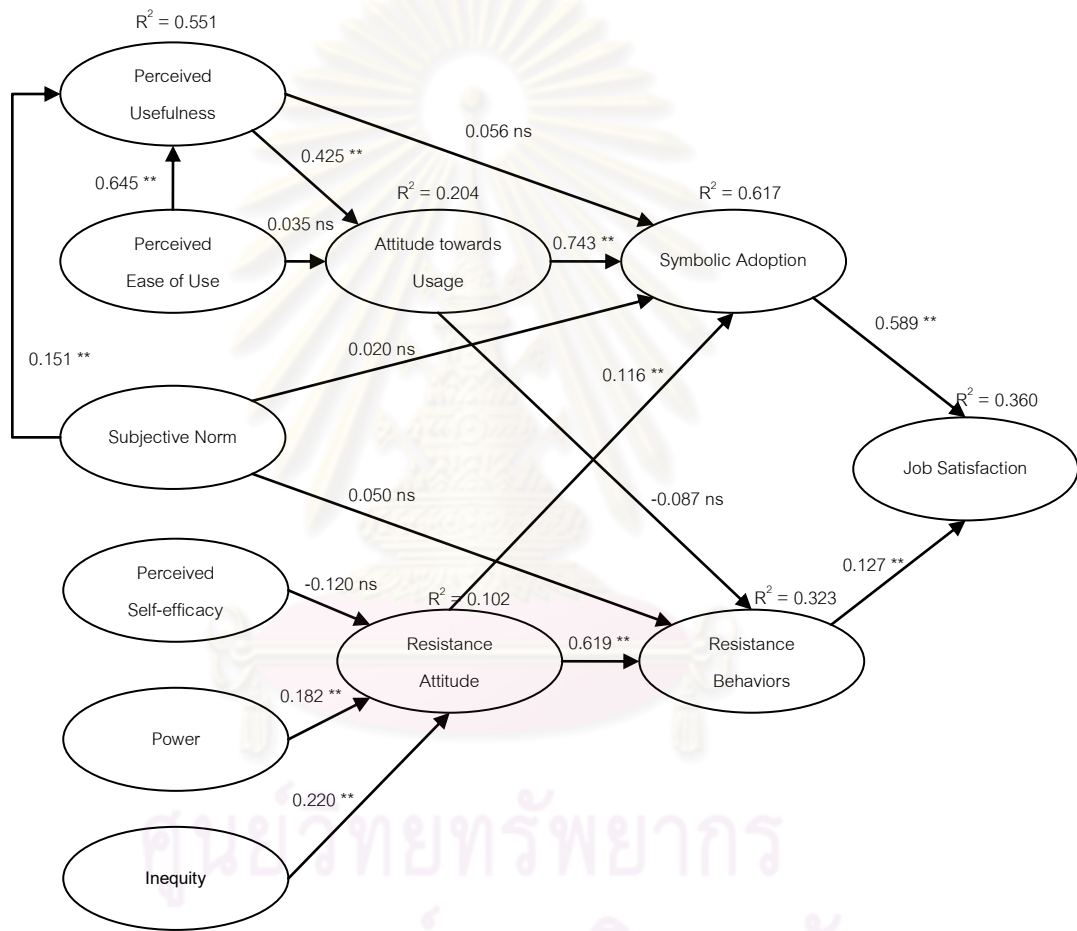
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

WATER

RTA was positively significantly related to SA (t = 2.356, p < 0.05), whereas ATU was not significantly related to RTB (t = 0.803, p > 0.05). RTA and ATU mutually explained the variance in SA and RTB, about 68.4% and 25.7%, respectively. SA and RTB were statistically significantly related to JS (t = 7.471, p < 0.01 and t = 2.011, p < 0.01).
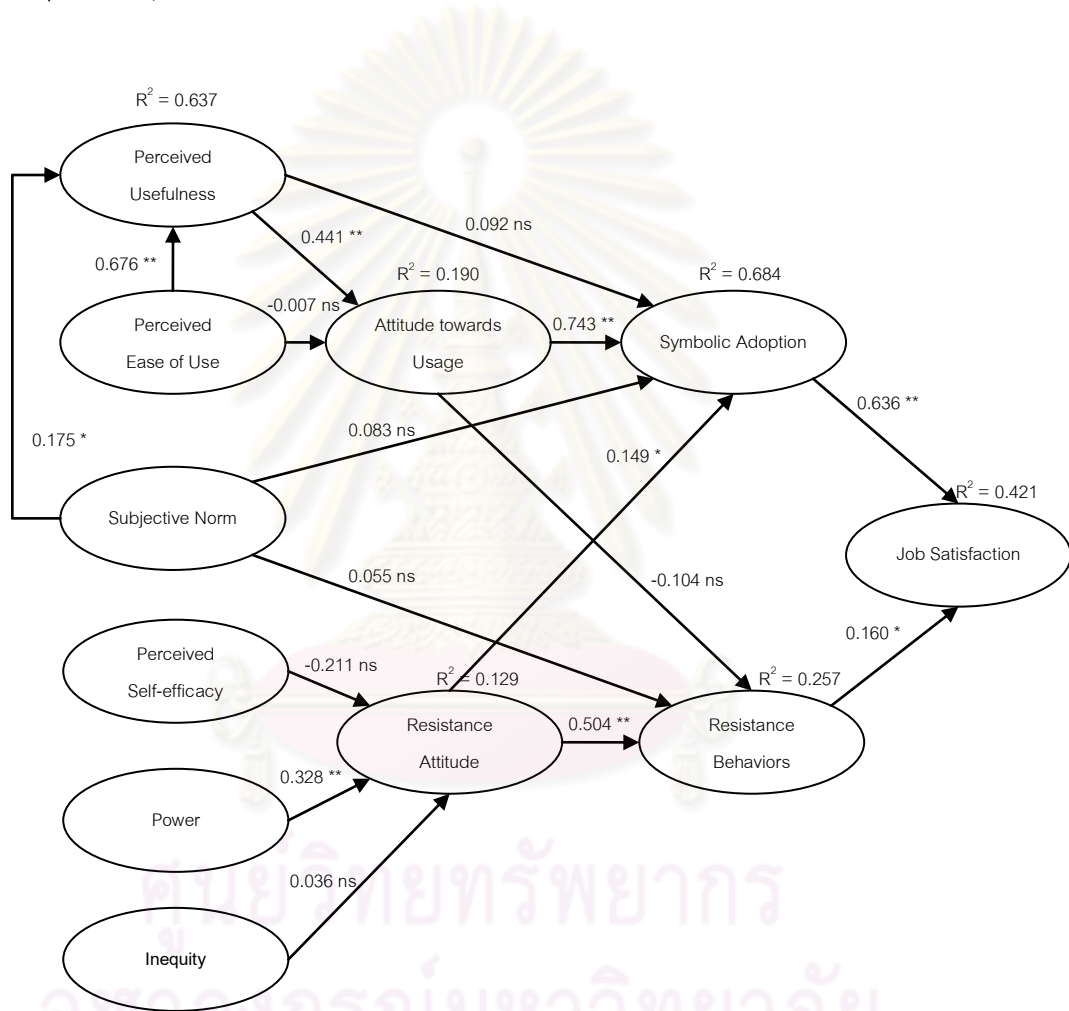
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

Summary of the Empirical Assessment of the Proposed Model

Table 32 provides path coefficients, explained variance, and statistical significance from three structural models. Some important findings are significant and should be emphasized: the effects of user acceptance on job-related outcomes, the effects of user resistance on job-related outcomes, and the relationship between user acceptance and user resistance.

First, the effects of user acceptance were found to be positive. SA was positively statistically significantly related to JS in all cases. It appears that a user who agrees with the idea of using the system will be more satisfied with the ERP jobs. The effects of user acceptance, represented by the level of symbolic adoption, tend to have a positive effect on job-related outcomes.

Second, the effects of user resistance were found to be positive. In all cases, RTB was positively statistically significantly correlated to JS. Intuitively, the effects of resistance to IS implementation would be negative. Resistance to IS implementation would lead individuals to be dissatisfied with, or retract from, their jobs on ERP. Hence, individuals with high resistance to IS implementation would lead to low job satisfaction. The findings here show contrasting results. It may be argued that an individual might be satisfied with the job on ERP after they could freely express resistance behaviors such as protesting or complaining. However, there could be the interaction effect between the effects of user acceptance and user resistance on job satisfaction which will be tested in the next section.

Third, the effects of user acceptance on user resistance were not significant in three cases. It appears that positive attitude towards system usage would not help decrease individual resistance behaviors. Even though users agree to the idea of using the system, their acceptance of this particular system will not discourage them to express their resistance behaviors.

Fourth, the effects of user resistance on user acceptance were found inconsistence among three cases. RTA positively significantly influenced SA in the case

of ENERGY and WATER. This may seem to contrast a general belief because resistance attitude is mostly perceived to be negative. It is least likely that negative thoughts and feelings would increase a degree of symbolic adoption. These effects will be explored in the next section.

The effects of user resistance on user acceptance were found to contrast general intuitions. This may stem from the asymmetric effects of resistance (Bhattacherjee and Hikmet, 2007) that makes the relationship between these two concepts perplexing. Further analysis will be performed in the next section to investigate the interaction between user acceptance and user resistance.

Table 32 Summary of structural model path coefficients and explained variance of the proposed model

	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PEU → PU	0.695 **	0.645 **	0.676 **
SN → PU	0.202 *	0.151 **	0.175 *
PEU → ATU	0.287 *	0.035 ns	-0.042 ns
PU → ATU	0.417 **	0.425 **	0.441 **
PU → SA	0.099 ns	0.054 ns	0.092 ns
ATU → SA	0.678 **	0.743 **	0.743 **
SN → SA	0.105 ns	0.020 ns	0.083 ns
RTA → SA	0.020 ns	0.116 **	0.149 *
PSE → RTA	-0.234 ns	-0.120 ns	-0.211ns
PP → RTA	0.413 **	0.182 **	0.328 **
PI → RTA	0.131 ns	0.220 **	0.036 ns
SN → RTB	-0.052 ns	0.050 ns	0.055 ns
RTA → RTB	0.503 **	0.563 **	0.504 **
ATU → RTB	0.020 ns	-0.087 ns	-0.104 ns
SA → JS	0.758 **	0.589 **	0.636 **
RTB → JS	0.214 **	0.127 **	0.160 *
Variance explained in PU	73.1%	55.1%	63.7%
Variance explained in ATU	45.8%	20.4%	19.0%
Variance explained in SA	65.9%	61.7%	68.4%
Variance explained in RTA	23.6%	10.2%	12.9%
Variance explained in RTB	24.6%	32.3%	25.7%
Variance explained in JS	61.7%	36.0%	42.1%

4.4.7 Empirical Assessment of the Proposed Model with Interaction Effects

From the results found in the empirical assessment of the proposed model shown in the previous section, an issue was posed by the relationship between user acceptance and user resistance. Previous studies have found that the effects of user resistance are asymmetric. Cenfetelli (2004b) posited that inhibitors solely discourage usage. However, the lack of inhibitors would not encourage system adoption. Following this theoretical contention, Bhattacherjee and Hikmet (2007) argue that resistance should not be viewed as non-usage. Especially in this particular context where system usage is mandatory, there should not be non-usage. Hence, the relationship between user acceptance and user resistance should not be viewed as simplistic. The interaction between user acceptance and user resistance could be expected.

The form of the relationships between user acceptance and user resistance should be modeled to include interaction effects. Thus, user acceptance could be moderated by user resistance. Since resistance to IS implementation could be expressed passively or actively, user acceptance might be moderated by either resistance attitude or resistance behaviors. How user acceptance is moderated by user resistance would follow theoretical conceptualization. Symbolic adoption is argued to be determined by user attitude. Hence, it should be mainly influenced by user attitude towards system usage and moderated by resistance attitude. Moreover, the relationship between job-related outcomes and symbolic adoption could be moderated by resistance behaviors. In order to empirically assess the moderating role of resistance to IS implementation, the PLS models with data from the three cases were tested.

In order to test an interaction effect, this study follows fundamental guidelines suggested by Baron and Kenny (1986). The product variable of the independent variable and the moderator is created in order to use in the PLS models. An interaction effect can be obtained by the built-in feature of smartPLS. The analyses for interaction effects in this study also followed the method illustrated in the study

conducted by Chin et al. (1996). Item scores were standardized before multiplication, and then the PLS procedure was used to estimate the interaction effect.

The three moderating effects were introduced into the proposed models: resistance attitude moderating the relationship between attitude towards usage and symbolic adoption, attitude towards usage moderating the relationship between resistance attitude and resistance behaviors, and resistance moderating the relationship between symbolic adoption and job satisfaction. These three interaction effects were created and entered into the proposed model. The PLS models were tested with the three case data separately.

Carte and Russell (2003) indicated nine common errors in testing moderation effects. One group of the errors deals with the inappropriate use and interpretation of statistics. The authors also suggested that the change in R-square should be used as the index of moderator effect size instead of the path coefficients. In addition, the path coefficient of the main effect should not be interpreted when the moderating effect is significant (Carte and Russell, 2003; Venkatesh et al., 2003).

POSTAL

No interaction effects were significant. The interaction effect of ATU and RTA on SA was not significant (t = 0.194, p > 0.05). RTA did not moderate the relationship between ATU and SA (t = 0.583, p > 0.05). The interaction term between SA and RTB was not significantly related to JS (t = 0.800, p > 0.05).
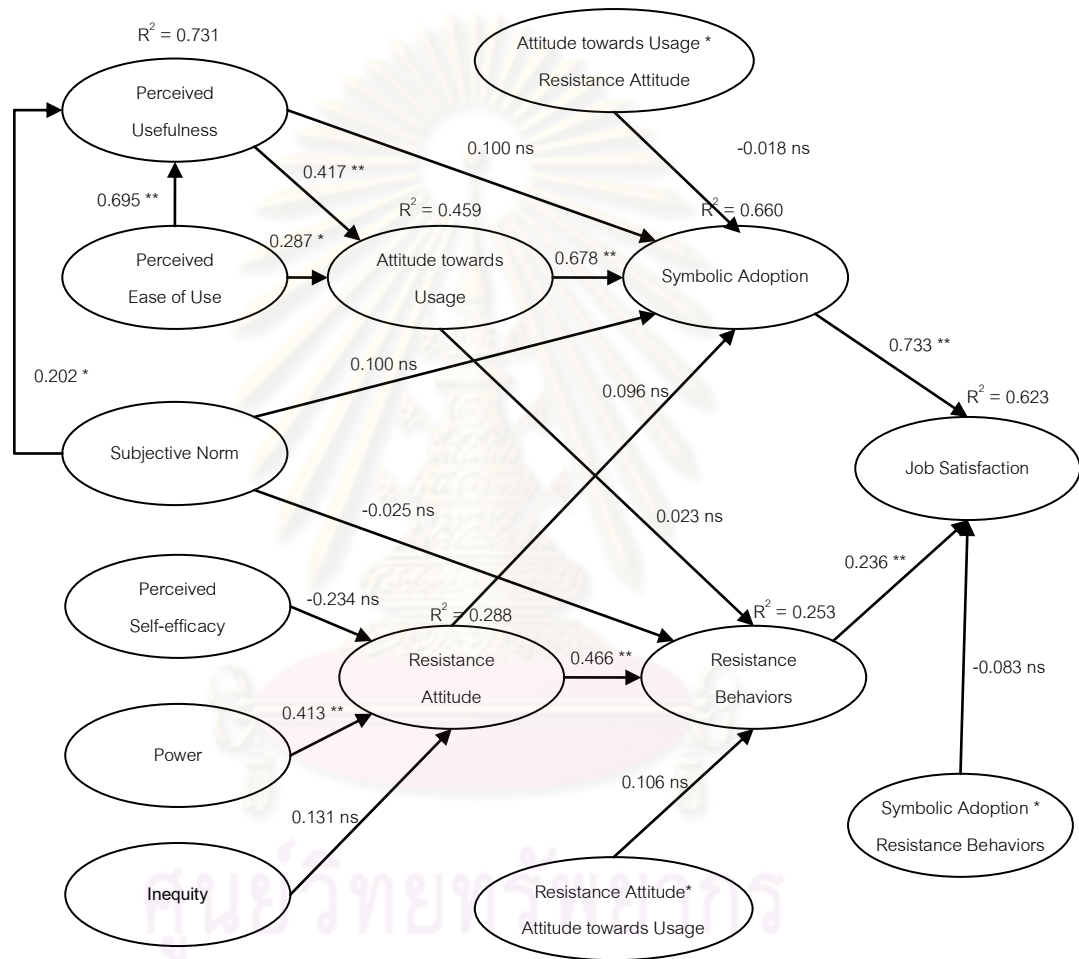
* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level

ENERGY

Only one interaction effect was found to be significant. RTA negatively moderated the relationship between ATU and SA (t = 2.664, p < 0.01). The interaction effect of RTA and ATU on RTB was not significant (t = 0.477, p > 0.05). RTB did not moderate the relationship between SA and JS (t = 1.691, p > 0.05).

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
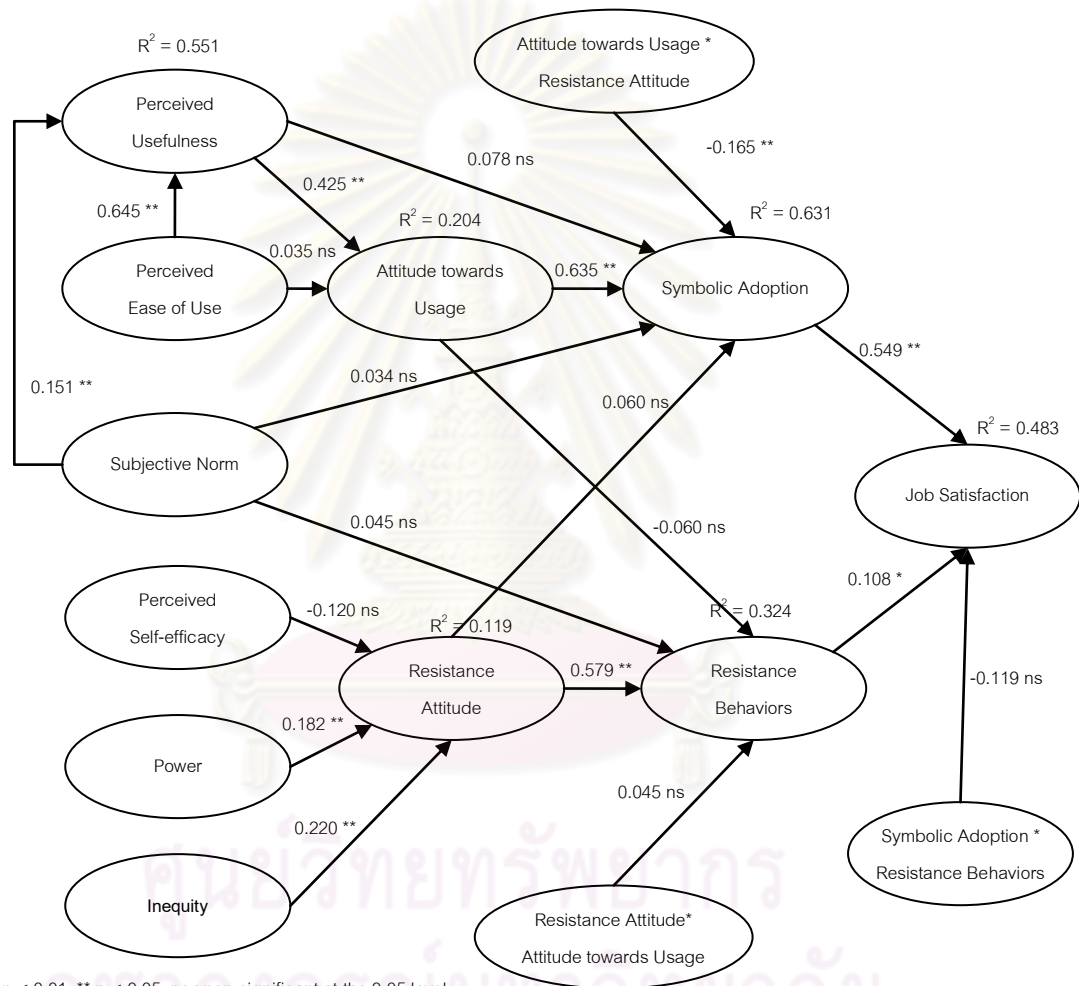
WATER

Only one interaction effect was insignificant. This is the interaction effect of RTA and ATU on RTB (t = 0.440, p > 0.05). For the significant interaction effects, the interaction effect of ATU and RTA on SA was significant (t = 2.665, p < 0.01), and the interaction effect between SA and RTB on JS was significant (t = 2.189, p < 0.05).

* p < 0.01, ** p < 0.05, ns : non-significant at the 0.05 level
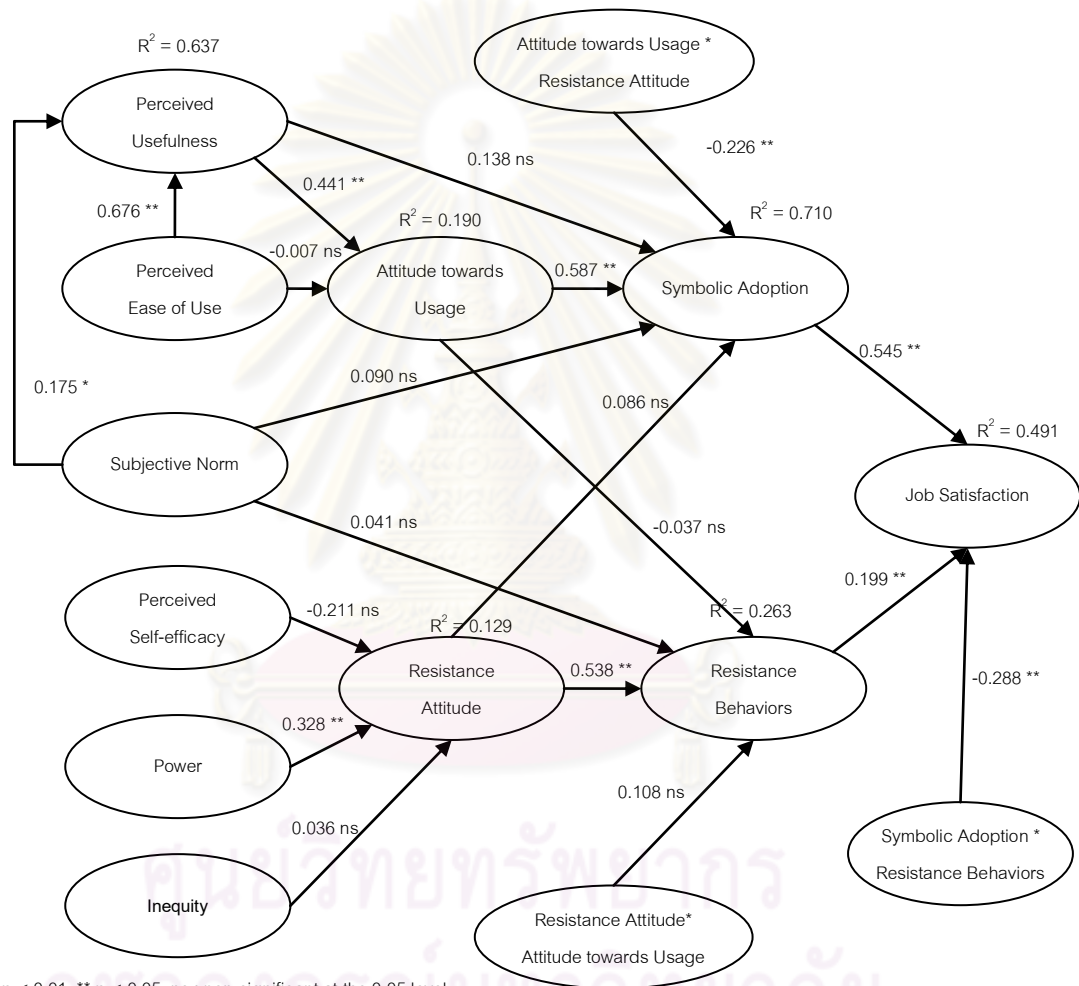
Summary of the Empirical Assessment of the Proposed Model with Interaction Effects

Table 33 presents path coefficients, explained variance, and statistical significance from three structural models testing the interaction effects. The results from the three cases are inconsistent. In the case of POSTAL, no interaction effects were significant. RTA appears to negatively moderate the relationship between ATU and SA in the case of ENERGY and WATER. This means the higher the RTA, the weaker this relationship. Only in the case of WATER, RTB negatively moderated the effects of SA on JS. The R-square change was 7% (from 42.1% to 49.1%). With the interaction effect taken into account, it seems that resistance behaviors could weaken the positive effects of symbolic adoption on job satisfaction.

Table 33 Summary of structural model path coefficients and explained variance of the proposed model with interaction effects

	Structural model path coefficients		
	POSTAL	ENERGY	WATER
PEU → PU	0.695 **	0.645 **	0.676 **
SN → PU	0.202 *	0.151 **	0.175 *
PEU → ATU	0.287 *	0.035 ns	-0.007 ns
PU → ATU	0.417 **	0.425 **	0.441 **
PU → SA	0.100 ns	0.078 ns	0.138 ns
ATU → SA	0.678 **	0.635 **	0.587 **
SN → SA	0.100 ns	0.034 ns	0.090 ns
RTA → SA	0.020 ns	0.060 ns	0.086 ns
ATU*RTA → SA	-0.018 ns	-0.165 **	-0.226 *
PSE → RTA	-0.234 ns	-0.120 ns	-0.211 ns
PP → RTA	0.413 **	0.182 **	0.328 **
PI → RTA	0.131 ns	0.220 **	0.036 ns
SN → RTB	-0.025 ns	0.045 ns	0.041 ns
RTA → RTB	0.466 **	0.579 **	0.538 **
ATU → RTB	0.023 ns	-0.060 ns	-0.037 ns
RTA*ATU → RTB	0.106 ns	0.045 ns	0.108 ns
SA → JS	0.733 **	0.549 **	0.545 **
RTB → JS	0.236 **	0.108 *	0.199 *
SA*RTB → JS	-0.083 ns	-0.119 ns	-0.288 **
Variance explained in PU	73.1%	55.1%	63.7%
Variance explained in ATU	45.9%	20.4%	19.0%
Variance explained in SA	66.0%	63.1%	71.0%
Variance explained in RTA	23.6%	10.2%	12.9%
Variance explained in RTB	25.3%	32.4%	26.3%
Variance explained in JS	62.3%	37.2%	49.1%

4.5 Summary of Chapter IV

A PLS approach to SEM was employed to empirically assess the proposed theoretical framework. The results of data analysis were presented. The next chapter will discuss the results and conclude the findings of the present study.

Chapter V

Discussion and Conclusion

5.1 Summary of Discussion

The results of the empirical assessment of the proposed model are reported in the previous chapter. This chapter summarizes the results from the three cases to test the hypotheses in this study. Furthermore, this section recapitulates the essential findings from the three cases in order to provide answers to the research questions set forth in this study.

5.1.1 Hypothesis Testing

The results from the empirical assessment are shown below. A solid line represents a relationship with consistent results in three cases, whereas a dotted line shows a relationship with inconsistent results. The symbol above the relationship depicts the direction of the relationship (+ is positive, - is negative, ns is non-significant). The majority of the results (two out of three) were reported when the results were inconsistent.

The summary of the hypothesis testing is presented in Table 34. In conclusion, there are seven supported hypotheses and four non-supported hypotheses. There was only inconsistent hypothesized relationship. There were other two hypotheses found to have indirect effects. And there were two hypothesized relationships found to have moderating effects.

The results provide support for seven hypotheses (H1, H3, H6, H10, H11, H12, and H15) and do not support four of the hypotheses (H5, H8, H9, and H13). It appears that most hypothesized relationships in TAM are supported. Perceived ease of use positively influenced perceived usefulness (H3) which, in turn, affected attitude towards usage (H1). Perceived usefulness and subjective norm did not directly affect symbolic adoption (H4 and H8). Their effects on symbolic adoption were medicated by

attitude towards usage. And this attitude, only one out of three hypothesized determinants, was found to directly influence individual symbolic adoption (H11). The relationships between subjective norm and perceived usefulness in the three cases were significant (H10). The relationships between perceived ease of use and attitude towards system usage were inconsistent (H2). However, there were still indirect effects of perceived ease of use on attitude towards system usage when the direct effect was insignificant.

Out of three hypothesized antecedents of resistance attitude, only perceived level of power in an organization was found significant (H6). Perceived self-efficacy was not found to be significant (H5). Only in the case of ENERGY, perceived inequity was significantly related to resistance attitude (H7). This resistance attitude appears to positively significantly determine resistance behaviors (H12). Subjective norm was not found to be a significant determinant of resistance behaviors (H9).

Although the results from the three cases were inconsistent (H14), resistance attitude was found to weaken the relationship between attitude towards system usage and symbolic adoption. On the other hand, user acceptance did not appear to influence user resistance (H13). Attitude towards system usage was not significantly related to resistance behaviors in all three cases.

It can be concluded that user acceptance positively affected job satisfaction because the results of the three cases were consistent (H15). However, this relationship was weakened by resistance behaviors in case of ENERGY and WATER. The results were inconsistent on how user resistance could influence job satisfaction (H16).

- Perceived Usefulness
- Attitude towards Usage * Resistance Attitude
- H4: ns
- H10: +
- H3: +
- Perceived Ease of Use
- H2: ns
- Attitude towards Usage
- H1: +
- H11: +
- Symbolic Adoption
- H8: ns
- H14: +
- Subjective Norm
- H9: ns
- H13: ns
- Job Satisfaction
- H15: +
- Perceived Self-efficacy
- H5: ns
- Resistance Attitude
- H12: +
- Resistance Behaviors
- H16: +
- Power
- H6: +
- H7: ns
- Inequity
- ns
- Resistance Attitude* Attitude towards Usage
- Symbolic Adoption * Resistance Behaviors
- ns

———— Results were consistent.

- - - - - - - - Results were inconsistent.

Table 34 Summary of hypothesis testing

Hypothesis	Description	Results
H1	Perceived usefulness will have a positive direct effect on attitude towards usage	Supported
H2	Perceived ease of use will have a positive direct effect on attitude towards usage	Inconsistent (Direct & Indirect Effects Found)
H3	Perceived ease of use will have a positive direct effect on perceived usefulness	Supported
H4	Perceived usefulness will have a positive direct effect on symbolic adoption	Indirect Effects Found
H5	A high level of self-efficacy will have a negative direct effect on resistance attitude	Not Supported
H6	A high level of power in an organization will have a positive direct effect on resistance attitude	Supported
H7	Perceived inequity will have a positive direct effect on resistance attitude	Inconsistent (Significant in ENERGY)
H8	A high level of subjective norm will have a positive direct effect on symbolic adoption	Not Supported
H9	A high level of subjective norm will have a negative direct effect on resistance behaviors	Not Supported
H10	A high level of subjective norm will have a direct effect on perceived usefulness	Supported
H11	A high level of user attitude towards usage will have a direct effect on symbolic adoption	Supported
H12	Resistance attitude will have a direct effect on Resistance behaviors	Supported

Hypothesis	Description	Results
H13	A high level of attitude towards usage will have a negative direct effect on resistance behaviors	Not Supported
H14	Resistance attitude will have a negative direct effect on symbolic adoption	Moderating Effects Found
H15	A high level of symbolic adoption will have a positive direct effect on job satisfaction	Supported
H16	Resistance behaviors will have a negative direct effect on job satisfaction	Moderating Effects Found

5.1.2 Results Discussion

Despite the fact that there are inconsistencies in the results from the three cases, explanations and conclusions can be drawn from the results in order to provide the answer to the research questions. There are four questions pertaining to the present research:

1. To what extent do perceived usefulness, perceived ease of use, subjective norm, and attitude towards system usage predict symbolic adoption in a mandatory-use context?

2. To what extent do perceived self-efficacy, perceived level of power in an organization, perceived inequity, and subjective norm predict resistance attitude and resistance behaviors in a mandatory-use context?

3. To what extent does user resistance affect user acceptance in a mandatory-use context?

4. To what extent are job-related outcomes affected by user acceptance and user resistance in a mandatory-use context?

5.1.2.1 To what extent is symbolic adoption explained by perceived usefulness, perceived ease of use, subjective norm, and attitude towards system usage in a mandatory-use context?

Symbolic adoption was seen to be a more pertinent and valid dependent variable of user acceptance model in a mandatory-use context (Nah et al., 2004; Rawstorne et al., 1998). This study aims to explore what perceptions could influence this construct in different phases of the ERP implementation process. Key constructs in TAM from previous research were included in the model to predict a degree of symbolic adoption. Perceived usefulness, perceived ease of use, subjective norm, and attitude towards system usage were hypothesized to predict symbolic adoption with some mediated relationships. The results of the three hypothesized direct relationships between symbolic adoption and its antecedents in all three cases were consistent. The relationships between perceived usefulness and subjective norm were statistically significant. The relationships between attitude towards system usage and symbolic adoption were all statistically significant. Despite the fact that two of the three constructs were not significantly related to symbolic adoption, they jointly explained the variance of symbolic adoption around 63% – 70%. Thus, it can be safely postulated that user attitude towards system usage is a predominant variable in predicting symbolic adoption.

The role of user attitude was mostly viewed to be trivial in TAM (Legris et al., 2003). In previous studies, user attitude was not conceptualized to cover cognitive and affective elements. When it included both dimensions, the role of attitude in promoting user acceptance was more prevalent (Yang and Yoo, 2004). The results of this current study are in line with those of previous studies in that user attitude conceptualized as combining cognitive and affective elements relatively strongly predicted symbolic adoption, a proxy of user acceptance to a new system. The results imply that the predictive role of attitude towards system usage is not varied across the different phases of implementation. This emphasizes the important role of user attitude in user acceptance process of a mandatory use IS. If one could monitor user attitude

towards system usage during the implementation process, it would be helpful to evaluate the level of user acceptance.

Although the three cases represent the different phases of implementation, the relationships between user attitude and symbolic adoption are not different. Nevertheless, determinants of user attitude towards system usage seem to be dissimilar among the cases. In most cases, perceived usefulness is most likely to be a major determinant of user attitude. Users seem to internalize perceived ease of use and the subjective norm, which influence the perception of usefulness. The direct effects of perceived ease of use on user attitude were absent from the case of ENERGY and WATER. When the relationship is significant (in the case of POSTAL), the strength of relationship is relatively weak. It is probable that POSTAL users who were in the early phase of implementation still had no actual experience with the ERP system. They were still in the phase of scope definition and selection. When ERP users attended system demonstrations, it is most likely that vendors selectively presented the system as being useful and easy to use. Difficult functions would not be presented since it would hurt the chance of an ERP vendor to win the bid process.

Most interview participants reported that they agreed with the adoption of the new ERP. Those who agreed stated the usefulness of the system when they were asked about what they thought about the system. For instance, a user in POSTAL responded to the question by stating: "… I agree with the use of system. … Benefits of ERP are quite clearly evident. We do not have to enter data into the system twice. … People around here could not work if there would be no ERP around…" The other user in WATER also commented: "…I agreed with the decision to adopt the ERP system. The system has helped the organization a lot in terms of improving work efficiency. ... " The benefits that participants reported include: reducing time in doing some work, providing timely access to information, single entry of data, linking business processes together, and so forth.

In summary, in this particular context where users are mandated to use the system, Brown, et al. (2002) argue that " … It appears that attitudes matter more

than intentions when technology use is mandated…" Even though attitude towards usage is not positive, users can still continue to use the system. Thus, there is no guarantee that this group of users would not passively misuse the system, as Marakas and Hornik (1996) suggested. The authors purported that users could covertly cooperate and accept the proposed system and then disrupt the system implementation. Hence, the behavioral aspect of user acceptance typically measured by usage or intention to use would provide limited explanations on the degree of user acceptance in the mandatory-use context. Symbolic adoption has been proposed to be a better measure of user acceptance to a new system. It could overcome the shortcomings of behavioral-oriented variables. Theoretically, users who completely agree with the idea of adopting a new system would be seen to accept the new system.

5.1.2.2 To what extent do perceived self-efficacy, perceived level of power in an organization, perceived inequity, and subjective norm predict resistance attitude and resistance behaviors in a mandatory-use context?

Resistance to IS implementation is a complex phenomenon that could arise from any number of different causes (Klaus et al., 2007; Setzekorn, Sugumaran, and Patnayakuni, 2002). In this study, two causes of resistance, perceived level of power in an organization and perceived inequity, were hypothesized to influence resistance attitude which, in turn, lead to resistance behaviors. In addition, perceived self-efficacy was expected to decrease resistant reactions.

Empirical evidence show that perceived level of power in an organization appears to influence resistance attitude. This is similar to the findings in the study of Markus (1983). When a newly introduced system alter power distribution in an organization, an individual whose power affected by the system will be most likely to resist to the implementation.

The effects of perceived inequity, the other hypothesized determinant of resistance attitude, on resistance attitude were inconsistent. Only one of the three cases (ENERGY) provides support to the hypothesized relationships between perceived inequity and resistance attitude. The possible explanations could be from the different phase of the implementation. During the phase of implementation, it could be compared to the change phase in the three stage model introduced by Lewin (1952). While the phase of selection/definition and operation could be viewed to be freeze and unfreeze. During the phase of change, it seems that the impact of perceived inequity would be quite apparent. Users tend to evaluate the net outcome brought about by the system being implemented before they go through the change. Perception of inequity would lead them to develop resistance attitude. On the other hand, the effects of change would still be too early for users to detect in the selection/definition. And it is most likely that the impact of change would be subside during the operation phase,

Perceived self-efficacy appears not to be a significant determinant of resistance attitude at any phase of the implementation. This finding is consistent with what Kim and Kankanhalli (2009) found in their research on user resistance to IS implementation. They argued that self-efficacy has no direct effect on user resistance. Rather, it indirectly decreases user resistance by lowering individual perception of switching costs to the new system.

In conclusion, perceived level of power in an organization seems to be a primary determinant of resistance attitude during the implementation process of a mandated-usage system. During the phase of change, perceived equity tends to play an immediate role in influencing resistance attitude. Users who have undergone through a process of change for a certain period of time seem to pay attention in evaluating and comparing between the net change of input and outcome. An individual with a perception of inequity is most likely to develop resistance attitude and may eventually exhibit resistance behaviors.

5.1.2.3 To what extent does user resistance affect user acceptance in a mandatory-use context?

User resistance has been known as a major obstacle to IS implementation (Gargeya and Brady, 2005; Kim et al., 2005; Kwahk, 2006; Suwardy et al., 2003). Resistance was viewed to be the opposite continuum of acceptance. Recently, there has been growing attention to support the idea that these two phenomena are distinct and inter-related (Bhattacherjee and Hikmet, 2007; Kim and Kankanhalli, 2009). One of the aims of this study is to investigate to what extent user resistance affects user acceptance in the context where users are required to use the ERP system involuntarily. Although the results from the three cases are inconsistent, user resistance appears to have a negative effect on user acceptance. In the case of ENERGY and WATER, resistance attitude moderated the relationship between user attitude towards usage and symbolic adoption. A user with high positive attitude towards system usage would have a high degree of symbolic adoption, implying a high level of acceptance. In a complicated situation, this user might understand the benefits of the system, but the change brought about could threaten the status quo until resistance is developed. Consequently, if a user has high resistance attitude towards IS implementation, it would weaken the positive effect of the user's attitude towards usage on symbolic adoption.

However, in the case of POSTAL, user resistance had no significant effect on user acceptance. Several reasons might explain the absence of the effect of user resistance on user acceptance. First, the phase of implementation was still the first episode of implementation. Information presented by ERP vendors during the bidding process or by management is typically on the positive side in order to gain acceptance from users. Second, it could be the unique culture of POSTAL. All informants in POSTAL reported that most staff willingly accepted change in the organization. They indicated that most people loved the organization and were willing to follow top management's decisions. One informant replied with a smile when asked about the resistance phenomenon; "…most people follow what top management asked us to do. … Perhaps,

because we are facing with the decline in our business, we would do whatever it takes to help our organization. …". The consistent answers tend to support the idea that the employees' perception of top management could affect how user resistance negatively influences user acceptance.

In contrast, the relationships between attitude towards system usage and resistance behaviors were not found to be significant in all three cases. No interaction effects were significant. Even though it could be expected that an individual with high positive attitude towards system usage would be least likely to express resistance behavior, the results of this study do not show any support for this. If the change threatens their status quo, users could potentially resist the change brought about by an IS implementation, regardless of how good they feel about the system usage. On the other hand, user resistance was found to negatively affect user acceptance. Resistance attitude negatively moderated the relationship between attitude towards system usage and symbolic adoption. A user with high resistance attitude could have a lesser degree of symbolic adoption. With the moderation effect, the absence of resistance attitude does not imply the increase in the level of symbolic adoption.

The results appear to support the principle of asymmetrical negativity bias (Bhattacherjee and Hikmet, 2007; Cenfetelli, 2004a). It is probably true that bad consequences from using ERP (e.g., losing power, losing some benefits, or working on more difficult jobs) would have more negative impacts than good consequences. Negatively valenced events seem to have a greater impact on an individual than the positively valenced events of the same type (Baumeister et al., 2001). Nevertheless, it could lead an individual to an adaptive advantage. "…those who mobilized their attention and resources toward the bad would be more likely to survive…" (Baumeister et al., 2001) has some meaningful implications here. Users faced with potential negative effects, who have developed resistance attitude, would be most likely to adapt to the change since they pay attention to unpleasant negative effects. If they ignore the bad and embrace only positive consequences, they would find in the end that they do not fit with the change.

5.1.2.4 To what extent are job-related outcomes affected by user acceptance and user resistance in a mandatory-use context?

One direction of research in user acceptance which seems to be mature and explored to a great extent is the link between user acceptance and individual usage outcome (Venkatesh et al., 2003). In the other stream of research, Oreg (2006) found that resistance to change in a general context was related to job satisfaction, intention to quit, and continuance commitment. His research aimed at examining whether user acceptance and resistance to change could link to individual usage outcome. Job satisfaction was chosen to represent job-related outcomes.

Symbolic adoption, a dependent variable of user acceptance, appears to positively determine job satisfaction whether user acceptance and user resistance were tested separately or simultaneously. An individual who highly agrees with the use of a mandated-usage system would have a high level of job satisfaction. Symbolic adoption alone explained around 30% – 60% of the variance in job satisfaction. The relationships were relatively high, as the path coefficients were around 0.59 – 0.76. In a mandatory-usage context, one might consider measuring symbolic adoption as a way to assess user acceptance since the measure of a level of use or an intention to use would be irrelevant. The results show that a high level of symbolic adoption would lead to a high degree of job satisfaction. Measuring only a behavioral perspective alone would not guarantee that users would have a high level of symbolic adoption. They might feel the need to use the system but not genuinely agree with the idea of using the system.

The effects of resistance behaviors on job satisfaction were, however, inconsistent. The results were inconsistent in both cases when user acceptance and user resistance were tested independently or concurrently. When user resistance was tested separately from user acceptance, the relationship was significant only in the case of POSTAL. The relationship was weak, as the path coefficient was only 0.281 and R-square was only 7.9%. But when tested jointly with symbolic adoption, resistance behaviors appear to be positively significantly related to job satisfaction in the case of POSTAL and ENERGEY with no significant interaction effect. In the case of WATER, the

interaction effect was significant. Resistance behaviors negatively moderated the relationship between symbolic adoption and job satisfaction. The effect was moderate, with the R-square change about 7% resulting from the interaction effect.

Although it seems to be inconclusive from the inconsistent results regarding how user resistance affects job satisfaction, it could be argued that in the definition/selection and implementation phase, users may not give true evaluation of the outcomes of job on a new ERP. But in the phase of operation, users are currently using it and can give a more precise view of how user acceptance and user resistance affect their job-related outcomes. However, this argument still needs to be validated further. It may indicate that it is more valid to empirically assess the effects of user acceptance and user resistance on job-related outcomes after the system is fully deployed.

5.2 Conclusion

User acceptance is a research area of much research attention. Many IS scholars have attempted to understand this complex phenomenon. It is argued that user acceptance should be viewed as a process of change. Recently, there have been some attempts to introduce a new body of knowledge to provide greater understanding about the process of user acceptance in the context of mandatory usage. It is believed that symbolic adoption could be a more appropriate dependent variable of user acceptance in this particular context.

Under this circumstance, to ask users whether to use or not to use a mandatory-usage system such as ERP would be too simplistic since users are left with no choice but to use the system. Thus, TAM has been criticized as being inapplicable for measuring user acceptance in this context because the model aims to predict or explain the system usage. A more pertinent dependent variable was needed for this context. When examining the acceptance process of a mandatory use system, an individual is faced with two decisions: to accept the idea and to use the system. If it is so, symbolic adoption could help to provide a more complete view of the user acceptance process (Klonglan and Coward, 1970). This theoretical construct mainly emphasizes the mental process of system adoption which seems to be more plausible in this mandatory use context (Nah et al., 2004). Recent studies have shown the promising role of symbolic adoption in explaining the user acceptance process in involuntary use. In order to capture the full extent to which this individual would thoroughly accept the system, this study included symbolic adoption combined with behavioral intention to use in order to provide richer explanations on the process of user acceptance.

It is argued that resistance to change, when included in the theory of user acceptance, would provide clearer understandings on how a user accepts the system. A pioneer study conducted by Bhattacherjee and Hikmet (2007) has shown that the interconnection between the two paradigms of research does exist. Taking an initiative to gain more insight into the interplay between these two lines of literature, this

study has sought to explore the role of individual attitude in the process of user acceptance in the context of an involuntary environment.

Quantitative and qualitative data were collected from three cases using the survey and interview methods. A total number of 690 questionnaires were acquired from the three organizations. This study employed a PLS approach to SEM illustrated in the work of Henseler et al. (2009), and with their practical guidelines, the level of reliability and validity of survey instruments were determined. All proposed hypothesized relationships were empirically assessed. The results provide support for most hypothesized relationships derived from TAM. Other hypothesized relationships were found to be inconsistent. Plausible explanations of the inconsistencies could be drawn from the fact that the three organizations differed in terms of the phase of implementations, scope of the implementation, and organizational culture. Nevertheless, the results do illustrate the complex nature of user resistance.

User resistance could potentially have a negative effect on user acceptance but not vice versa. Resistance attitude negatively moderated the relationship between attitude towards system usage and symbolic adoption. This follows the principle of asymmetric negativity effect where negative events have a greater impact than do positive events. In the resistance literature, Piderit (2000) argues- that resistance to change should be conceptualized as attitude, thus- providing the theoretical link between user acceptance and user resistance.

The findings also lend support to the findings from the study of Bhattacherjee and Hikmet (2007) where it was found that user resistance could possibly negatively moderate the effects of user acceptance on job-related outcomes in the phase of operation. This would shed light on one of the research objectives, which is to examine whether user acceptance and resistance to change could affect job-related outcomes. Typically, a user with a high level of symbolic adoption would have a high level of job satisfaction. In the presence of resistance behaviors during the phase of operation, job satisfaction could be decreased by the moderating effect between symbolic adoption and resistance behavior.

5.2 Research Contributions

This research offers several theoretical contributions. A main contribution is the theoretical link between user acceptance and user resistance, and the empirical assessment of this link. User attitude is conceptualized to include attitude towards system usage and resistance attitude. The first deals with system characteristics, whereas the latter concerns the consequences of the change brought by the system being implemented. IS researchers have enquired as to what makes users use the system since it is believed that system usage will determine the success of IS implementation (Davis, 1989; Davis, 1993; Davis et al., 1989; DeLone and McLean, 1992, 2002; Legris et al., 2003). In this regard, TAM has been adopted extensively by previous research to understand the user acceptance process. On the other hand, resistance to IS implementation has been recognized to be a major obstacle to IS success (Joshi, 2005; Lapointe and Rivard, 2005; Marakas and Hornik, 1996; Markus, 1983 ; Martinko et al., 1996). Until recently, Bhattacherjee and Hikmet (2007) proposed a model bringing together the influencing role of resistance to change and system usage. This model can be seen as the initial attempt to link the two inter-related phenomena determining the success or failure of IS implementation.

From the theoretical point of view, the current research is the attempt to continue the investigation of the link between user acceptance and resistance to IS implementation. User attitudes which have been a debating issue in the line of user acceptance research are conceptualized using the attitude concept identified in the resistance to change studies. Especially, in the context of ERP implementation where the use is mandated, resistance to change seems to be pervasive. The empirical evidence found in this research contributes to the line of resistance to IS implementation literature, which is still premature.

Second, by simultaneously examining these two concepts, the findings offer support to the principle of asymmetric negativity effects. User resistance when conceptualized as an individual attitude was found to negatively moderate the influence of attitude towards system usage on symbolic adoption. Even though this concept may

not be a new area in IS, there is still a paucity of research addressing this phenomenon. Moreover, the findings provide explanations on how user acceptance and user resistance are inter-related. User resistance negatively moderated user acceptance, but not vice versa.

Third, the results of this study provide empirical assessment of TAM with symbolic adoption as a dependent variable. When a behavioral variable of TAM is substituted by a psychological construct, user attitude tends to be predominant of symbolic adoption. This provides support to the existing literature on user acceptance in a mandatory-usage context where there is a lock of empirical evidence.

Fourth, the empirical evidence from this research also adds to the growing development of the resistance to IS implementation literature. Attention has been growing in exploring the complex nature of resistance. Threats to power and a perception of inequity could lead to the resistance attitude which, in turn, would encourage resistance behaviors. However, perceived self-efficacy does not directly affect the resistance attitude. The results support the findings of previous studies (Joshi, 2005; Kim and Kankanhalli, 2009; Markus, 1983) as well as test the theoretical conceptualization in the mandatory-usage context.

Fifth, the findings provide empirical evidence on how user acceptance together with user resistance can affect job-related outcomes. With the mature stage of user acceptance, the study addresses the individual consequence of user acceptance on job-related outcomes. It is known that user resistance could negatively affect job-related outcomes (Oreg, 2006). When taken together, a high degree of user acceptance would lead to more job satisfaction with the negative moderating effect of user resistance. These two phenomena should be evaluated mutually since they are interdependent. By including user resistance, it seems to provide a more holistic view of the user acceptance process.

Sixth, regarding the methodological issue, only a few previous studies have attempted to capture the dynamic nature of user acceptance and user resistance.

This study recognizes this dynamic nature of user attitude. Three organizations at different phases of implementation were chosen as cases. Data were collected prospectively and retrospectively. With the different time frames, empirical evidence provides different aspects of user acceptance and user resistance.

5.3 Managerial Implications

It may seem that user acceptance and user resistance are two parallel universes. Somehow, they are inter-related to one another. User resistance appears to weaken the process which individual attitude influence a degree of user acceptance as it can be illustrated in the Figure 11. The results of this study provide a venue for understanding the underlying complex nature of a mandatory usage environment, and offer several implications for management in dealing with user acceptance and user resistance of a mandated-use system.
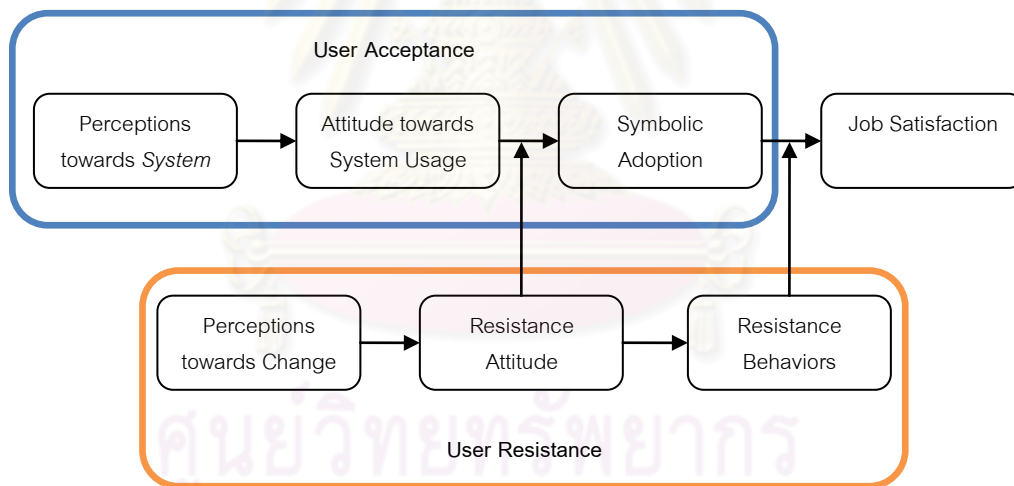
Figure 11 The Linkage between User Acceptance and User Resistance

First, in a mandatory use context, management should not focus on measuring individual behavioral intention to use or a level of system usage since either of these two measurements would not be pertinent in this particular context. Attention should be paid to evaluate whether organization members related to the adoption of ERP system agree with the use of this system. This implies that the success of the implementation should be equated with the high level of system usage. Mostly, the

success of the implementation is measured by the level of system usage. In this particular context, it is illusive to monitor only the use of the system. Symbolic adoption would be a better alternative to illustrate the success level of the implementation.

Second, the role of attitude is seen to be vital in all implementation phases. Attitude towards system usage and resistance attitude were two attitudes that play an influential role in inducing a degree of symbolic adoption. Promoting user acceptance could be done by fostering individual positive attitude towards system usage and manage resistance attitude since these two attitudes were found to play an active role in determining user acceptance. Most of change management program in IS implementation tends to focus on evaluating individual awareness of the implementation. The results of this study suggest that management should probe beyond awareness to understand individual attitudes. Questionnaire survey or interview could be used to detect negative attitude that could potentially hinder the progress of the implementation.

Third, there are two important groups of perceptions determining individual attitudes. The first group is perceptions towards system and the latter is perceptions towards change. These two sets of perceptions influence the two crucial attitudes mentioned earlier (attitude towards system usage and resistance attitude). The effects of perceptions towards system on attitude towards system usage seem to be consistent throughout the three phases. There seems to be some slight differences between how the perceptions towards change affect the resistance attitudes in each phase of the implementation and management should understand these differences in order to better manage the change brought by the system being implemented. Change seems to highly affect users who have a high level of power in an organization since the early episode of the implementation and later on until the phase of operation. However, inequity or unfairness appears to promote individual resistance attitude. During the phase of implementation, management should pay special concern on how organization members affected by the change are treated. Incentive or reward plan should be made clear at this stage to motivate people to embrace the change.

Fourth, to reduce the impact of resistance to IS implementation, most of the change management programs currently in practice are introduced during the time when implementation is taking place. Management generally emphasizes training and communication programs, the programs of which are highly focused on features of the system and the benefits of using the system. Obviously, this would help users understand more and develop a positive attitude towards system usage. However, it does not appear to lessen the degree of user resistance. Users are more prone to negative ideas of the system implementation. By emphasizing only the positive features of the system, it would not help rectify the issue of why users resist implementation. It is not advised to over focus on this particular side. Management should introduce a change management program that provides a channel for users to complain or voice their concerns. This practice would help them to release their stress brought by the change that they are encountering.

Fifth, the increased level of attitude towards system usage would not help alleviate the resistance phenomenon. A new system possibly presents different level of threats to users. Management should pay attention to individuals with a high level of power in an organization. A new system could possibly alter the power distribution in an organization. Thus, those people who perceive to be losing their power should be identified in advance in order to keep the level of resistance low since it might be difficult to reduce the effects of this particular threat. Management should treat this group of people fairly since the perception of inequity would lead them to a higher degree of resistance.

Sixth, the resistance phenomena may be viewed to be transient and will disappear after a long period of usage. The results of this study show that resistance still persists, even when the system has been used for almost 10 years, as in the case of WATER. Management should continue to look for any sign of resistance, since it could hurt job satisfaction. After the system has been used for an extensive period, resistance behaviors may indicate that the system is no longer fully supporting user tasks.

5.4 Limitations and Future Research

This research presents some limitations that should be noted. First, the three organizations that served as cases are state-owned enterprises which might provide a particular view of organizations. This may limit the generalizability of the results. Future research might consider replicating this study in another context. Working for a state-owned enterprise, individuals would probably feel more secure about their job security, which could lead to a different level of resistance to change when compared with other private organizations. Organizational culture, which is a basic assumption embodying the behaviors and values of organization members, is argued to promote a strategic change (Avison and Myers, 1995). Future research should take organizational culture into account.

Second, there have been no validated items for resistance to IS implementation and some other constructs, particularly negative perceptions or the cause of the resistance. Future research is encouraged to develop scales measuring user attitude. In the present study, antecedents of resistance to IS implementation were hypothesized to include a threat to a power level in an organization, a perception of inequity and perceived self-efficacy. According to Ajzen (1988), an individual could hold a large number of beliefs about an object, but only a few individuals may determine attitude towards an object in evaluation. Future studies should identify salient beliefs about a mandated IS and examine their role in determining resistance attitude.

Finally, the cohort study design can provide comparison views at three different time frames, but there still are a number of variables that could potentially affect user acceptance and user resistance. A process approach might be considered to study the dynamic interplay of the two phenomena by using a longitudinal study following the same individual through the process of user acceptance of the change process.

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Appendices

Appendix A Questionnaires

This set of questionnaire was distributed to POSTAL and ENERGY in a phase of definition/selection and implementation.

QUESTOINNAIRE: ERP IMPLEMENTATION

My name is Thanachart Ritbumroong, a Ph.D. candidate in IT in Business, Faculty of Commerce and Accountancy, Chulalongkorn University. I am currently working on the data collection process as a part of my doctoral dissertation. The objective of this research is to study the role of attitude and the organizational change brought by the ERP implementation. The results of the research will help broaden the knowledge in the field of organizational change management as well as improve practices in IT project management.

I would kindly request your support in answering this set of questionnaires about your perceptions and attitudes towards ERP and its implementation. It will take approximately around 10 – 15 minutes. Please be assured that the results of the survey will be used exclusively on the research purposes and kept confidential. No specific names will be identified as your identity will be anonymous.

Best regards,

Thanachart Ritbumroong

Professor Dr. Uthai Tanlamai (Dissertation Advisor)

Faculty of Commerce and Accountancy, Chulalongkorn University

Section 1   Please place an x in a circle that most represents your perceptions towards ERP implementation

Strongly Disagree   Strongly Agree

	1	2	3	4	5
Using ERP in my job would enable me to accomplish tasks more quickly	O	O	O	O	O
Using ERP would improve my job performance.	O	O	O	O	O
Using ERP in my job would increase my productivity.	O	O	O	O	O
Using ERP would enhance my effectiveness on the job.	O	O	O	O	O
I would find ERP useful in my job.	O	O	O	O	O
Using ERP would improve the quality of work I do.	O	O	O	O	O
Learning to operate ERP would be easy for me.	O	O	O	O	O
I would find it easy to get ERP to do what I want it to do.	O	O	O	O	O
My interaction with ERP would be clear and understandable.	O	O	O	O	O
I would find ERP to be flexible to interact with.	O	O	O	O	O
It would be easy for me to become skillful at using ERP.	O	O	O	O	O
I would find ERP ease to use.	O	O	O	O	O
People who influence my behavior think that I should use ERP.	O	O	O	O	O
People who are important to me think that I should use ERP.	O	O	O	O	O

Section 2   Please place an x in a circle that most represents your perceptions towards ERP implementation

Strongly Disagree   Strongly Agree

	1	2	3	4	5

I have enough power in this organization to control events that might affect my job.
1 O   2 O   3 O   4 O   5 O

In this organization, I can prevent negative things from affecting my work situation.
1 O   2 O   3 O   4 O   5 O

I understand this organization well enough to be able to control things that affect me.
1 O   2 O   3 O   4 O   5 O

I invest more in my work than I get out of it.
1 O   2 O   3 O   4 O   5 O

I exert myself too much considering what I get back in return.
1 O   2 O   3 O   4 O   5 O

For the efforts I put into the organization, I get much in return.
1 O   2 O   3 O   4 O   5 O

If I take into account my dedication, the organization ought to give me a better practical training.
1 O   2 O   3 O   4 O   5 O

In general, the benefits I receive from the organization outweigh the effort I put in it.
1 O   2 O   3 O   4 O   5 O

Section 3   Please place an x in a circle that most represents your feelings towards ERP implementation

| | Strongly Disagree | | | | Strongly Agree |

	1	2	3	4	5
I think that using ERP is a good idea.	O	O	O	O	O
I think that using ERP is a wise idea.	O	O	O	O	O
I like the idea of using ERP.	O	O	O	O	O
Using ERP is pleasant.	O	O	O	O	O
I intend to use the system.	O	O	O	O	O
I predict I would use the system.	O	O	O	O	O
I plan to use the system.	O	O	O	O	O
I believe that ERP implementation would harm the way things are done in the organization.	O	O	O	O	O
I think that it is a negative thing that we are going through ERP implementation.	O	O	O	O	O
I believe that ERP implementation would make my job harder.	O	O	O	O	O
I am afraid of ERP implementation.	O	O	O	O	O
I have a bad feeling about ERP implementation.	O	O	O	O	O
ERP implementation makes me upset.	O	O	O	O	O
I am stressed by ERP implementation.	O	O	O	O	O

Section 4   Please place an x in a circle that most represents your feelings towards ERP implementation

Strongly Disagree   Strongly Agree

	1	2	3	4	5
I look for ways to prevent ERP implementation.	O	O	O	O	O
I protest against ERP implementation.	O	O	O	O	O
I complain about ERP implementation to my colleagues.	O	O	O	O	O
I present my objections regarding ERP implementation to management.	O	O	O	O	O
I speak rather highly of ERP implementation to others.	O	O	O	O	O
I am enthusiastic about using ERP.	O	O	O	O	O
I am excited about using ERP in my workplace.	O	O	O	O	O
It is my desire to see the full utilization and deployment of ERP.	O	O	O	O	O

Section 5 Please place an x in a circle that most represents your feelings towards ERP implementation

Strongly Dissatisfied   Strongly Satisfied

On my new job using ERP, this is how I would feel about …

	1	2	3	4	5
Being able to keep busy all the time	O	O	O	O	O
The chance to work alone on the job	O	O	O	O	O
The chance to do different things from time to time	O	O	O	O	O
The chance to be "somebody" in the community	O	O	O	O	O
The way my boss handles his/her workers	O	O	O	O	O
The competence of my supervisor in making decisions	O	O	O	O	O
Being able to do things that don't go against my conscience	O	O	O	O	O
The way my job provides for steady employment	O	O	O	O	O
The chance to do things for other people	O	O	O	O	O
The chance to tell people what to do	O	O	O	O	O
The chance to do something that makes use of my abilities	O	O	O	O	O
The way company policies are put into practice	O	O	O	O	O
My pay and the amount of work I do	O	O	O	O	O
The chances for advancement on this job	O	O	O	O	O

	Strongly Dissatisfied				Strongly Satisfied

	1	2	3	4	5
The freedom to use my own judgment	○	○	○	○	○

	1	2	3	4	5
The chance to try my own methods of doing the job	○	○	○	○	○

	1	2	3	4	5
The working conditions	○	○	○	○	○

	1	2	3	4	5
The way my co-workers get along with each other	○	○	○	○	○

	1	2	3	4	5
The praise I get for doing a good job	○	○	○	○	○

	1	2	3	4	5
The feeling of accomplishment I get from the job	○	○	○	○	○

แบบสอบถามการนำระบบ ERP มาใช้ในองค์กร

ด้วยนายธนชาตย์ ฤทธิ์บำรุง นิสิตปริญญาเอก คณะพาณิชยศาสตร์และการบัญชี หลักสูตรดุษฎีบัณฑิต
สาขาวิชาเทคโนโลยีสารสนเทศทางธุรกิจ กำลังดำเนินการวิจัยเชิงวิชาการเรื่องบทบาทของเจตคติกับ การ
เปลี่ยนแปลงองค์กรในการนำระบบการวางแผนทรัพยากรองค์การ (ระบบ ERP) มาใช้ ซึ่งเป็นส่วนหนึ่งของ
วิทยานิพนธ์ ผลวิจัยจะก่อให้เกิดประโยชน์ในการพัฒนาองค์ความรู้ และศาสตร์ ด้านการบริหารจัดการ อีกทั้ง
เป็นข้อมูลสำหรับ การดำเนินงานในโครงการการพัฒนาระบบงานองค์กรให้ดียิ่งขึ้น คณะผู้วิจัย จึงขอความ
อนุเคราะห์จากท่านในการให้ ความร่วมมือตอบแบบสอบถามในครั้งนี้ ซึ่งเป็นการเก็บข้อมูลเกี่ยวกับทัศนคติ
และปัจจัยต่าง ๆ ที่ท่านรับรู้รับทราบเกี่ยวกับ การใช้งานระบบ ERP การตอบแบบสอบถามใช้เวลาประมาณ 10-
15 นาทีเท่านั้น และข้อมูลคำตอบของแต่ละบุคคลจะรักษาเป็นความลับ และจะรายงานผลวิเคราะห์ในภาพรวม
เท่านั้น คณะผู้วิจัยขอขอบคุณที่ท่านสละเวลาและให้ความร่วมมือในการตอบแบบสอบถามมา ณ ที่นี้

นายธนชาตย์ ฤทธิ์บำรุง
ศ. ดร. อุทัย ตันละมัย (อาจารย์ที่ปรึกษาวิทยานิพนธ์)
คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย

ส่วนที่ 1	โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับที่ท่านรับรู้ รับทราบจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้

	ไม่เห็นด้วยที่สุด				เห็นด้วยที่สุด
	1	2	3	4	5

การใช้ ERP ในงานของฉันจะช่วยทำให้ฉันทำงานสำเร็จเร็ว............
1 2 3 4 5 ○ ○ ○ ○ ○

การใช้ ERP จะช่วยเพิ่มประสิทธิภาพงานของฉัน.......................
1 2 3 4 5 ○ ○ ○ ○ ○

การใช้ ERP ในงานของฉันจะเพิ่มผลผลิตของฉัน........................
1 2 3 4 5 ○ ○ ○ ○ ○

การใช้ ERP จะเสริมประสิทธิผลในงาน.................................
1 2 3 4 5 ○ ○ ○ ○ ○

ฉันพบว่า ERP จะมีประโยชน์ในงานของฉัน............................
1 2 3 4 5 ○ ○ ○ ○ ○

การใช้ ERP จะพัฒนาคุณภาพของงานที่ฉันทำ.........................
1 2 3 4 5 ○ ○ ○ ○ ○

การเรียนรู้ที่จะใช้งาน ERP จะง่ายสำหรับฉัน...........................
1 2 3 4 5 ○ ○ ○ ○ ○

ฉันพบว่ามันง่ายที่จะใช้ ERP เพื่อทำในสิ่งที่ฉันต้องการที่จะทำ.......
1 2 3 4 5 ○ ○ ○ ○ ○

การโต้ตอบของฉันกับ ERP จะชัดเจนและเข้าใจง่าย...................
1 2 3 4 5 ○ ○ ○ ○ ○

ฉันพบว่า ERP จะยืดหยุ่นที่จะโต้ตอบด้วย.............................
1 2 3 4 5 ○ ○ ○ ○ ○

มันง่ายสำหรับฉันที่จะมีความชำนาญในการใช้ ERP...................
1 2 3 4 5 ○ ○ ○ ○ ○

ฉันพบว่า ERP จะง่ายต่อการใช้......................................
1 2 3 4 5 ○ ○ ○ ○ ○

คนทั่วไปที่มีอิทธิพลต่อพฤติกรรมของฉันคิดว่าฉันควรจะใช้ ERP......
1 2 3 4 5 ○ ○ ○ ○ ○

คนทั่วไปที่มีความสำคัญต่อฉันคิดว่าฉันควรจะใช้ ERP...............
1 2 3 4 5 ○ ○ ○ ○ ○

| ส่วนที่ 2 | โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับที่ท่านรับรู้ รับทราบจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้ |

ไม่เห็นด้วยที่สุด   เห็นด้วยที่สุด

ฉันมีอำนาจเพียงพอในองค์กรนี้ที่จะควบคุมเหตุการณ์ต่างๆที่จะส่งผล กระทบต่องานของฉัน………………………………

1   2   3   4   5
O   O   O   O   O

ในองค์กรนี้ ฉันสามารถป้องกันสิ่งที่ไม่ดีจากการกระทบสถานการณ์ งานของฉัน…………………………………………

1   2   3   4   5
O   O   O   O   O

ฉันเข้าใจองค์กรนี้ดีเพียงพอที่จะทำให้ฉันควบคุมสิ่งต่างๆ ที่มากระทบ ฉัน……………………………………………

1   2   3   4   5
O   O   O   O   O

ฉันลงทุนในงานของฉันมากกว่าที่ฉันได้จากงาน………………

1   2   3   4   5
O   O   O   O   O

ฉันทุ่มเทตัวเองมากเกินไปพิจารณากับสิ่งที่ฉันได้ตอบแทนกลับมา

1   2   3   4   5
O   O   O   O   O

สำหรับความพยายามที่ฉันได้ทุ่มเทไปกับองค์กรนี้ ฉันได้ผลตอบแทน กลับมามาก……………………………………………

1   2   3   4   5
O   O   O   O   O

ถ้าฉันนำความทุ่มเทมาพิจารณา องค์กรนี้ควรที่จะให้การฝึกอบรมที่ ดีกว่านี้…………………………………………

1   2   3   4   5
O   O   O   O   O

โดยทั่วไป ผลตอบแทนที่ฉันได้รับจากองค์กรนี้มีน้ำหนักมากกว่าสิ่งที่ ฉันทุ่มเทลงไป…………………………………

1   2   3   4   5
O   O   O   O   O

| ส่วนที่ 3 | โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับคำที่มีความหมายตรงกับความรู้สึกจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้ |

<div align="center">ไม่เห็นด้วยที่สุด   เห็นด้วยที่สุด</div>

ฉันคิดว่าการใช้ ERP เป็นความคิดที่ดี………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันคิดว่าการใช้ ERP เป็นความคิดที่ฉลาด……………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันชอบความคิดของการใช้ ERP………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

การใช้ ERP เป็นสิ่งน่าพอใจ……………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันตั้งใจที่จะใช้ระบบ……………………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันคาดว่าฉันใช้ระบบ……………………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันวางแผนที่จะใช้ระบบ…………………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันเชื่อว่าการพัฒนาระบบ ERP จะส่งผลเสียต่อวิธีการทำงานขององค์กร

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันคิดว่ามันเป็นสิ่งที่ไม่ดีที่เราจะดำเนินการพัฒนาระบบ ERP…………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันเชื่อว่าการพัฒนาระบบ ERP จะทำให้งานฉันยากขึ้น………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันหวาดกลัวการพัฒนาระบบ ERP………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันมีความรู้สึกที่ไม่ดีต่อการพัฒนาระบบ ERP…………………………..

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

การพัฒนาระบบ ERP ทำให้ฉันอารมณ์เสีย……………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ฉันเครียดจากการพัฒนาระบบ ERP………………………………………

| 1 | 2 | 3 | 4 | 5 |
| O | O | O | O | O |

ส่วนที่ 4   โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับคำที่มีความหมายตรงกับความรู้สึกจากการ
นำระบบงานองค์กร (ระบบ ERP) มาใช้

ไม่เห็นด้วยที่สุด   เห็นด้วยที่สุด

	1	2	3	4	5
ฉันมองหาหนทางที่จะป้องกันการพัฒนาระบบ ERP………………….	O	O	O	O	O
ฉันจะต่อต้านการพัฒนาระบบ ERP………………………………….	O	O	O	O	O
ฉันจะบ่นเกี่ยวกับการพัฒนาระบบ ERP กับเพื่อนร่วมงานของฉัน….	O	O	O	O	O
ฉันจะเสนอความคิดคัดค้านเกี่ยวกับการพัฒนาระบบ ERP………….	O	O	O	O	O
ฉันจะพูดเกี่ยวกับการพัฒนาระบบ ERP ในด้านดีกับผู้อื่น………….	O	O	O	O	O
ฉันรู้สึกกระตือรือร้นเกี่ยวกับ ERP………………………………	O	O	O	O	O
ฉันรู้สึกตื่นเต้นกับการใช้ระบบ ERP ในองค์กรของฉัน…………….	O	O	O	O	O
มันเป็นความปรารถนาของฉันที่จะเห็นการใช้ประโยชน์และการนำไปใช้ ERP อย่างเต็มที่……………………………………………	O	O	O	O	O

| ส่วนที่ 5 | โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับคำที่มีความหมายตรงกับความรู้สึกจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้ |

ไม่พึงพอใจที่สุด   พึงพอใจที่สุด

ในงานใหม่ของฉันที่ใช้ ERP นี่คือสิ่งที่ฉันจะรู้สึกเกี่ยวกับ …..

	1	2	3	4	5
ความสามารถที่ทำให้ไม่ว่างได้ตลอดเวลา………………………………	◯	◯	◯	◯	◯
โอกาสที่จะทำงานด้วยตัวคนเดียว…………………………………	◯	◯	◯	◯	◯
โอกาสที่จะทำสิ่งที่แตกต่างออกไปในแต่ละช่วง…………………………	◯	◯	◯	◯	◯
โอกาสที่จะเป็นคนสำคัญในสังคม………………………………..	◯	◯	◯	◯	◯
หนทางที่หัวหน้าของฉันจัดการงานลูกน้อง……………………………	◯	◯	◯	◯	◯
ความสามารถของหัวหน้างานในการตัดสินใจ………………………….	◯	◯	◯	◯	◯
ความสามารถที่ทำงานที่ไม่ขัดแย้งกับความรู้สึกผิดชอบของฉัน………	◯	◯	◯	◯	◯
หนทางที่งานของฉันทำให้มีการจ้างงานที่มั่นคง…………………………	◯	◯	◯	◯	◯
โอกาสที่จะทำงานให้กับผู้อื่น……………………………………….	◯	◯	◯	◯	◯
โอกาสที่จะสอนให้ผู้อื่นทำสิ่งต่างๆ…………………………………	◯	◯	◯	◯	◯
โอกาสที่จะทำบางอย่างจากความสามารถของฉัน…………………	◯	◯	◯	◯	◯
หนทางที่นโยบายบริษัทถูกนำมาใช้ในการทำงานจริง……………	◯	◯	◯	◯	◯
ผลตอบแทนและปริมาณงานที่ฉันทำ…………………..………....	◯	◯	◯	◯	◯
หนทางสำหรับความก้าวหน้าในงานนี้…………………………………	◯	◯	◯	◯	◯

	ไม่พึงพอใจที่สุด				พึงพอใจที่สุด

ความเป็นอิสระในการใช้การตัดสินใจของตัวเอง.........................

1	2	3	4	5
○	○	○	○	○

โอกาสที่จะได้ลองใช้วิธีทางของฉันในการทำงาน.........................

1	2	3	4	5
○	○	○	○	○

สภาพการทำงาน...

1	2	3	4	5
○	○	○	○	○

หนทางที่เพื่อนร่วมงานของฉันจะเข้ากันได้ดี.............................

1	2	3	4	5
○	○	○	○	○

คำชมเชยที่ฉันได้จากการทำงานดี..

1	2	3	4	5
○	○	○	○	○

ความรู้สึกของความสำเร็จที่ได้จากการทำงาน............................

1	2	3	4	5
○	○	○	○	○

This set of questionnaire was distributed to WATER in a phase of operation.

QUESTOINNAIRE: ERP IMPLEMENTATION

My name is Thanachart Ritbumroong, a Ph.D. candidate in IT in Business, Faculty of Commerce and Accountancy, Chulalongkorn University. I am currently working on the data collection process as a part of my doctoral dissertation. The objective of this research is to study the role of attitude and the organizational change brought by the ERP implementation. The results of the research will help broaden the knowledge in the field of organizational change management as well as improve practices in IT project management.

I would kindly request your support in answering this set of questionnaires about your perceptions and attitudes towards ERP and its implementation. It will take approximately around 10 – 15 minutes. Please be assured that the results of the survey will be used exclusively on the research purposes and kept confidential. No specific names will be identified as your identity will be anonymous.

Best regards,

Thanachart Ritbumroong

Professor Dr. Uthai Tanlamai (Dissertation Advisor)

Faculty of Commerce and Accountancy, Chulalongkorn University

Section 1   Please place an x in a circle that most represents your perceptions towards ERP
implementation

Strongly Disagree   Strongly Agree

	1	2	3	4	5
Using ERP in my job enables me to accomplish tasks more quickly	O	O	O	O	O
Using ERP improves my job performance.	O	O	O	O	O
Using ERP in my job increases my productivity.	O	O	O	O	O
Using ERP enhances my effectiveness on the job.	O	O	O	O	O
I find ERP useful in my job.	O	O	O	O	O
Using ERP improves the quality of work I do.	O	O	O	O	O
Learning to operate ERP is easy for me.	O	O	O	O	O
I find it easy to get ERP to do what I want it to do.	O	O	O	O	O
My interaction with ERP is clear and understandable.	O	O	O	O	O
I find ERP to be flexible to interact with.	O	O	O	O	O
It is easy for me to become skillful at using ERP.	O	O	O	O	O
I find ERP ease to use.	O	O	O	O	O
People who influence my behavior think that I should use ERP.	O	O	O	O	O
People who are important to me think that I should use ERP.	O	O	O	O	O

Section 2   Please place an x in a circle that most represents your perceptions towards ERP implementation

Strongly Disagree   Strongly Agree

	1	2	3	4	5
I have enough power in this organization to control events that might affect my job.	O	O	O	O	O
In this organization, I can prevent negative things from affecting my work situation.	O	O	O	O	O
I understand this organization well enough to be able to control things that affect me.	O	O	O	O	O
I invest more in my work than I get out of it.	O	O	O	O	O
I exert myself too much considering what I get back in return.	O	O	O	O	O
For the efforts I put into the organization, I get much in return.	O	O	O	O	O
If I take into account my dedication, the organization ought to give me a better practical training.	O	O	O	O	O
In general, the benefits I receive from the organization outweigh the effort I put in it.	O	O	O	O	O

Section 3   Please place an x in a circle that most represents your feelings towards ERP implementation

Strongly Disagree   Strongly Agree

	1	2	3	4	5
I think that using ERP is a good idea.	O	O	O	O	O
I think that using ERP is a wise idea.	O	O	O	O	O
I like the idea of using ERP.	O	O	O	O	O
Using ERP is pleasant.	O	O	O	O	O
I intend to use the system.	O	O	O	O	O
I predict I would use the system.	O	O	O	O	O
I plan to use the system.	O	O	O	O	O
I believe that ERP implementation harms the way things are done in the organization.	O	O	O	O	O
I think that it is a negative thing that we have gone through ERP implementation.	O	O	O	O	O
I believe that ERP implementation makes my job harder.	O	O	O	O	O
I am afraid of ERP implementation.	O	O	O	O	O
I have a bad feeling about ERP implementation.	O	O	O	O	O
ERP implementation makes me upset.	O	O	O	O	O
I am stressed by ERP implementation.	O	O	O	O	O

Section 4   Please place an x in a circle that most represents your feelings towards ERP implementation

<div style="text-align:right">Strongly Disagree   Strongly Agree</div>

	1	2	3	4	5
I have looked for ways to prevent ERP implementation.	◯	◯	◯	◯	◯
I protest against ERP implementation.	◯	◯	◯	◯	◯
I complain about ERP implementation to my colleagues.	◯	◯	◯	◯	◯
I present my objections regarding ERP implementation to management.	◯	◯	◯	◯	◯
I speak rather highly of ERP implementation to others.	◯	◯	◯	◯	◯
I am enthusiastic about using ERP.	◯	◯	◯	◯	◯
I am excited about using ERP in my workplace.	◯	◯	◯	◯	◯
It is my desire to see the full utilization and deployment of ERP.	◯	◯	◯	◯	◯

Section 5   Please place an x in a circle that most represents your feelings towards ERP implementation

---

                          Strongly Dissatisfied   Strongly Satisfied

On my new job using ERP, this is how I feel about …

	1	2	3	4	5
Being able to keep busy all the time	O	O	O	O	O
The chance to work alone on the job	O	O	O	O	O
The chance to do different things from time to time	O	O	O	O	O
The chance to be "somebody" in the community	O	O	O	O	O
The way my boss handles his/her workers	O	O	O	O	O
The competence of my supervisor in making decisions	O	O	O	O	O
Being able to do things that don't go against my conscience	O	O	O	O	O
The way my job provides for steady employment	O	O	O	O	O
The chance to do things for other people	O	O	O	O	O
The chance to tell people what to do	O	O	O	O	O
The chance to do something that makes use of my abilities	O	O	O	O	O
The way company policies are put into practice	O	O	O	O	O
My pay and the amount of work I do	O	O	O	O	O
The chances for advancement on this job	O	O	O	O	O

	Strongly Dissatisfied				Strongly Satisfied
	1	2	3	4	5
The freedom to use my own judgment	O	O	O	O	O
The chance to try my own methods of doing the job	O	O	O	O	O
The working conditions	O	O	O	O	O
The way my co-workers get along with each other	O	O	O	O	O
The praise I get for doing a good job	O	O	O	O	O
The feeling of accomplishment I get from the job	O	O	O	O	O

แบบสอบถามการนำระบบ ERP มาใช้ในองค์กร

ด้วยนายธนชาตย์ ฤทธิ์บำรุง นิสิตปริญญาเอก คณะพาณิชยศาสตร์และการบัญชี หลักสูตรดุษฎีบัณฑิต สาขาวิชาเทคโนโลยีสารสนเทศทางธุรกิจ กำลังดำเนินการวิจัยเชิงวิชาการเรื่องบทบาทของเจตคติกับ การเปลี่ยนแปลงองค์กรในการนำระบบการวางแผนทรัพยากรองค์การ (ระบบ ERP) มาใช้ ซึ่งเป็นส่วนหนึ่งของวิทยานิพนธ์ ผลวิจัยจะก่อให้เกิดประโยชน์ในการพัฒนาองค์ความรู้ และศาสตร์ ด้านการบริหารจัดการ อีกทั้งเป็นข้อมูลสำหรับ การดำเนินงานในโครงการการพัฒนาระบบงานองค์กรให้ดียิ่งขึ้น คณะผู้วิจัย จึงขอความอนุเคราะห์จากท่านในการให้ ความร่วมมือตอบแบบสอบถามในครั้งนี้ ซึ่งเป็นการเก็บข้อมูลเกี่ยวกับทัศนคติ และปัจจัยต่าง ๆ ที่ท่านรับรู้รับทราบเกี่ยวกับ การใช้งานระบบ ERP การตอบแบบสอบถามใช้เวลาประมาณ 10-15 นาทีเท่านั้น และข้อมูลคำตอบของแต่ละบุคคลจะรักษาเป็นความลับ และจะรายงานผลวิเคราะห์ในภาพรวมเท่านั้น คณะผู้วิจัยขอขอบคุณที่ท่านสละเวลาและให้ความร่วมมือในการตอบแบบสอบถามมา ณ ที่นี้

นายธนชาตย์ ฤทธิ์บำรุง
ศ. ดร. อุทัย ตันละมัย (อาจารย์ที่ปรึกษาวิทยานิพนธ์)
คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย

| ส่วนที่ 1 | โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับที่ท่านรับรู้ รับทราบจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้ |

ไม่เห็นด้วยที่สุด   เห็นด้วยที่สุด

	1	2	3	4	5
การใช้ ERP ในงานของฉันช่วยทำให้ฉันทำงานสำเร็จเร็ว............	○	○	○	○	○
การใช้ ERP ช่วยเพิ่มประสิทธิภาพงานของฉัน........................	○	○	○	○	○
การใช้ ERP ในงานของฉันเพิ่มผลผลิตของฉัน.........................	○	○	○	○	○
การใช้ ERP เสริมประสิทธิผลในงาน.................................	○	○	○	○	○
ฉันพบว่า ERP มีประโยชน์ในงานของฉัน..............................	○	○	○	○	○
การใช้ ERP พัฒนาคุณภาพของงานที่ฉันทำ...........................	○	○	○	○	○
การเรียนรู้ที่จะใช้งาน ERP ง่ายสำหรับฉัน...........................	○	○	○	○	○
ฉันพบว่ามันง่ายที่จะใช้ ERP เพื่อทำในส่งที่ฉันต้องการที่จะทำ.......	○	○	○	○	○
การโต้ตอบของฉันกับ ERP ชัดเจนและเข้าใจง่าย...................	○	○	○	○	○
ฉันพบว่า ERP ยืดหยุ่นที่จะโต้ตอบด้วย.............................	○	○	○	○	○
มันง่ายสำหรับฉันที่มีความชำนาญในการใช้ ERP....................	○	○	○	○	○
ฉันพบว่า ERP ง่ายต่อการใช้.......................................	○	○	○	○	○
คนทั่วไปที่มีอิทธิพลต่อพฤติกรรมของฉันคิดว่าฉันควรใช้ ERP......	○	○	○	○	○
คนทั่วไปที่มีความสำคัญต่อฉันคิดว่าฉันควรใช้ ERP................	○	○	○	○	○

ส่วนที่ 2   โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับที่ท่านรับรู้ รับทราบจากการนำระบบงาน
องค์กร (ระบบ ERP) มาใช้

ไม่เห็นด้วยที่สุด   เห็นด้วยที่สุด

	1	2	3	4	5
ฉันมีอำนาจเพียงพอในองค์กรนี้ที่จะควบคุมเหตุการณ์ต่างๆที่จะส่งผลกระทบต่องานของฉัน..........................	○	○	○	○	○
ในองค์กรนี้ ฉันสามารถป้องกันสิ่งที่ไม่ดีจากการกระทบสถานการณ์งานของฉัน..	○	○	○	○	○
ฉันเข้าใจองค์กรนี้ดีเพียงพอที่จะทำให้ฉันควบคุมสิ่งต่างๆ ที่มากระทบฉัน..	○	○	○	○	○
ฉันลงทุนในงานของฉันมากกว่าที่ฉันได้จากงาน.........................	○	○	○	○	○
ฉันทุ่มเทตัวเองมากเกินไปพิจารณากับสิ่งที่ฉันได้ตอบแทนกลับมา	○	○	○	○	○
สำหรับความพยายามที่ฉันได้ทุ่มเทไปกับองค์กรนี้ ฉันได้ผลตอบแทนกลับมามาก..	○	○	○	○	○
ถ้าฉันนำความทุ่มเทมาพิจารณา องค์กรนี้ควรที่จะให้การฝึกอบรมที่ดีกว่านี้..	○	○	○	○	○
โดยทั่วไป ผลตอบแทนที่ฉันได้รับจากองค์กรนี้มีน้ำหนักมากกว่าสิ่งที่ฉันทุ่มเทลงไป.......................................	○	○	○	○	○

ส่วนที่ 3 โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับคำที่มีความหมายตรงกับความรู้สึกจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้

	ไม่เห็นด้วยที่สุด				เห็นด้วยที่สุด

	1	2	3	4	5
ฉันคิดว่าการใช้ ERP เป็นความคิดที่ดี………………………………	O	O	O	O	O
ฉันคิดว่าการใช้ ERP เป็นความคิดที่ฉลาด……………………………	O	O	O	O	O
ฉันชอบความคิดของการใช้ ERP…………………………………	O	O	O	O	O
การใช้ ERP เป็นสิ่งน่าพอใจ…………………………………	O	O	O	O	O
ฉันตั้งใจที่จะใช้ระบบ…………………………………	O	O	O	O	O
ฉันคาดว่าฉันใช้ระบบ…………………………………	O	O	O	O	O
ฉันวางแผนที่จะใช้ระบบ…………………………………	O	O	O	O	O
ฉันเชื่อว่าการพัฒนาระบบ ERP จะส่งผลเสียต่อวิธีการทำงานขององค์กร	O	O	O	O	O
ฉันคิดว่ามันเป็นสิ่งที่ไม่ดีที่เราจะดำเนินการพัฒนาระบบ ERP………….	O	O	O	O	O
ฉันเชื่อว่าการพัฒนาระบบ ERP จะทำให้งานฉันยากขึ้น………………	O	O	O	O	O
ฉันหวาดกลัวการพัฒนาระบบ ERP…………………………………	O	O	O	O	O
ฉันมีความรู้สึกที่ไม่ดีต่อการพัฒนาระบบ ERP………………………..	O	O	O	O	O
การพัฒนาระบบ ERP ทำให้ฉันอารมณ์เสีย……………………………	O	O	O	O	O
ฉันเครียดจากการพัฒนาระบบ ERP…………………………………	O	O	O	O	O

ส่วนที่ 4   โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับคำที่มีความหมายตรงกับความรู้สึกจากการ
นำระบบงานองค์กร (ระบบ ERP) มาใช้

<div align="right">

ไม่เห็นด้วยที่สุด   เห็นด้วยที่สุด

</div>

	1	2	3	4	5
ฉันมองหาหนทางป้องกันการพัฒนาระบบ ERP………………….	O	O	O	O	O
ฉันต่อต้านการพัฒนาระบบ ERP………………………………	O	O	O	O	O
ฉันบ่นเกี่ยวกับการพัฒนาระบบ ERP กับเพื่อนร่วมงานของฉัน….	O	O	O	O	O
ฉันเสนอความคิดคัดค้านเกี่ยวกับการพัฒนาระบบ ERP………….	O	O	O	O	O
ฉันพูดเกี่ยวกับการพัฒนาระบบ ERP ในด้านดีกับผู้อื่น……………	O	O	O	O	O
ฉันรู้สึกกระตือรือร้นเกี่ยวกับ ERP………………………………	O	O	O	O	O
ฉันรู้สึกตื่นเต้นกับการใช้ระบบ ERP ในองค์กรของฉัน………………	O	O	O	O	O
มันเป็นความปราถนาของฉันที่จะเห็นการใช้ประโยชน์และการนำไปใช้ ERP อย่างเต็มที่………………………………………………	O	O	O	O	O

ส่วนที่ 5	โปรดทำเครื่องหมาย x ลงในวงกลมให้ใกล้เคียงกับคำที่มีความหมายตรงกับความรู้สึกจากการนำระบบงานองค์กร (ระบบ ERP) มาใช้

ไม่พึงพอใจที่สุด   พึงพอใจที่สุด

ในงานใหม่ของฉันที่ใช้ ERP นี่คือสิ่งที่ฉันรู้สึกเกี่ยวกับ .....

	1	2	3	4	5
ความสามารถที่ทำให้ไม่ว่างได้ตลอดเวลา…………………………..	O	O	O	O	O
โอกาสที่จะทำงานด้วยตัวคนเดียว………………………………….	O	O	O	O	O
โอกาสที่จะทำสิ่งที่แตกต่างออกไปในแต่ละช่วง…………………..	O	O	O	O	O
โอกาสที่จะเป็นคนสำคัญในสังคม……………………………..	O	O	O	O	O
หนทางที่หัวหน้าของฉันจัดการงานลูกน้อง……………………..	O	O	O	O	O
ความสามารถของหัวหน้างานในการตัดสินใจ………………….	O	O	O	O	O
ความสามารถที่ทำงานที่ไม่ขัดแย้งกับความรู้สึกผิดชอบของฉัน………	O	O	O	O	O
หนทางที่งานของฉันทำให้มีการจ้างงานที่มั่นคง…………………	O	O	O	O	O
โอกาสที่จะทำงานให้กับผู้อื่น………………………………..	O	O	O	O	O
โอกาสที่จะสอนให้ผู้อื่นทำสิ่งต่างๆ…………………………….	O	O	O	O	O
โอกาสที่จะทำบางอย่างจากความสามารถของฉัน………………….	O	O	O	O	O
หนทางที่นโยบายบริษัทถูกนำมาใช้ในการทำงานจริง………………	O	O	O	O	O
ผลตอบแทนและปริมาณงานที่ฉันทำ………………..…………..	O	O	O	O	O
หนทางสำหรับความก้าวหน้าในงานนี้…………………………..	O	O	O	O	O

| | ไม่พึงพอใจที่สุด | | | | | พึงพอใจที่สุด |

ความเป็นอิสระในการใช้การตัดสินใจของตัวเอง..........................

| 1 | 2 | 3 | 4 | 5 |
| ○ | ○ | ○ | ○ | ○ |

โอกาสที่จะได้ลองใช้วิธีทางของฉันในการทำงาน..........................

| 1 | 2 | 3 | 4 | 5 |
| ○ | ○ | ○ | ○ | ○ |

สภาพการทำงาน...

| 1 | 2 | 3 | 4 | 5 |
| ○ | ○ | ○ | ○ | ○ |

หนทางที่เพื่อนร่วมงานของฉันจะเข้ากันได้ดี..............................

| 1 | 2 | 3 | 4 | 5 |
| ○ | ○ | ○ | ○ | ○ |

คำชมเชยที่ฉันได้จากการทำงานดี..

| 1 | 2 | 3 | 4 | 5 |
| ○ | ○ | ○ | ○ | ○ |

ความรู้สึกของความสำเร็จที่ได้จากการทำงาน..............................

| 1 | 2 | 3 | 4 | 5 |
| ○ | ○ | ○ | ○ | ○ |

Appendix B Reliability Analysis

Initially, Cronbach's alpha was used to assess reliability of items for each of latent constructs. The alphas of constructs were calculated separately in each case. Further analysis was conducted to individually assess an item whether it can be used to measure a theoretical construct reasonably in the context of this study. Cronbach's alphas when the item was deleted from the particular construct were also determined.

Perceived Usefulness

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.881	0.920	0.935

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
PU1	0.703	0.858	0.770	0.906	0.753	0.930
PU2	0.621	0.871	0.814	0.900	0.822	0.922
PU3	0.683	0.861	0.796	0.902	0.825	0.922
PU4	0.748	0.850	0.782	0.904	0.870	0.915
PU5	0.675	0.863	0.699	0.915	0.774	0.928
PU6	0.716	0.856	0.770	0.906	0.820	0.922

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Perceived Ease of Use

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.841	0.893	0.904

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
PEU1	0.629	0.812	0.701	0.878	0.705	0.892
PEU2	0.728	0.792	0.739	0.871	0.693	0.893
PEU3	0.680	0.802	0.735	0.871	0.803	0.876
PEU4	0.686	0.802	0.720	0.875	0.817	0.877
PEU5	0.420	0.852	0.700	0.877	0.715	0.890
PEU6	0.578	0.822	0.703	0.876	0.706	0.891

Subjective Norm

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.925	0.894	0.945

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
SN1	0.869	.	0.809	.	0.896	.
SN2	0.869	.	0.809	.	0.896	.

Perceived Self-efficacy

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.798	0.737	0.821

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
PSE1	0.531	0.784	0.382	0.764	0.474	0.844
PSE2	0.722	0.691	0.616	0.626	0.733	0.731
PSE3	0.644	0.732	0.567	0.656	0.710	0.745
PSE4	0.556	0.774	0.570	0.656	0.674	0.761

Power

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.833	0.840	0.885

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
PP1	0.730	0.733	0.658	0.831	0.771	0.844
PP2	0.794	0.663	0.753	0.729	0.831	0.788
PP3	0.573	0.878	0.712	0.775	0.733	0.874

Inequity

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.119	0.455	0.777

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
PI1	0.215	-0.127	0.283	0.368	0.712	0.679
PI2	0.260	-0.176	0.490	0.206	0.512	0.749
PI3	-0.100	0.284	0.164	0.452	0.474	0.762
PI4	-0.068	0.221	0.125	0.478	0.518	0.747
PI5	-0.007	0.149	0.167	0.450	0.546	0.738

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Attitude towards Usage – Cognitive Component

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.911	0.909	0.912

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
ATUC1	0.839	.	0.834	.	0.839	.
ATUC2	0.839	.	0.834	.	0.839	.

Attitude towards Usage – Affective Component

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.874	0.896	0.920

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
ATUA1	0.776	.	0.812	.	0.853	.
ATUA2	0.776	.	0.812	.	0.853	.

Intention to Use

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.932	0.914	0.932

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
IU1	0.819	0.938	0.824	0.880	0.829	0.925
IU2	0.898	0.872	0.844	0.863	0.887	0.879
IU3	0.869	0.895	0.815	0.886	0.864	0.898

Symbolic Adoption

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.791	0.854	0.858

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
SA1	0.720	0.621	0.779	0.751	0.769	0.772
SA2	0.715	0.624	0.762	0.760	0.782	0.752
SA3	0.481	0.868	0.646	0.874	0.654	0.877

Resistance Attitude – Cognitive Component

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.841	0.794	0.788

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
RTAC1	0.589	0.895	0.624	0.733	0.595	0.750
RTAC2	0.779	0.705	0.733	0.614	0.744	0.590
RTAC3	0.764	0.728	0.559	0.797	0.556	0.788

Resistance Attitude – Affective Component

	POSTAL		ENERGY		WATER	
Cronbach's Alpha	0.956		0.917		0.937	

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
RTAA1	0.883	0.945	0.778	0.904	0.821	0.926
RTAA2	0.890	0.943	0.842	0.881	0.887	0.905
RTAA3	0.903	0.939	0.875	0.870	0.818	0.927
RTAA4	0.893	0.942	0.750	0.914	0.872	0.910

Resistance Behaviors

	POSTAL	ENERGY	WATER
Cronbach's Alpha	0.703	0.669	0.728

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
RTB1	0.506	0.635	0.255	0.692	0.509	0.673
RTB2	0.721	0.532	0.677	0.489	0.576	0.646
RTB3	0.559	0.612	0.571	0.542	0.557	0.654
RTB4	0.786	0.495	0.592	0.533	0.731	0.577
RTB5	-0.156	0.849	0.048	0.743	0.105	0.804

Job Satisfaction

	POSTAL		ENERGY		WATER	
Cronbach's Alpha	0.960		0.945		0.948	

	POSTAL		ENERGY		WATER	
	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha	Correlation with Total	Cronbach's Alpha
JS1	0.485	0.961	0.406	0.947	0.595	0.947
JS2	0.594	0.960	0.462	0.946	0.406	0.968
JS3	0.710	0.958	0.620	0.943	0.711	0.945
JS4	0.795	0.957	0.679	0.942	0.702	0.945
JS5	0.640	0.959	0.563	0.944	0.697	0.946
JS6	0.734	0.958	0.588	0.944	0.726	0.945
JS7	0.604	0.960	0.644	0.943	0.797	0.944
JS8	0.696	0.959	0.716	0.942	0.704	0.945
JS9	0.757	0.958	0.667	0.942	0.812	0.944
JS10	0.802	0.957	0.686	0.942	0.805	0.944
JS11	0.817	0.957	0.733	0.941	0.767	0.945
JS12	0.721	0.958	0.655	0.943	0.770	0.944
JS13	0.680	0.959	0.738	0.941	0.795	0.944
JS14	0.767	0.958	0.733	0.941	0.791	0.944
JS15	0.668	0.959	0.703	0.942	0.711	0.945
JS16	0.757	0.958	0.729	0.941	0.708	0.945
JS17	0.829	0.957	0.744	0.941	0.889	0.943
JS18	0.829	0.957	0.704	0.942	0.826	0.944
JS19	0.834	0.957	0.740	0.941	0.801	0.944
JS20	0.833	0.957	0.753	0.941	0.877	0.943

Appendix C Details of Statistical Analysis

POSTAL

Item	Questionnaire Item	Mean	Std Dev	N
PU1	1. Using ERP in my job would enable me to accomplish tasks more quickly.	3.46	0.811	106
PU2	2. Using ERP would improve my job performance.	3.54	0.716	106
PU3	3. Using ERP in my job would increase my productivity.	3.40	0.808	106
PU4	4. Using ERP would enhance my effectiveness on the job.	3.59	0.813	106
PU5	5. I would find ERP useful in my job.	3.62	0.656	106
PU6	6. Using ERP improves the quality of work I do.	3.52	0.728	106
PEU1	1. Learning to operate ERP would be easy for me.	3.20	0.762	106
PEU2	2. I would find it easy to get ERP to do what I want it to do.	3.17	0.737	106
PEU3	3. My interaction with ERP would be clear and understandable.	3.26	0.752	106
PEU4	4. I would find ERP to be flexible to interact with.	3.14	0.687	105
PEU5	5. It would be easy for me to become skillful at using ERP.	2.97	0.730	106
PEU6	6. I would find ERP ease to use.	3.36	0.729	106
SN1	1. People who influence my behavior think that I should use ERP.	3.19	0.797	106
SN2	2. People who are important to me think that I should use ERP.	3.19	0.923	106
PSE1	1. I could complete a job or task using ERP if there is no one around to tell me what to do as I go.	3.35	0.660	107

Item	Questionnaire Item	Mean	Std Dev	N
PSE2	2. I could complete a job or task using ERP if I could call someone for help if I get stuck.	3.48	0.737	107
PSE3	3. I could complete a job or task using ERP if I have a lot of time to complete the job for which ERP is provided.	3.35	0.806	107
PSE4	4. I could complete a job or task using ERP if I have just the built-in help facility for assistance.	3.59	0.745	107
IU1	1. I intend to use the system.	3.40	1.008	107
IU2	2. I predict I would use the system.	3.42	0.927	107
IU3	3. I plan to use the system.	3.31	0.924	106
RTC1	1. I look for ways to prevent ERP implementation.	2.78	0.998	107
RTC2	2. I protest against ERP implementation.	2.33	1.046	107
RTC3	3. I complain about ERP implementation to my colleagues.	2.70	1.002	106
RTC4	4. I present my objections regarding ERP implementation to management.	2.46	1.068	107
RTC5	5. I speak rather highly of ERP implementation to others.	3.36	0.888	107
PT1	1. I have enough power in this organization to control events that might affect my job.	2.50	0.982	105
PT2	2. In this organization, I can prevent negative things from affecting my work situation.	2.73	1.028	106
PT3	3. I understand this organization well enough to be able to control things that affect me.	2.92	0.902	106
PT4	1. I invest more in my work than I get out of it.	3.14	0.888	106
PT5	2. I exert myself too much considering what I get back in return.	3.05	0.844	106

Item	Questionnaire Item	Mean	Std Dev	N
PT6	3. For the efforts I put into the organization, I get much in return. (reversed)	3.08	0.933	106
PT7	4. If I take into account my dedication, the organization ought to give me a better practical training.	3.32	0.799	106
PT8	5. In general, the benefits I receive from the organization outweigh the effort I put in it (reversed).	2.98	0.676	106
UAC1	1. I think that using ERP is a good idea.	3.69	0.770	107
UAC2	2. I think that using ERP is a wise idea.	3.61	0.833	107
UAA1	1. I like the idea of using ERP.	3.46	0.861	107
UAA2	2. Using ERP is pleasant.	3.50	0.851	107
RCC1	1. I believe that ERP implementation would harm the way things are done in the organization.	2.65	1.029	107
RCC2	2. I think that it is a negative thing that we are going through ERP implementation.	2.43	0.992	107
RCC3	3. I believe that ERP implementation would make my job harder.	2.48	0.915	107
RCA1	1. I am afraid of ERP implementation.	2.37	0.986	107
RCA2	2. I have a bad feeling about ERP implementation.	2.31	0.985	107
RCA3	3. ERP implementation makes me upset.	2.36	1.004	107
RCA4	4. I am stressed by ERP implementation.	2.39	1.016	107
SA1	1. I am enthusiastic about using ERP.	3.36	0.829	107
SA2	2. I am excited about using ERP in my workplace.	3.27	0.853	107
SA3	3. It is my desire to see the full utilization and deployment of ERP.	3.67	0.822	107
JS1	1. Being able to keep busy all the time	3.01	0.863	107

Item	Questionnaire Item	Mean	Std Dev	N
JS2	2. The chance to work alone on the job	3.16	0.848	107
JS3	3. The chance to do different things from time to time	3.20	0.818	107
JS4	4. The chance to be "somebody" in the community	3.18	0.867	107
JS5	5. The way my boss handles his/her workers	3.12	0.809	107
JS6	6. The competence of my supervisor in making decisions	3.47	0.744	107
JS7	7. Being able to do things that don't go against my conscience	3.37	0.721	106
JS8	8. The way my job provides for steady employment	3.36	0.795	106
JS9	9. The chance to do things for other people	3.31	0.794	107
JS10	10. The chance to tell people what to do	3.25	0.778	107
JS11	11. The chance to do something that makes use of my abilities	3.43	0.802	107
JS12	12. The way company policies are put into practice	3.10	0.952	97
JS13	13. My pay and the amount of work I do	3.09	0.864	107
JS14	14. The chances for advancement on this job	3.17	0.818	107
JS15	15. The freedom to use my own judgment	3.16	0.892	107
JS16	16. The chance to try my own methods of doing the job	3.19	0.881	107
JS17	17. The working conditions	3.32	0.760	107
JS18	18. The way my co-workers get along with each other	3.43	0.754	107
JS19	19. The praise I get for doing a good job	3.31	0.732	107
JS20	20. The feeling of accomplishment I get from the job	3.34	0.752	107

ENERGY

Item	Questionnaire Item	Mean	Std Dev	N
PU1	1. Using ERP in my job would enable me to accomplish tasks more quickly.	3.27	0.755	477
PU2	2. Using ERP would improve my job performance.	3.35	0.788	479
PU3	3. Using ERP in my job would increase my productivity.	3.31	0.745	477
PU4	4. Using ERP would enhance my effectiveness on the job.	3.36	0.768	475
PU5	5. I would find ERP useful in my job.	3.48	0.755	477
PU6	6. Using ERP improves the quality of work I do.	3.20	0.741	476
PEU1	1. Learning to operate ERP would be easy for me.	2.84	0.804	477
PEU2	2. I would find it easy to get ERP to do what I want it to do.	2.98	0.709	478
PEU3	3. My interaction with ERP would be clear and understandable.	3.01	0.750	478
PEU4	4. I would find ERP to be flexible to interact with.	3.01	0.643	475
PEU5	5. It would be easy for me to become skillful at using ERP.	2.94	0.692	479
PEU6	6. I would find ERP ease to use.	3.04	0.735	477
SN1	1. People who influence my behavior think that I should use ERP.	3.02	0.783	478
SN2	2. People who are important to me think that I should use ERP.	3.09	0.795	478
PSE1	1. I could complete a job or task using ERP if there is no one around to tell me what to do as I go.	2.85	0.816	478
PSE2	2. I could complete a job or task using ERP if I could call someone for help if I get stuck.	3.36	0.784	477

Item	Questionnaire Item	Mean	Std Dev	N
PSE3	3. I could complete a job or task using ERP if I have a lot of time to complete the job for which ERP is provided.	3.30	0.752	477
PSE4	4. I could complete a job or task using ERP if I have just the built-in help facility for assistance.	3.55	0.738	479
IU1	1. I intend to use the system.	3.37	0.831	478
IU2	2. I predict I would use the system.	3.47	0.763	478
IU3	3. I plan to use the system.	3.32	0.794	479
RTC1	1. I look for ways to prevent ERP implementation.	2.80	0.903	477
RTC2	2. I protest against ERP implementation.	2.30	0.911	476
RTC3	3. I complain about ERP implementation to my colleagues.	2.78	0.958	478
RTC4	4. I present my objections regarding ERP implementation to management.	2.52	0.932	476
RTC5	5. I speak rather highly of ERP implementation to others.	3.40	0.688	477
PT1	1. I have enough power in this organization to control events that might affect my job.	2.42	0.971	476
PT2	2. In this organization, I can prevent negative things from affecting my work situation.	2.73	0.896	476
PT3	3. I understand this organization well enough to be able to control things that affect me.	2.81	0.829	476
PT4	1. I invest more in my work than I get out of it.	3.09	0.839	474
PT5	2. I exert myself too much considering what I get back in return.	3.06	0.822	474
PT6	3. For the efforts I put into the organization, I get much in return. (reversed)	3.12	0.816	473

Item	Questionnaire Item	Mean	Std Dev	N
PT7	4. If I take into account my dedication, the organization ought to give me a better practical training.	3.35	0.821	475
PT8	5. In general, the benefits I receive from the organization outweigh the effort I put in it (reversed).	3.05	0.820	475
UAC1	1. I think that using ERP is a good idea.	3.65	0.891	475
UAC2	2. I think that using ERP is a wise idea.	3.49	0.896	475
UAA1	1. I like the idea of using ERP.	3.43	0.841	474
UAA2	2. Using ERP is pleasant.	3.37	0.844	474
RCC1	1. I believe that ERP implementation would harm the way things are done in the organization.	2.55	1.026	473
RCC2	2. I think that it is a negative thing that we are going through ERP implementation.	2.37	0.968	473
RCC3	3. I believe that ERP implementation would make my job harder.	2.69	0.959	472
RCA1	1. I am afraid of ERP implementation.	2.38	0.963	473
RCA2	2. I have a bad feeling about ERP implementation.	2.36	0.982	473
RCA3	3. ERP implementation makes me upset.	2.33	0.986	473
RCA4	4. I am stressed by ERP implementation.	2.49	1.031	473
SA1	1. I am enthusiastic about using ERP.	3.33	0.796	473
SA2	2. I am excited about using ERP in my workplace.	3.25	0.874	472
SA3	3. It is my desire to see the full utilization and deployment of ERP.	3.58	0.896	473
JS1	1. Being able to keep busy all the time	2.98	0.801	464
JS2	2. The chance to work alone on the job	3.05	0.855	466
JS3	3. The chance to do different things from time to	3.23	0.744	465

Item	Questionnaire Item	Mean	Std Dev	N
	time			
JS4	4. The chance to be "somebody" in the community	3.08	0.766	465
JS5	5. The way my boss handles his/her workers	3.16	0.723	464
JS6	6. The competence of my supervisor in making decisions	3.30	0.803	463
JS7	7. Being able to do things that don't go against my conscience	3.23	0.716	462
JS8	8. The way my job provides for steady employment	3.29	0.751	463
JS9	9. The chance to do things for other people	3.42	0.730	465
JS10	10. The chance to tell people what to do	3.23	0.752	465
JS11	11. The chance to do something that makes use of my abilities	3.36	0.738	465
JS12	12. The way company policies are put into practice	3.38	0.789	465
JS13	13. My pay and the amount of work I do	3.23	0.743	465
JS14	14. The chances for advancement on this job	3.15	0.804	465
JS15	15. The freedom to use my own judgment	3.09	0.788	464
JS16	16. The chance to try my own methods of doing the job	3.12	0.760	464
JS17	17. The working conditions	3.25	0.739	462
JS18	18. The way my co-workers get along with each other	3.23	0.759	463
JS19	19. The praise I get for doing a good job	3.11	0.752	464
JS20	20. The feeling of accomplishment I get from the job	3.29	0.791	464

WATER

Item	Questionnaire Item	Mean	Std Dev	N
PU1	1. Using ERP in my job enables me to accomplish tasks more quickly.	3.53	0.926	99
PU2	2. Using ERP improves my job performance.	3.53	0.825	99
PU3	3. Using ERP in my job increases my productivity.	3.43	0.800	99
PU4	4. Using ERP enhances my effectiveness on the job.	3.57	0.853	99
PU5	5. I find ERP useful in my job.	3.55	0.941	99
PU6	6. Using ERP improves the quality of work I do.	3.36	0.917	97
PEU1	1. Learning to operate ERP is easy for me.	3.11	0.862	99
PEU2	2. I find it easy to get ERP to do what I want it to do.	3.12	0.741	99
PEU3	3. My interaction with ERP is clear and understandable.	3.12	0.797	99
PEU4	4. I find ERP to be flexible to interact with.	2.96	0.688	99
PEU5	5. It is easy for me to become skillful at using ERP.	2.78	0.783	99
PEU6	6. I find ERP ease to use.	2.95	0.816	99
SN1	1. People who influence my behavior think that I should use ERP.	3.04	0.889	99
SN2	2. People who are important to me think that I should use ERP.	3.11	0.880	99
PSE1	1. I could complete a job or task using ERP if there is no one around to tell me what to do as I go.	2.95	0.827	97
PSE2	2. I could complete a job or task using ERP if I could call someone for help if I get stuck.	3.28	1.009	97
PSE3	3. I could complete a job or task using ERP if I have a lot of time to complete the job for which ERP is provided.	3.08	0.883	97

Item	Questionnaire Item	Mean	Std Dev	N
PSE4	4. I could complete a job or task using ERP if I have just the built-in help facility for assistance.	3.46	0.939	97
IU1	1. I intend to use the system.	3.21	0.981	99
IU2	2. I predict I would use the system.	3.32	0.980	99
IU3	3. I plan to use the system.	3.21	0.942	99
RTC1	1. I look for ways to prevent ERP implementation.	2.63	0.919	98
RTC2	2. I protest against ERP implementation.	2.03	0.900	99
RTC3	3. I complain about ERP implementation to my colleagues.	2.46	0.932	99
RTC4	4. I present my objections regarding ERP implementation to management.	2.26	0.920	99
RTC5	5. I speak rather highly of ERP implementation to others.	3.22	0.809	99
PT1	1. I have enough power in this organization to control events that might affect my job.	2.33	0.997	97
PT2	2. In this organization, I can prevent negative things from affecting my work situation.	2.58	0.934	97
PT3	3. I understand this organization well enough to be able to control things that affect me.	2.52	0.903	97
PT4	1. I invest more in my work than I get out of it.	2.91	0.947	97
PT5	2. I exert myself too much considering what I get back in return.	2.80	0.931	97
PT6	3. For the efforts I put into the organization, I get much in return. (reversed)	2.77	0.952	97
PT7	4. If I take into account my dedication, the organization ought to give me a better practical training.	3.32	0.908	97

Item	Questionnaire Item	Mean	Std Dev	N
PT8	5. In general, the benefits I receive from the organization outweigh the effort I put in it (reversed).	2.76	0.910	97
UAC1	1. I think that using ERP is a good idea.	3.69	0.933	99
UAC2	2. I think that using ERP is a wise idea.	3.53	0.930	99
UAA1	1. I like the idea of using ERP.	3.61	0.901	99
UAA2	2. Using ERP is pleasant.	3.47	0.962	99
RCC1	1. I believe that ERP implementation would harm the way things are done in the organization.	2.38	0.903	98
RCC2	2. I think that it is a negative thing that we are going through ERP implementation.	2.14	0.833	99
RCC3	3. I believe that ERP implementation would make my job harder.	2.49	0.885	99
RCA1	1. I am afraid of ERP implementation.	2.10	0.942	99
RCA2	2. I have a bad feeling about ERP implementation.	2.18	0.973	99
RCA3	3. ERP implementation makes me upset.	2.23	0.978	99
RCA4	4. I am stressed by ERP implementation.	2.23	0.967	99
SA1	1. I am enthusiastic about using ERP.	3.22	0.864	99
SA2	2. I am excited about using ERP in my workplace.	3.12	0.940	99
SA3	3. It is my desire to see the full utilization and deployment of ERP.	3.64	0.974	99
JS1	1. Being able to keep busy all the time	2.89	0.840	100
JS2	2. The chance to work alone on the job	3.27	2.260	100
JS3	3. The chance to do different things from time to time	3.21	0.868	100
JS4	4. The chance to be "somebody" in the community	3.07	0.844	100
JS5	5. The way my boss handles his/her workers	3.15	0.730	100

Item	Questionnaire Item	Mean	Std Dev	N
JS6	6. The competence of my supervisor in making decisions	3.41	0.808	99
JS7	7. Being able to do things that don't go against my conscience	3.26	0.812	100
JS8	8. The way my job provides for steady employment	3.33	0.805	100
JS9	9. The chance to do things for other people	3.30	0.759	100
JS10	10. The chance to tell people what to do	3.11	0.777	100
JS11	11. The chance to do something that makes use of my abilities	3.33	0.817	100
JS12	12. The way company policies are put into practice	3.21	0.880	100
JS13	13. My pay and the amount of work I do	3.11	0.875	100
JS14	14. The chances for advancement on this job	3.10	0.827	99
JS15	15. The freedom to use my own judgment	3.13	0.837	100
JS16	16. The chance to try my own methods of doing the job	3.16	0.813	100
JS17	17. The working conditions	3.27	0.737	100
JS18	18. The way my co-workers get along with each other	3.34	0.807	100
JS19	19. The praise I get for doing a good job	3.19	0.787	100
JS20	20. The feeling of accomplishment I get from the job	3.28	0.877	100

VITAE

Thanachart Ritbumroong earned his Bachelor of Engineering, major of civil engineering, from Chulalongkorn University. Later, he received Master of Science, major of Information Technology in Business. He worked as a consultant in information technology and business areas, particularly in Business Intelligence, Data Warehouse, ERP, and Change Management.