The importance of customization on the acceptance of the enterprise resource planning (ERP) system in Chinese company

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The Importance of Customization on the Acceptance of the Enterprise Resource Planning (ERP) System in Chinese Company

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Abstract

Although ERP systems have been depicted as a solution in many organizations, there are many negative reports on ERP success, benefits, and effect on user's performance. Previous research noted that there is a lack of knowledge and awareness of ERP systems and their overall value to ERP organizations. ERP systems have been widely studied during the past decade, yet they often fail to deliver the intended benefits originally expected. One notable reason for their failures is the lack of understanding how the customization influence the ERP user acceptance. In our research, customization is a code change put into place because the ERP business process does not mirror the "desired" business process. (Davis 2005), compared to configuration which refers to setting parameters in the package to reflect organizational features.

This dissertation study was designed to understand the relative importance of customization level (CL) and ease of customization (CE), and their influence on ERP users. The dependent variable behavior intention is used to represent the intention of ERP usage, and ultimately represent ERP success at the individual level of analysis. To answer the question raised related to the research objective, we proposed 15 hypothesis. The research was based on the UTAUT model (Venkatesh et al. 2003), and two new latent variables, customization level and ease of customization as exogenous variable, which were checked for their influence on the three endogenous variables, performance expectancy(PE), effort expectancy(EE) and social influence(SI) of UTAUT model, and finally reflect the indirect influence on behavioral intention(BI). In addition, this study examined the moderating effect of users' characteristics variables (experience and position) on the three endogenous variables. A web-based survey was employed to collect data for this study.

A number of ERP users with customization experience participated in this survey. The survey screening process provided 303 usable responses for further analysis. Using SPSS 20, we determined the validity and reliability of the items. The result of the exploratory factor analysis (EFA) via principal component analysis (PCA) identified six factors, and most of the scales loaded absolutely on their represented factors. Following the EFA results, we investigated the items' reliability, internal consistency, convergent validity, and discriminant validity. Hypothetical relationships were examined using structural equation modeling (SEM) based on the partial least squares (PLS) technique. SmartPLS application was used as suggested by Hair et al. (2013). The moderating effect was examined using the multigroup analysis (MGA) method.

To verify the hypothesis, we conducted data analysis, and 12 out of 15 hypothesis were supported, which confirmed our assumption that, ERP customization is significant and positively related to ERP acceptance or behavioral intention in China market, and there are different perception in decision makers and normal users. Because of the various risks in ERP project, financial, technical, functional and political, vendors and consultants are keen on helping the project manager to meet the budget and time target rather than to reap more benefit for business performance. Thus, customization usually had been avoided, and insufficient customization are more common than over customization.

This dissertation study contributed to the body of knowledge by highlighting the importance of CL and CE in impacting ERP users' behavior intention or intention to use in an ERP environment. The results of this research can be used by companies to evaluate the ERP system in project preparation phase,

considering about the degree of misfit between business requirement and system capability, choose an appropriate level of customization, and adjust the project scope, budget and time to the project accordingly. This research bridged the gap in the literature on the need to conduct more ERP research in the ERP customization domain, especially in China market. Understanding the relative importance of ERP customization brings the attention of ERP organizations and vendors to focus their efforts on the important issues perceived by end users. Organizations can also build a rigorous approach to assess the impacts of the different type (strategic and consistency) of customization, and help in improving ERP implementation decision effectiveness, and achieve higher alignment between business process and system functionality, improve the productivity, performance and in the meantime, improve the user acceptance.

Key words: ERP, Customization, Enhancement, Misfit, Adaptation, PLS-SEM

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GENERAL INTRODUCTION

0.1. Contextualization

Today, information technology (IT) is universally regarded as an essential tool in enhancing the competitiveness of the economy of a country. And there is consensus that IT has significant effects on the productivity of firms. But these effects will only be realized if, and when, IT are widely spread and used.

Enterprise systems are commercial packages; that is, they are purchased or leased from software vendors rather than being developed in-house (Markus and Tanis, 2000) from scratch. ERP (Enterprise Resource Planning) comprises of a commercial software package that promises the seamless integration of all the information flowing through the company financial, accounting, human resources, supply chain and customer information. (Davenport 1998)

The ERP implementation learning curve, however, saw many of the early installations being unstable, several of which failed spectacularly (Plant and Willcocks, 2007), including, for example, installations at FoxMeyer and Hershey Foods. While there have been examples of successful ERP implementations e.g., Cisco, it has been estimated that 90% of all early ERP projects were either late or over budget. Organizations such as Volkswagen, Cleveland State University, Whirlpool and W.L. Gore have suffered similar problems. Whirlpool for example decided to push ahead with their implementation; even though their SAP consultants had red-flagged a functional issue that they felt may affect the outcome of the implementation, which in fact did ultimately result in a major problem with their supply chain. Failures and problems during implementation itself have been subjects of an extensive literature and while high visibility failure is not as common at large organizations as in the past, application integration problems do still occur (Plant & Willcocks, 2007), especially when organizations attempt to customize their ERP systems (Brehm et al., 2001; Light, 2001; Scott & Kaindl, 2000)). However, with the increased demand for ERP systems by smaller organizations, cost overruns or failures in process design can cause significant problems as these new adopters may have limited resources, experience or staffing skills with which to overcome these issues.

Global competition, reengineered product life cycles, and the increased need to respond quickly to customers' needs are just some of the more pronounced trends currently driving organizational change (Grenier & Metes, 1995). Companies that implement the systems have the opportunity to redesign their business practices using templates states that performance is influenced by the level of fit between information processing mechanisms and organizational context. (Gattiker & Goodhue, 2005).

From a strategic alignment standpoint, a clear link is desirable between strategic business goals and the specialization of business assets. However, the implementation realities frequently tell a different story. Customizations are often not linked to strategic business goals and at times even run counter to these goals. (Haines, 2009)

The customization of an Enterprise System can be viewed as a specialization of an IT related business asset. Its customization should be driven by these strategic business goals.

Packaged software systems, including Enterprise Systems (ES, https://en.wikipedia.org/wiki/Enterprise_system) are large-scale application software packages that support business processes, information flows, reporting, and data analytics in complex organizations. Types of enterprise systems include: enterprise resources planning (ERP) systems, enterprise planning systems, and customer relationship management software), are the dominant type of software used in many organizations today (Mabert, Soni, & Venkataramanan, 2000). Unfortunately, the "out-of-the-box" solution of a packaged software system, as provided by the vendor, frequently does not meet the existing information processing requirements of the organization implementing the system (Hong & Kim, 2002; Mabert, Soni, & Venkataramanan, 2001; Markus & Tanis, 2000; Soh, Kien & Tay-Yap, 2000). Organizations must then decide whether to adjust their organizational processes or change parts of the packaged system (Davenport, 2000; Luo & Strong, 2004).

And today, we found customers' requirements involving software security and customization are the two main attributes that determine a firm's decision to change its on premise software to cloud-based SaaS.

The inability to support unique and sometimes critical business processes and/or other customer internal systems via customization is a major gap in today's SaaS (Almodovar, 2015) which refer to as S1.0. This major gap prevents SaaS, as an offering, from evolving to what refer to as SaaS 2.0 or S2.0; an off-premise SaaS solution maintained by the vendor on a common code line, who is responsible for future upgrades and feature releases, provides user configuration capabilities, and some level of customization. It's clear that S1.0 has made great strides in providing the customer with fairly easy graphical user interfaces (GUI) designed to configure their SaaS system with little to no support from their IT group. The configuration features and capabilities have vastly improved over that period of time, and have placed a great deal of power in the hands of the functional user. While configuration capabilities in S1.0 are strong they do not address the need for many firms to support unique and/or critical business processes, which can only be solved by customization.

It was clear to that configuration alone could not meet most critical needs, and only some level of customization would provide the final bridge needed to move to a total SaaS solution. S2.0 can be that bridge required by many firms to make the final and complete transition to SaaS. S2.0 must provide more than the custom user fields offered today by the majority of SaaS vendors, it must also offer the customer the ability to add and maintain some level of logic/code that will support unique processes, while continuing to offer the current benefits of S1.0. While custom fields are beneficial, they alone cannot support critical processes. Making customization available in the SaaS construct will significantly close a gap that prevents many firms from taking that last giant leap into the SaaS arena. Until S 2.0 is available, business will be constrained by the limitations of S1.0 and its inability to support key customer business processes.

Technology acceptance research has attracted several theoretical perspectives including the technology acceptance model (TAM) (Davis, 1989), the theory of planned behaviour (TPB) (Ajzen, 1991), and, recently, the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003).

Technology adoption is one of the most mature streams in information systems (IS) research (Venkatesh 2003). In addition to it, Venkatesh identified several important directions for future research and suggested that “one of the most important directions for future research is to tie this mature stream technology adoption of research into other established streams of work”.

Prior ERP research predominantly focused on the North American context (the United States in particular) and, to a lesser extent, the western European context. Needless to say that very few studies have dealt with developing countries in spite of the many valuable lessons that could be learned from the experiences of these countries (Ifinedo, 2008). Huang and Palvia, (2001) argue that in developing countries, ERP technology confronts extra challenges which are intrinsically connected to several contextual reasons such as culture, economic conditions, government regulations, management style, and labor skills. Nevertheless, studies about ERP experiences in developing countries are strikingly scarce. Additional efforts are, therefore required, to fill this research gap. However most ERP research in developing countries have taken place in Asian countries, mainly in China.

0.2. Research objective

1. ERP failure & functional misfit

Many organizations reported success in implementing their ERP systems; however, Iskanius (2010) estimated the failure rate of ERP systems to be as high as 70%. Given the high failure rate, top management has come to realize that achieving ERP success is a very complex task.

One important reason for ERP no adoption, partial adoption, or discontinuance is lack of "feature-function fit" between the company's needs and the packages available in the marketplace. "There are very few companies that don't have specialized processes dictated by their industry," according to one consultant (Markus and Tanis, 2000).

Due to the large scope of the ERP system and its tight link to business practices, any mismatches between organizational requirements and the processes supported by the system can be highly disruptive to an organization's operations. A lack of system-to-business fit in critical parts of the organization can lead to negative business outcomes (Gattiker & Goodhue, 2002; Harris, 2000; Stedman, 2000).

And findings suggest the "misfit" issue may be worse in Asia because the business models underlying most ERP packages reflect European or U.S. industry practices. Procedures in Asian organizations are likely to be different, having evolved in a different cultural, economic, and regulatory context (Soh, et.al 2000).

To address this issue, companies and ERP vendors proposed different options to mitigate or to avoid the issues. To use “Vanilla” system, adopt industry “best practice”, conduct business process “reengineering” to fit the system, and customization, which may be the last resort, because of it is complexity and risk behind of it.

2. Customization as the last resort

Rather than designing a system to meet the organization’s idiosyncratic ways of working, the adopters of an enterprise system often adjust the organization’s ways of working to fit the package (because modifying packages has numerous negative consequences). Consequently, package adopters sometimes forgo or curtail the analysis of current information requirements and business processes that is a hallmark of the traditional IS life cycle process of configuring an enterprise system for an organization differs substantially from software programming.

There are different options to address the misfit issues. One way is that, the vendors of enterprise systems have crafted what they claim to be “best practices.” Best practices represent a powerful reason to adopt enterprise systems without modifying them because few organizations claim to have redesigned all their business processes for cross-functional efficiency and effectiveness - which was the stated purpose of business process reengineering (Hammer, 1990). But to realize the advantages of the best practices embedded in enterprise systems, most adopting organizations must commit themselves to some degree of business process reengineering (Markus and Tanis, 2000). But there is general consensus that business process change adds considerably to the expense and risk of the implementation of enterprise systems. The principal reason is the difficulty of managing large-scale human and organizational change. Some organizations rebel against the inflexibility of these imposed business practices; even when organizational leadership accepts the need for change, the process of implementing enterprise systems can involve considerable change in organizational structure, job design, work sequencing, training, and so on.

The organizations may acquire and interface the package to any number of “bolt-on” applications from third-party vendors for various tasks. Sometimes the adopting organization may turn to a third party that has integrated the enterprise package around the special needs of a particular industry segment. Finally, some organizations adopt a “best-of-breed” strategy in which they try to integrate several enterprise packages from different vendors, each designed to be the best fit in its class with the needs of the adopting organizations.

Even with those options mentioned above, misfit still an issue for most of the ERP system. Customization as another option for any kind of packaged software system (Lucas, Walton, & Ginzberg, 1988), it is particularly acute for ERP system. Because of the high level of integration and the attendant complexity, ERP customizations, which is defined as code change, can be especially intricate and therefore difficult and expensive (Hitt, Wu, & Zhou, 2002). While the initial implementation of customizations can require significant effort and resources, the cost implications deriving from future maintenance and upgrades of the ES solution are often the larger part (Ng, Gable, & Chan, 2003).

Customization is overwhelming for most of the companies as the complex of ERP system itself, difficulty of customization because of the technique and tools for customization is still evolving, lack of capability of the ERP consultant to handle the customization. Customization has been taken as one critical success factor for ERP implementation, and in the meantime, explained for many case of implementation failure. The unpredictability and unforeseen longtime cost of customization is hindering the company from leverage the customization to benefit the company from strategic and tactical perspective.

3. Risk avoidance leads to insufficient customization

There are already “comment sense” that, customization should be avoid during ERP implementation. In spite of the potential strategic and tactical benefit customization may bring to the company, company still choose not to customize the ERP system, or do customization as less as possible.

Thus, we assume that, the companies is trying to avoid customization intentionally when the vendor or consultants don’t support the idea of customization, especially when the project manager is under time and budget pressure, which is always the case, most companies experienced customization deficiency (under customization) other than over customization as some literature stated. This research is going to verify this and check if the perception of ERP users have on the customization is positive or negative. How much customization the ERP users expect to be beneficial and how it will led to acceptance of ERP system, or intention to use the system.

There are research (Alzoubi, 2016) in the ERP acceptance domain that, respondent with difference age, gender, experience and position could have different perspective on the ERP acceptance. As age and gender are widely discussed in other technology acceptance, we are not going to investigate on these because of time limitation. But positon and experience is of interest to our research. As in ERP implementation, decision maker or the project manager may more concern about the time and budget, and may more care about the negative part of customization. Experience is of interest to us as well. In UTAUT model, the influence of the performance expectancy, effort expectancy and social influence are stronger in the early stages of experience, which may conflict with our understanding that, more experienced users could have deeper understanding on customization and its strategic and tactical benefit, even may have more understanding about the feasibility of customization, so, respondents with more experience may have stronger intention to use.

4. Customization level influence performance & effort expectancy

Strategic customization has been proved to be positively correlated to performance. To keep the competence of the company, ERP system should be unique and be able to support company strategy. Consistency customization is able to improve the users' effectivity and efficiency, and it may lead to higher acceptance of system.

To check the relationship between customization and the intention of ERP usage, we employed the UATAU model, which has been approved to be a classical model in information technology, and extension of this model, we can bridge the gap between customization and ERP system acceptance, and behavioral intention. Performance expectancy, effort expectancy and social influence directly positive related to behavioral intention. And as customization has great potential positively relationship to performance and effectiveness, we are able to approve that, the customization is positively related to ERP system intention. Instead of listening to the ERP vendor's propaganda that, customization should always be avoided because of the cases that, over customization will lead to ERP implementation failure, we can encourage the company objectively evaluate the gap between the limited system functionality and the desired business process from strategic and tactical perspective, and help them to make right decision on the customization.

5. Ease of customization as a critical factor for customization choice

While persuading the customer or the users to give up the customization, vendors, implementation partners, and IS managers have realized the problems associated with customization and have worked to devise approaches to make customizations more manageable and less costly. This includes more strident admonitions to change business processes rather than customizing the ES (Brehm, Heinzl, & Markus, 2001; Millman, 2004; Pereira, 1999; Stedman,1998), as well as developing industry specific templates (Huber, et al., 2000) and providing new tools and technologies that support customizations (Scheer & Habermann, 2000) and the integration of ES with other systems (e.g., Web Services) (Huvar & Mattern, 2003).

ERP is a complex system, customization is even more challenge as it require the ERP system’s capability to support the customization without change the system standard, or manage the change to system standard in an appropriate way to avoid or reduce future upgrade and maintenance effort, and the risk of losing support from the vendor.

To understand the complexity of customization need to clarify on the conception of the customization, and also, understand the technology behind customization would be helpful to address some critical issues related to customization, especially in ERP implementation, when budget and timeline is of significant importance to the project manager.

In literature review, we found that, there is no unified concept for customization, some of them mixed the configuration with customization, and some of them treat customization equally with change to the ERP standard. For example, in SAP, customization is more synonyms to configuration, beside of this, there are quite a few definitions used to describe different level of customization (code change), customer exit, user exit, enhancement, and change to SAP standard. We are going to have a glimpse on these, and may help the ERP customization decision maker understand, most of the customization requirements are manageable. If there are sufficient gap analysis, time and budget preparation, customization is feasible, higher performance and user acceptance could be achieved.

6. Summary

Nowadays, the researcher wants to be able to measure the nature and extent of package tailoring as an independent variable that predicts or explains success. Practitioners want to know how much and what kinds of tailoring pose a threat to project success. At present, however, the literature makes only the most basic distinction between ERP packages that have merely been "configured" and ERP packages that have been "modified" (Davenport, 1998; Martin et al., 1998). (Soh et al., 2000) is an exception.

We are going to fill the gap, try to identify if the characters of customization impact the ERP acceptance or behavioral intention to use the system, and check if the Customization Level (CL) and Ease of Customization (CE) directly influence Performance Expectancy (PE), Effort Expectancy (EE), and/or Social Influence (SI) in extended UTAUT model.

0.3. Problematic of the research

Researchers have reported that many organizations have been unable successfully to extend and utilize their ERP systems to achieve success (Peng & Nunes, 2009; Zhu et al., 2010). Caruso (2009) argued that employees play a key role in the success of any organization; therefore, it is critical to identify and understand factors that largely impact users in an ERP system environment.

The success of an ERP system is assured when there is a perfect fit between the ERP system and the organizational processes it supports (Holland & Light, 1999; Robey, Ross, & Boudreau, 2002). The significance of ERP systems is that they are packaged software solutions rather than customized systems.

Several studies have demonstrated that the implementation of ERP systems requires the examination of many business processes and it is vital for the company's processes to be accurately aligned with those of the ERP system if the full benefits are to be realized (Redouane et al., 2006). This clearly indicates the need for carefully carrying out the customization during ERP implementation. Business process reengineering (BPR) is not merely the adaptation of an ERP system or the business processes of an organization, it is changing the way of an organization works and the process-orientated vision that the organization needs to integrate.

The use of new technology, especially when the technology is intended to replace a legacy system is considered a tedious task. Salim, Suleiman, and Salisu (2015) asserted that the introduction of new technology is fraught with problems that are often linked to inadequate requirements, end-user resistance to adapting to a new technology, and lack of management support. Ramdani

(2012) noted that the question of the ERP system's value to the end users has been a key issue in many organizations. According to Koch (2011), ERP users can influence the success or failure of the ERP system. Peslak and Boyle (2010) suggested that users play an important role in achieving success in an ERP environment. Despite the large body of literature on ERP systems, there is a need to investigate the ERP system's success from the end users' perspectives (Kwak et al., 2012).

The importance of identifying the key factors that determine the IS success at the individual level is necessary for ERP success in the workplace, in different cultures. According to Hatamizadeh and Aliyev (2011), ERP systems have been widely used by organizations in developed regions. Regions such as Asia are moving toward implementing ERP systems and are in need of better understanding of the key factors behind ERP success. According to Zaglago et al. (2013), factors that influence ERP success have not been widely studied in the context of regions other than developed regions.

According to Soja and Paliwoda-Pękosz (2013), the process of information systems (IS) acceptance in developing countries is associated with different considerations as compared with acceptance observed in developed countries. In particular, IS projects conducted in developing countries struggle with lack of experience, inadequate infrastructure, and lack of strategic planning. According to Kujala (2008), despite the huge investments in ERP systems, ERP failures have been noted in many organizations. It is obvious that the benefits of ERP systems depend partially on how they are perceived by end users.

Research question

In the light of previous research, it seems interesting to analyze if and how the customization will influence the ERP users' acceptance or behavior intention in China market. To achieve that, we tried to link customization to UTAUT model, extended it using two new variables: customization level (CL) and ease of customization (CE) and try to use this new framework to answer the questions about the nature and significance of ERP customization.

This has led us to examine on an important issue, which can be formulated as follow:

To what extent the customization level can improve the behavior intention?

As discussed, to avoid the risk in ERP implementation, companies may decide to do customization as less as possible, but from the users' perspective, the questions are:

Had the companies done sufficient customization in China?

Is over customization really a problem in ERP implementation in China?

Based on the model of UTAUT, researches have already identified that, three variable, performance expectancy (PE), effort expectancy (EE) and social influence (SI) have direct and positive influence on behavioral intention (BI), and we will check and try to answer three sub-questions:

To what extent the customization level can improve the performance expectancy?

To what extent the customization level can improve the effort expectancy?

To what extent the customization level can improve the social influence?

As the complexity and difficulty of customization could hinder the decision to do customization, it is necessary to check how the ease of customization will influence the performance and effort expectancy.

To what extent the ease of customization can improve the performance expectancy? Is direct effect, or through customization level?

To what extent the ease of customization can improve the effort expectancy? Is direct effect, or through customization level?

To what extent the ease of customization can improve the effort expectancy? Is direct effect, or through customization level?

Demonstrated by existing literatures, demographic information could influence the effect of the variables on behavioral intention. We are interested in position and experience, and have two questions on it:

Will the user with different position (decision maker or general user) have different perception on the customization's influence?

Will the user with different level of ERP experience have different perception on customization?

The thesis is trying to answer these questions, aim at verifying the models by extending the UTAUT model and explores the path the customization impact on the technology adoption activity, help the managers to understand the drivers of acceptance in order to proactively decide on the customization adoption and provides opportunity to improve the likelihood of success for new technology introductions. And also initiate the topic on the desired-customization, which may benefit for further study and business applications.

To show how we will articulate these concepts in a model of integrative research, we will introduce in the next section, the structure of our thesis, with the various chapters which present the steps that we have carried out to respond to our research questions and ensure the reliability and validity of our empirical results.

0.4. Organization of the thesis

0.4.1. Chapter 1: Theory of TAM & UTAUT

Success outcome of ERP implementation is defined as a multidimensional concept, a dynamic concept, and a relative one. Aladwani (2001) stated that many ERP systems faced implementation difficulties because of end users' resistance. So it is critical for organizations to understand the important variables to enhance the use of ERP among the end users since the resulting cost to the organization is tremendous (Keong, et.al 2012). Yi and Davis (2001) also noted that organizations will not realize desired returns on their investments in information technologies designed to improve decision-making unless users are able to use them (Amoako-Gyampah, 2007).

In this chapter, we will review user acceptance literature and discuss five prominent models, compare and the unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT) will be adopted as main research framework, as it's appropriate of application in information technology and mandatory enterprise use environment.

0.4.2. Chapter 2: The theory of customization

First of all, in this chapter we are going to clarify on the concept of customization in our research, and compare customization with configuration and change to ERP standard. By demonstration on SAP's definition of customization, enhancement and change to SAP standard, we understand that, there are variance in the definition of customization in ERP research domain, and there are comprehensive tools and technology available for customization. The major concern for customization is that, normally vendor don't provide support for the change to ERP standard, via clarification on the concept of customization, we can comprehend that it is not necessarily to change the ERP standard, even it is complicated, there are kinds of sophisticated and evolving way to handle customization, and problem for future maintenance may not always happen, and extra cost and other risk could be avoided.

Since ERP system involves a standardized view on how a business operates and at the same time each business performs its operations uniquely, it is inevitable to involve customization in ERP implementation. From strategic perspective, a competitive advantage cannot be derived solely from a noncustomized, "out-of-the-box" packaged ERP solution, and customization is a must.

However, there are various risks in information system projects, financial, technical, functionality, project and political. Vendors and consultants are keener on helping the project manager to meet the budget and time target than to reap more benefit for business performance. Thus, we assume that customization usually had been avoided, and insufficient customization are more common than over customization, even there are propaganda by ERP vendors that, over customization is an issue in ERP implementation. To further discuss on this assumption, we are going to review more literatures on the decision on how much customization have been chosen, and if there are desired customization exist. To support this, we will compare the two types of customization, strategic and consistency customization, and present how the researchers suggested to employ this criteria to evaluate the desired customization.

ERP is a complex system, customization is even more challenge. Nowadays, ease of customization will help the company to reduce the cost and risk to conduct right level of customization. Vendors, implementation partners, and IS managers have realized the problems associated with customization and have worked to devise approaches to make customizations more manageable and less costly. New tools and technologies that support customizations (Scheer & Habermann, 2000) have been developed, and it is going to change the view on customization, and encourage the companies to focus more on business benefit from strategic and long term point of view, instead of employ work around or even worse, to change the business process to fit in the ERP system.

As discussed, there are different perspective of ERP success, but more dominant one from the project manager point of view is to make the budget under control and project go live on time. It is influencing their decision on customization. Reviewing on exiting literatures, experience is a moderator for ERP acceptance, we discussed the different result of experience influence on expectancy, and present the conflict that, respondents with lower experience could have stronger expectancy on the performance, effect and social influence, however, as understand, there are confusion on the concept and how customization is related to business objective, ERP customization may too complex to be understood and accepted by person with less experience, they may have lower expectancy on customization influence. Another moderator in the existing literature involved in ERP system acceptance is position, we will discuss on it and check if the decision maker or managers in ERP implementation have weaker intention to do customization because they have more concern that, more customization could impact their project objective of budget and time.

0.4.3. Chapter 3: Model search

In light of the technology acceptance models and the concept of customization, we are going to propose our hypothesis, and develop the research model with assumptions associated. To make our research more effective, we are going to build our model based on the UTAUT framework, because of its comprehensiveness and experience from our research who have employed and extended the UTAUT models.

ERP adoption is an innovation and a complexity excise. Many obstacles faced in ERP implementation, among them, user's acceptance of the new system is a major problem. Two approaches (variance theory and process theory) are commonly used in the literature for study of organizational behavior. Process theory, which are employed to identify ERP stages or phases with considering the events and behaviors, seems helpful to understand when the issues e.g. users' acceptance could happened and how importance the resistance from the users could damper the ERP adoption. We also use the "ERP Systems Experience Cycle" framework to demo the different levels of business transformation, its related potential performance improvement which is a link between the acceptance of ERP system and the potential performance expectancy.

Based on the model combined by customization with UTAUT, and hypothesis will be presented for further empirical research.

0.4.4. Chapter 4: Paradigms, discipline and research design

In the previous chapter, we developed a model of research integrator of the UTAUT with customization. This chapter we will discusses on the one hand, the methodology used to study the assumptions made in the preceding chapter and, on the other hand, the methods of analysis of the results to test and validate our model.

There are three main stages of our research, namely (1) the paradigms of scientific research and their use in the discipline of the information system acceptance, (2) the paradigmatic positioning of our research, and finally (3) the design of our research. To do that, we will start by reviewing the different paradigms in the social sciences namely positivism, post-positivism and critical theory that derives from as well as the constructivism. In order to better understand these paradigmatic currents, we will present their characteristics ontological, epistemological and methodological, relating to the first two characteristics, in order to have a global vision on the nature of reality, the basis of knowledge, the relationship of the researcher at the time with reality, and with its object of research, and finally the way in which it is going to guarantee the scientific nature of the knowledge. This will allow us to justify in a second part our way of designing the reality, in other words our ontological orientation, our epistemological positioning, and the methodology that derived. In the third part, we will present, with more detail, our process of methodological research. After that, we will present the theoretical design of our research model and the approach taken to test and validate our theoretical model. To do this, we will discuss our choice of web survey method and the target population, the sampling method, the design of the questionnaire and the mechanisms of its administration, as well as the methods of analysis of empirical data that we have deployed, namely, a statistical analysis univariate and multivariate results. Exploratory factor analysis (EFA) will be introduced to identify the underlying relationships between the measured variables, and principle component analysis (PCA) performed as a method of extraction for a maximal amount of variance for the observed variable. After that, validity and reliability of our scales of measurement, the structural model and our assumptions will be validated using Confirmatory factor analysis (CFA) and Partial Least Square – Structure Equitation Model (PLS-SEM) with SmartPLS.

0.4.5. Chapter 5: Model & data analysis, results

In this chapter, we assessed the unidimensionality, validity and reliability of the measurement model, and tested the hypothesis using SmartPLS PLS-SEM analysis.

Prior to beginning any analysis, we validated the data for completeness and accuracy. There is no data missing and very few straight lining issue, because we employed policy designed in the web survey items. We filtered out a few outliers using 3 times standard deviation as suggested. And checked the skewness and kurtosis and found it is within the acceptable level.

After all the data had been collected and validated for completeness, several analysis techniques were used to analyze the data for the research study. All survey items had been validated using factor analysis through exploratory factor analysis (EFA) to determine whether items in the survey represent a specific construct. And then Confirmatory Factor Analysis (CFA) and Partial Leased Squares-Structural Equation Modeling (PLS-SEM) were used for this research and the details explaining this justification are listed in the next section.

Using SPSS, an assessment of the measurement model was performed through principal component analysis (PCA). The factor rotations, based on an eigenvalue on 1 or scree plots, were satisfactory. 5 factors identified in the initial PCA extraction, and the last component with eigenvalue 0.991, it is close to 1, so instead of relying on the eigenvalue or scree plots approach, six factors were specified a priori for the factor rotations, in line with the six reflectively measured constructs of the study's theoretical framework. And then we identified all the scales have loading higher than 7 on their main structure, except two scales. We deleted the items and confirmed that after they had been deleted, both the VAE and the content validity.

After that, relied on SmartPLS (Ringle et al., 2005), we used CFA to check the factor loading, internal consistency, indicator reliability, and convergent and discriminant validity were analyzed, and we found they are all satisfactory.

For the structural model, the following assessment were processed: assess the model for collinearity issues, there was no issues in structures collinearity, access the significance and relevance of the relationships, assess the level of R^2 value, assess the *f* effect size, and assess the predictive relevance of Q^2 and the q^2 effect sizes. And found the two latent variable, ease of customization and customization level have signification positive influence on ERP use behavioral intention. And then, we split the samples into two groups separately by position and ERP experience, and employed the SmartPLS MGA group analysis to check the effects of the two moderators. And we concluded that, there were 15 proposed hypothesis, 12 hypothesis were supported, two hypothesis related to effect of customization level on social influence and one related to ease of customization related to effort expectancy are not supported.

0.4.6. Chapter 6: Discussion of research

This chapter has for objective the discussion of the results of our analysis that we have presented in the previous chapter. First we re-emphasize the constraints facing to collect the data, and all the measures taken for the purification of our measurement scales. And how we leverage the benefit of survey tool to improve the quality of response, and the data collected. After the valid samples being confirmed, we checked the required sample size, and assure that, we have collected sufficient response to guarantee our research.

Secondly, we assessed the unidimensionality of the measurement model, and checked if the adopted survey instrument offers an efficient means of collecting data to test hypothetical relationships. We found that, the scales for 4 latent variables adopted from UTAUT, and the items adopted for measuring ease of customization and customization level are all valid and reliable.

Then based on the data analysis using SmartPLS PLS-SEM, we discussed the result of hypothesis and the theoretical relevance. And found that, the general hypothesis is supported, and approved our assumption that, companies were faced with risk and challenges in ERP project implementation, the decision maker preferred not to do customization or tried to avoid more customization, and it resulted in the normal users had perception that, there are more customizations needed to strengthen their ERP acceptance or the behavioral intention to use the system. As shown in the analysis, 12 out of 15 hypothesis were supported, and for the 3 hypothesis which were not supported by the data, we had a try to explain the variance and found they are explainable as well. It proved our models theoretical relevance.

0.4.7. Chapter 7: General conclusion

This chapter provides an overall summation of the findings, contribution to research, limitations, future research and finally a conclusion to the research study. The purpose of this research study was to identify if customization is one of the key determinants of ERP acceptance, and tried to answer the questions raised in the beginning of the research.

Part I

CHAPTER 1 THEORY OF TAM & UTAUT

1.0. Introduction

In view of the complexity of implementation and cross functional nature, implementing ERP in an organization is not an easy task and does not always prove successful (Scott and Vessey, 2002; Ramayah et al., 2007). Seymour et al. (2007) mentioned that approximately 50 percent of all ERP implementations fail to meet the adopting organizations' expectations and this is supported by Jasperson et al. (2005). In 1996, foxmeyer Drug, a$5 billion wholesale drug distribution company, argued that one of the major problems that led to their bankruptcy was due to a failed ERP system (Scott and Vessey, 2002).

As such, it is critical for organizations to understand the important variables to enhance the use of ERP among the end users since the resulting cost to the organization is tremendous (Keong, et.al 2012). Aladwani (2001) stated that many ERP systems faced implementation difficulties because of end users' resistance. Yi and Davis (2001) also noted that organizations will not realize desired returns on their investments in information technologies designed to improve decision-making unless users are able to use them (Amoako-Gyampah, 2007). Cooke and Peterson (1998), reported that 186 companies that implemented large systems found that resistance is the second most important contributor to time and budget overruns and is the fourth most important barrier to implementation (Klaus et al., 2007). Hence, it is important for organization's to identify factors that would enhance user's acceptance of ERP system.

This research aims to examine the influence of selected factors (customization) on end-user's usage of ERP systems. The aim of this paper is to check if we can evaluate the roles of customization use existing theoretical models in ERP implementation and facilitate organizations in diagnosing if customization can be helpful in achieving the expected objective.

In academic terms, success outcome of ERP implementation is defined as a multidimensional concept, a dynamic concept, and a relative one (to the concept of “optimal success,” representing the best an organization can hope to achieve with enterprise systems).

As the KPMG quotation suggests, one can define success in terms of the implementation project (did the company succeed in getting the system up and running within some reasonable budget and schedule?) or in terms of business results (did the company succeed in realizing its business goals for the project?). Success can look very different when examined at different points in time, on different dimensions, or from different points of view (Larsen & Myers, 1997). Instead, enterprise systems adopting organizations require a “balanced scorecard” of success metrics addressing different dimensions (financial, technical, human) at different points in time. Based on observations of enterprise systems projects, a minimum set of success metrics includes the following:

• Project Metrics. Performance of the enterprise system project team against planned schedule, budget, and functional scope. These are the classic performance measures applied to project managers.

• Early Operational Metrics. How business operations perform in the period after the system becomes operational until “normal operation” is achieved. Specifically, these metrics include some normally used to track the business as well as some unique to enterprise systems. When the business performs very poorly during the shakedown phase, the organization may lose business, sometimes permanently, when the organization has yet to experience any major benefits to offset the large up-front investment. Exceedingly poor performance can lead to internal or external pressures to disinstall the system and in extreme cases can tip the organization into bankruptcy, as happened to Fox-Meyer Drug (Bulkeley, 1996).

• Longer-Term Business Results. How the organization performs at various times after normal business operation has been achieved. Examples of relevant metrics include return on investment, achievement of qualitative goals such as "one face to the customer," better management decision making attributable to higher-quality data, continuous improvement of business metrics after operations return to normal, maintenance of internal enterprise system competence (among both IT specialists and end users), ease of upgrading to later versions of the enterprise system software, and so on. Multidimensional and relative Success (or failure) of enterprise systems is not a monolithic concept. Rather, it is multidimensional and relative. It is relative, first, to the time at which it is assessed. Some companies with disastrous project and shakedown metrics but high levels of subsequent business benefits from enterprise systems. Conversely, companies with acceptable project and shakedown metrics that could not identify business benefits from installing the system. Similarly, an enterprise system that gives competitive advantage today may not do so tomorrow when competitors catch up and having such a system becomes a cost of doing business (McKenney et al., 1995).

• Relative goal, success is often judged relative to the organization's unique goals for the system. Two organizations with identical improvements in inventory carrying costs can be judged successful in different ways if the one's goals were to replace its legacy systems (more successful than expected) and the others were to achieve an increase in market share (less successful than expected). At the same time, the company's goals, taken alone, make a poor standard against which to judge success. First, the company's goals may be insufficiently ambitious if they are compared to the inherent capabilities of enterprise systems and how well the organization needs to perform given its competitive position. For example, a company that is losing market share because it cannot promise delivery on a global basis would be "leaving money on the table" if it adopted an enterprise system solely to solve the Y2K problem and implemented it so that available-to-promise capability was not possible.36 For another example, highly decentralized businesses may achieve less than is theoretically possible with enterprise systems if they configure the software so that each product business unit presents its own separate face to the customer. Conversely, the success of a company that achieved more with an enterprise system than it expected at the outset should be judged against a higher standard of performance than its unambitious goals. It might better be judged against the average business benefits realized by similar firms in its industry.

• Optimal success. To accommodate the multidimensionality and relativity of enterprise system success from the adopting organization's perspective, a standard of optimal success was defined, which refers to the best outcomes the organization could achieve with enterprise systems, given its business situation, measured against a portfolio of project, early operational, and longer-term business results metrics. Optimal success can be far more or less than the organization's goals for an enterprise system. Furthermore, optimal success can be dynamic; what is possible for an organization to achieve may change over time as business conditions change. What the framework to help predict or explain is an organization's actual achievement of an enterprise system's success (a scorecard of measures, assessed relative to optimal success—the best possible outcome). Organizations do not usually set out to achieve optimal success with information technologies; and optimal success is a theoretical abstraction that may be neither achievable in practice nor measurable in empirical research. Nevertheless, the concept is theoretically useful because it "factors in" unintended positive and negative consequences of enterprise system adoption and organizational realities that are not fully reflected in the organization's enterprise system goals.

An accepted classification scheme (Markus & Robey, 1988), derived from (Kling, 1980) parses academic theories of IT-related outcomes into rational actor, external control, and emergent process theories. Rational actor theories emphasize the great, but bounded, ability of organizations and decision makers to realize their goals. An example of such a theory is the technology acceptance model (Davis, Bagozzi, & Warshaw, 1989), which includes the factors that enter into an individual's choice of technology for particular tasks when faced with alternatives. On the plus side, rational actor theories highlight peoples' motivations and the actions they take to achieve their goals. Therefore, these theories tend to be very appealing to practitioners. A drawback of rational actor theories is that they downplay influential forces beyond the decision maker's control; furthermore, these theories accept managers' goals as givens without questioning their suitability relative to external constraints.

The second type of theory, external control theory, emphasizes the inexorable environmental forces. A strength of external control theories is their explicit acknowledgment that organizations and people have less than perfect ability to make their goals a reality; on the downside, they minimize the ability of exceptional people and companies to change the world.

The third type of theory, emergent process, emphasizes the often unpredictable interactions between people in organizations and the environment. Example of an emergent process theory in the IS field is structuration theory (Orlikowski & Robey, 1991). A strength of emergent process theories is that they account for mutual influences between the organization and its environment. Weaknesses include their greater explanatory than predictive power and the prominent role they assign to chance: Decision makers prefer prescriptive models that favor skill more than luck and that promise successful outcomes to those who follow the rules.

Because emergent process theories combine goals and actions with external forces and chance, this theoretical structure was chosen for modeling the enterprise system experience.

A particular emergent process theory designed by Soh and Markus (1995) to explain how information technology creates (or fails to create) business value. This theory contributes three key points to an understanding of the success of enterprise systems. First, it argues that the necessary conditions for a successful outcome (in their model, high-quality information technology "assets") are not always sufficient for success. Occasionally, an IT investment on track for success is derailed by an external event (e.g., competitors' responses) or changing external conditions (e.g., recession). Chance and randomness can play an important role in the outcomes achieved.

Second, the Soh and Markus (1995) framework describes the “IT investment to business value” process as a series of three linked models that correspond to the phases of a typical IT investment, roughly speaking, system development, implementation, and ongoing operation.

Third, the Soh and Markus (1995) framework (Figure 1) explains the outcomes of each phase as resulting from interactions between external conditions and the activities that characterize the phase.

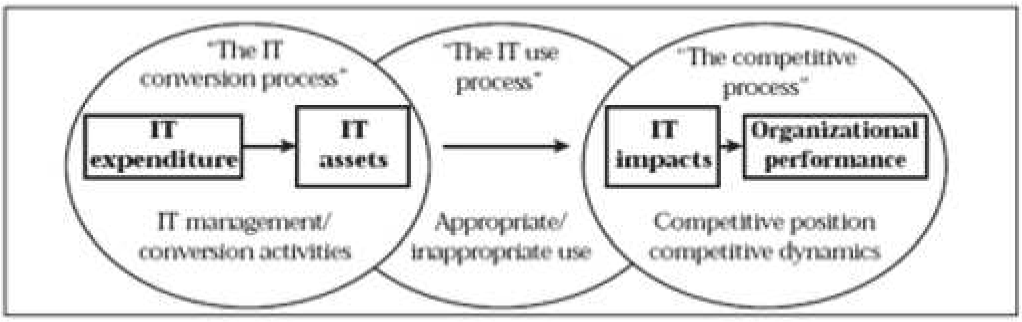


Figure 1. Soh and Markus (1995) Model

1.1. TAM or The theory of technology acceptance

The technology acceptance model TAM (Technology Acceptance Model) Davis (1989) (Figure 2)

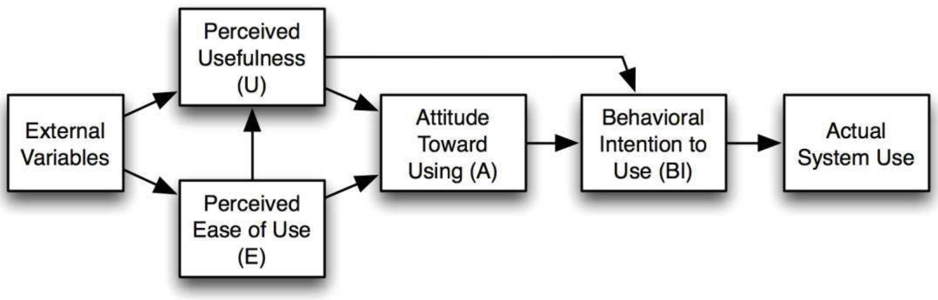


Figure 2. The Technology Acceptance Model, version 1. (Davis 1989)

The Technology Acceptance Model (TAM) is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably:

According to Lee et al. (2003), technology acceptance model (TAM) is one of the most influential models used in explaining the acceptance of information technology (IT). Davis (1989) and Davis et al. (1989) developed TAM by looking into the perceived usefulness (PU) and perceived ease of use (PEU), which comprise of two major determinants of IT usage. PU is defined as the extent to which a person believes that using the system will enhance his or her job performance and PEU is defined as the extent to which a person believes that using the system will be free of effort. TAM states that computer usage is determined by behavioral intention to use a system, where the intention to use the system is jointly determined by a person’s attitude toward using the system and its perceived usefulness. According to Davis et al. (1989), as learning progressed over time, the concern on perceived ease of use is less salient.

The underlying theory behind TAM is its usage is voluntarily, however, in order to successfully implement ERP, TAM’s usage must be mandatory throughout the organization. This is necessary since the system integrates data to produce organizational reports which are useful for managers and these reports would not be useful if only some departments used the system while others do not (Klaus et al., 2007). In a comparison of five theoretical models on theory of acceptance, Riemenschneider et al. (2002) found that apart from usefulness (significant across five models), subjective norm, voluntariness and compatibility were found to be significant determinants of end user acceptance.

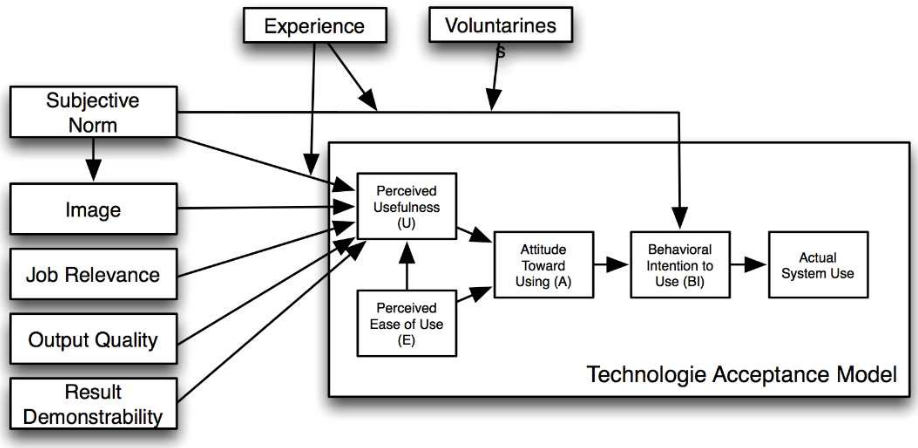


Figure 3. TAM 2 (Venkatesh & Davis 2000 & Venkatesh 2000)

The TAM has been continuously studied and expanded, the two major upgrades being the TAM 2 (Venkatesh & Davis, 2000 & Venkatesh, 2000) (Figure 3) and the Unified Theory of Acceptance and Use of Technology or UTAUT, (Venkatesh et al., 2003).

A TAM 3 (Figure 4) has also been proposed in the context of e-commerce with an inclusion of the effects of trust and perceived risk on system use. (Venkatesh & Bala 2008)

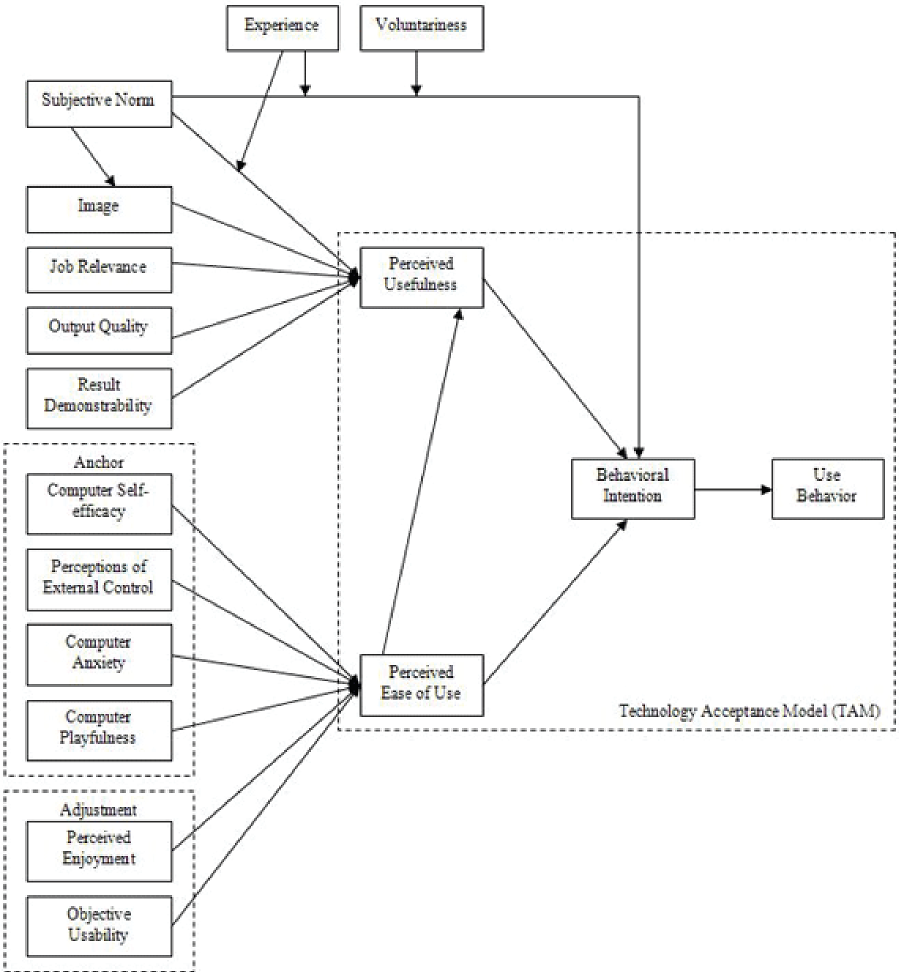


Figure 4. Technology Acceptance Model 3 (TAM3)

1.2. TRA or Theory of Reasoned Action

TRA is proposed by Fishbein and Ajzen (1975) theory in social psychology, which defines the relationship between beliefs, attitudes, norms, intentions and behavior. According to this theory, an individual's behavior (e.g. use or reject technology) is determined by the intention of the person to achieve this behavior, and this intention is influenced both by the attitudes of the individual and his subjective standard (that is to say the person perception that most people who are important to her think she should (or should not) perform the behavior in question). Here, attitudes towards a behavior are expected to be determined by beliefs about the consequences of this behavior and emotional evaluation of these consequences. This approach suggests that external stimuli influence attitudes as through changes in the structure of beliefs of the person (see Figure 5). However, the attitudes alone are not sufficient to determine behavioral intentions. They are also determined by the standards subjective, which in turn are determined by normative beliefs of individuals and their motivation to comply with perceived norms. All this leads to a generalized model for understand the determinants of human behavior in situations where individuals are forced to make choices. This model was used to make accurate

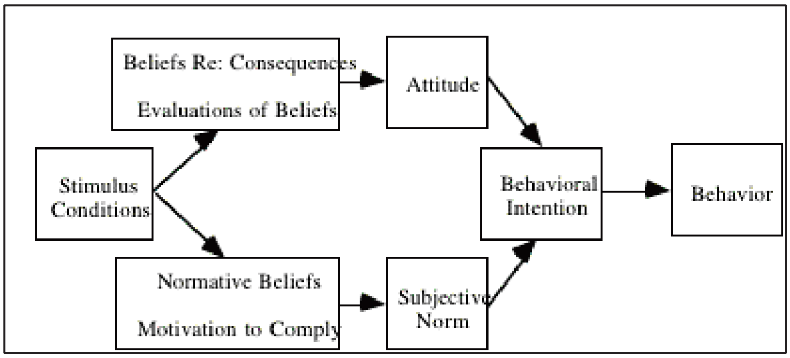


Figure 5. Theory of Reasoned Action TRA (Fishbein and Ajzen, 1975)

predictions of choice humans as diverse as voting in elections situations, (Hartwick and Warshaw, 1988) conducted a meta-analysis of the TRA and concluded she was exceptionally strong and had a strong predictive utility, even when used in situations and activities that are outside of the context for which it was thought. This theory was then extended through the Theory of Planned Behavior (TPB) which involves an additional factor: the perceived behavioral control during exercise.

1.4. TPB or Theory of Planned Behavior

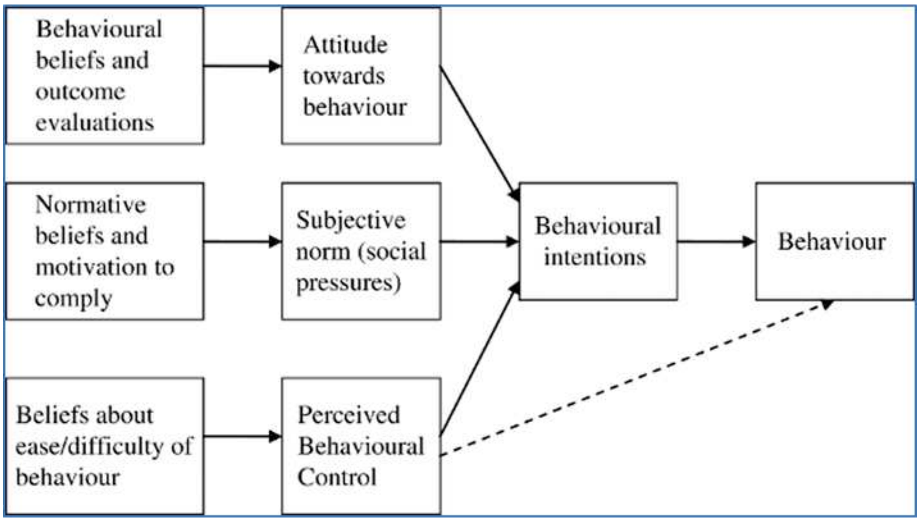


Figure 6. Theory of Planned Behavior, according to Ajzen (1991)

Descendant of TRA theory which postulates a third antecedent behavioral intention: perceived behavioral control. This is determined by several parameters, including: 1) whether the individual has the skills necessary to achieve the expected behavior; 2) the fact that the individual has sufficient resources to achieve this behavior; 3) the fact that there are opportunities to achieve results expected and that the individual perceives the importance of these opportunities. Perceived control of behavior is seen as linked to the concept of self-efficacy proposed by Bandura (1997). According to TPB (Figure 6), attitudes, subjective norms and perceived control of behavior are direct determinants of behavioral intentions, which in turn influence behavior. Here, regarding the use of technology systems, utility perceived ease of use and perceived are considered antecedents of attitudes (we see that the TAM model is consistent with this). Furthermore, the influence of peers and supervisors would be a history of subjective norm. Finally, the authors of this theory considers the perceived self-efficacy, conditions where resources are facilitators and conditions where the technology facilitator as determinants of perceived control of behavior.

1.5. TIB or The theory of interpersonal behavior

Triandis (1980) proposed a model (Figure 7), which aims integrator behavior interpersonal. As part of his theory, the author emphasizes the key role played by factors social and emotional in the construction of behavioral intentions. Consideration emotions in such a model to predict behavior is relatively precursor time. Another significant contribution to the Triandis theory is the introduction of the concept habits. The author suggests that past behavior plays an important role on the achievement behaviors present. And he adds that habits also play a crucial role in actual behavior. In contexts where the habit had a lot of weight in behavioral decision, the intentions would be less (or even tend towards zero) and variables related to attitudes play no role in behavioral prediction (Landis, Triandis and Adamopoulos, 1978). If a behavior in a context given never appeared in the history of the person, then the behavioral decision would indeed, under the control of the behavioral intention. Thus, according to the model of Triandis in any situation, behavior depends in part: intentions, situational constraints, physical and environmental conditions. Furthermore, intentions are influenced by social factors, emotional factors and rational deliberations (which refers to the value placed on the perceived consequences).

It suggests that Triandis emotional response to a decision must be regarded as distinct from an assessment rational instrumental consequences of behavior. And these emotional responses include, according to the author, emotional responses to positive valence as answers

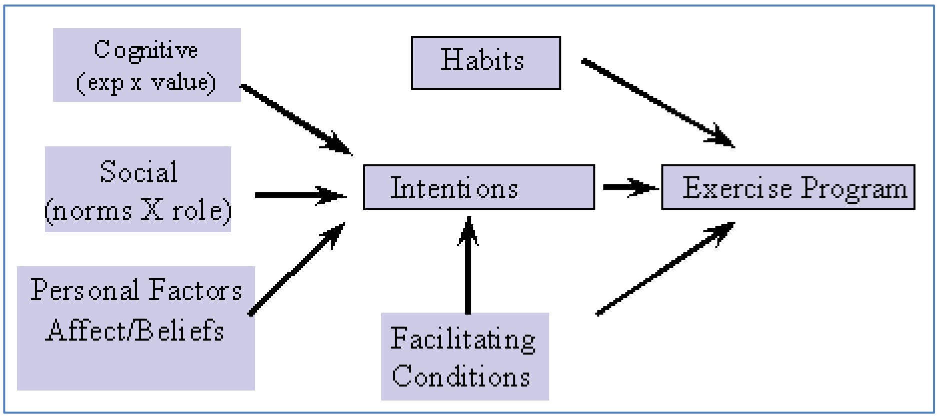


Figure 7. The theory of interpersonal behavior (Triandis, 1980)

negative emotional valence and different powers. Triandis adds that emotions contribute to a more or less unconscious. Among the models of behavioral decision that emerged subsequently in the field of the use of information systems, some based on the proposal yet rich and relevant. This can be explained by the problems to operationalize the Triandis model. Many of the models related to the decision to use systems information such as the technology acceptance model (TAM) Davis (1989) are more focused on a few variables, "perception" type linked to the value given system. The models using intentions have marked the evolution of research is the TAM , the P3 (Power, Performance , Perceptions) of Dillon and Morris (1999) and the unified theory of acceptance and use of technology(or UTAUT) by Venkatesh and colleagues (Venkatesh et al., 2003).

1.6. UTAUT or the Unified Theory of Acceptance & Use of Technology

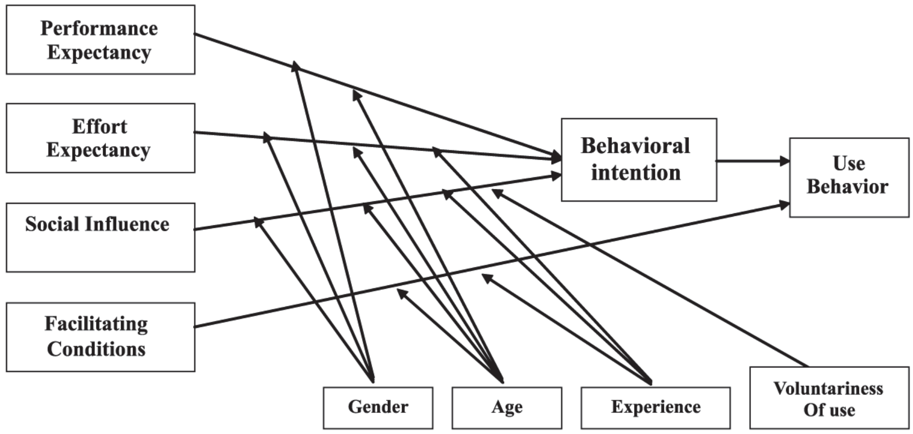


Figure 8. UTAUT model Venkatesh et al. (2003)

Venkatesh et al. (2003) proposed the unified theory of acceptance and use of technology (UTAUT) (Figure 8) as an alternative to TAM. The four key components in UTAUT are performance expectancy, effort expectancy, social influences, and facilitating conditions. Performance expectancy measures the degree to which a person believes that using the system could help improve his or her performance, and this construct is similar to the usefulness construct in the TAM model. Effort expectancy measures the degree to which a person believes the system will be easy to use and this is similar to the ease of use construct in the TAM model. Social influence measures the degree to which a person believes that others who he/she cares about feel that he/she should use the system. Facilitating conditions measures the degree to which a person believes that organizational assistance is there to facilitate the usage of the system. UTAUT also considers the moderating effect of four other factors such as gender, age, experience and voluntariness of usage (see Venkatesh et al., 2003). Thus, as an extension to TAM, UTAUT takes into consideration the factor of voluntariness of usage which plays an important factor in ERP implementation. When comparing UTAUT and Riemenschneider's (Riemenschneider et al., 2002) results from the comparison of five theory of technology acceptance models, apart from usefulness (performance expectancy), UTAUT addressed the rest of the other important variables: subjective norm (social influence), and voluntariness. In view of this, UTAUT model was adopted as the basis of this study. And also, Amoako-Gyampah and Salam (2004) further noted that it is appropriate to examine behavioral intention to use technology even when usage might be mandatory

Performance expectancy (perceived usefulness). In UTAUT, performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in a job (Venkatesh et al., 2003). This factor was derived from the perceived usefulness factor as proposed in TAM. As mentioned by Davis (1989), PU was significantly correlated with self-predicted current usage ($r = 0.63$) and self-predicted future usage ($r = 0.85$). A system that is high in PU is one that the user believes will reduce his or her task ambiguities and eventually increases work-related performance (Davis, 1989; Venkatesh and Davis, 2000; Amoako-Gyampah, 2007). As evidenced by a research of comparison of five theories later in year 2002, usefulness was still found to be a strong and highly significant determinant of technology usage (Riemenschneider et al., 2002; Lee, 2009; Schaupp et al., 2010). Further research in Malaysia by Ramayah and Lo (2007) suggested that PU was the more influential driver for predicting the intention to use an ERP system. The greater the PU in using the ERP system, the more likely it is that ERP system would be adopted (Venkatesh and Davis, 2000):

Effort expectancy (perceived ease of use). In UTAUT, effort expectancy is defined as the degree of ease associated with the use of the system. According to Venkatesh et al. (2003), this factor was derived from the perceived ease of use factor as proposed in TAM. Davis (1989) found that an application perceived by people which is easier to use is more likely to be acceptable. In a similar finding by Davis et al. (1989), effort-oriented constructs are expected to be more salient in the early stages of a new behavior, when process issues represent hurdles to be overcome, and later become overshadowed by instrumentality concerns. This is consistent with previous findings by Davis (1989), Davis et al. (1989), Amoako-Gyampah and Salam (2004), Venkatesh and Davis(2000), and Ramayah and Lo (2007) who found that effort expectancy (PEU) influenced behavioral intention to use ERP system through influencing perceived usefulness.

Social influence. In UTAUT, social influence is defined as the degree to which an individual feels that it is important for others to believe he or she should use the new system. This factor is similar to the factor ‘‘subjective norm’’ as defined in TAM2, an extension of TAM (Venkatesh and Davis, 2000). In TAM2, subjective norm exerts a significant direct effect on usage intentions over and above perceived usefulness and perceived ease of use for mandatory systems. However, none of the social influence constructs are significant in voluntary contexts. (Venkatesh et al., 2003). As explained by Venkatesh et al. (2003), subjective norm significantly influences perceived usefulness via both internalization, in which people incorporate social influences into their own usefulness perceptions and identification, in which people use a system to gain status and influence within the work group and thereby improve their job performance, particularly in the early stages of experience. This normative pressure will attenuate over time as increasing experience provides a more instrumental (rather than social) basis for individual intention to use the system (Venkatesh et al., 2003; Lee, 2009; Schaupp et al., 2010).

Facilitating condition. In UTAUT, facilitating condition is defined as the degree to which an individual believes that organizational and technical infrastructure exists to support use of the system. Similar discussion can be found in model of personal computer utilization by Thompson et al. (1991) The underlying construct of facilitating condition is operationalized to include aspects of the technological and/or organizational environment that are designed to remove barriers to use (Venkatesh et al., 2003). The construct of facilitating condition is having the same goal with compatibility construct from perceived characteristics of innovating (PCI) which incorporates items that tap the fit between the individual's work style and the use of the system in the organization (Riemenschneider et al., 2002).

Gender. Venkatesh and Morris (2000) acknowledged that different gender gives a different impact on the use of any information system in both mandatory and voluntary settings. Venkatesh et al. (2003) noted that women tend to be more sensitive to others' opinions and therefore find social influence to be more salient when forming an intention to use new technology. Research on gender differences indicates that men tend to be highly task-oriented and, therefore, performance expectancies, which focus on task accomplishment, are likely to be especially salient to men (Venkatesh et al., 2003). In contrast, female end-users were observed to have higher levels of computer anxiety and their perceived ease of use tends to be lower than that of their male counterparts; women also weighted ease of use as a much more important determinant of behavioral intention than men (Venkatesh and Morris, 2000).

Venkatesh et al. (2003) identified gender as a moderating variable for the following relationship:

- Performance expectancy and system use;
- Effort expectancy and system use; and
- Social influence and system use.

Age. According to Venkatesh et al. (2003), research on job-related attitudes suggests that younger workers may place more importance on extrinsic rewards. Burton-Jones and Hubona (2006) found that age is a significant moderating factor between effort expectancy (PEU) and usage of the system but age was not a significant moderating factor between performance expectancy (PU) and system use. Generally, older end-users may find it hard to adapt to new system usage and effort expectancy (PEU) becomes an important factor on the impact of system usage. Thus, older workers shall have lower performance expectancy as they require more effort to learn the new ERP system and do not perceive that use of the system would increase their work performance.

Venkatesh et al. (2003) identified age as a moderating variable for the following relationship:

- Performance expectancy and system use;
- Effort expectancy and system use;
- Social influence and system use; and
- Facilitating conditions and system use.

Intention to use ERP system. Amoako-Gyampah and Salam (2004) opined that behavioral intention is the intention of end-users to make use of new technology. This is supported by Venkatesh and Davis (2000) as they found that there is a strong correlation between behavioral intention and actual behavior. This means end users who have high PU will use ERP when they believe that there is a positive user-performance relationship. Amoako-Gyampah and Salam (2004) further noted that it is appropriate to examine behavioral intention to use technology even when usage might be mandatory. Thus, when ERP usage is mandatory, end-users who have a low intention to use may reduce the frequency of system usage. As noted by Seymour et al. (2007), mandatory usage may represent the level of use needed to perform minimal job functions, and any usage beyond that will be voluntary.

1.7. Conclusion

In this chapter, we reviewed user acceptance literature and discuss five prominent models, compare and the unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT) will be adopted as main research framework, as it’s appropriate of application in information technology and mandatory enterprise use environment.

CHAPTER 2. THE THEORY OF ERP CUSTOMIZATION

2.0. Introduction

Customization is believed to be the critical success factor for ERP implementation (Markus & Tanis, 2000; Holland & Light, 1999; Van Everdingen, Hilergersberg, & Waarts, 2000; Hong & Kim, 2002). Hong and Kim (2002) assessed the impact of data, process, and user fit between ERP system and organizational requirements on implementation success. They found a positive correlation between the initial organizational fit and the implementation success. However, for most organizations such a fit can only be achieved through the mutual adaptation of the ERP systems and the organization processes (Lassila & Brancheau, 1999). Functionality and reliability of packaged software depend solely on the degree of customization.

Customization in this paper refers interfaces or for system modification. The reason for only using these types of customization is that historically, these types of customization require the most upkeep, and will have the biggest impact on strategic alignment and system agility. Also, interfaces and modifications are both "code" change type customization, meaning that a certain amount of custom programming is required to achieve this type of customization. Modifications (Davis, 2005) are code changes that the vendor does not support. This notion of "code changes" as a particular and influential form of customization is supported by other academic studies (Gattiker and Goodhue, 2004) as well as by practitioner journals.

ERP systems introduce large-scale change that can cause resistance, confusion, redundancies, and errors if not managed effectively. An issue with packaged software is the potential for incompatibility with the organization's needs and business processes. The literature suggests that improvements in organizational performance requires the restructuring of organizational business processes to fit the software: indeed, business process reengineering (BPR) plays a particularly crucial role in the early stages of implementation, from initiation through adaptation. Many ERP implementations fail to achieve expected benefits possibly because companies underestimate the efforts involved in change management. Such activities appear to be important from the early stages of the project, and continue throughout the adaptation and acceptance stages affects the amount of customization needed to the software and/or the organization.

2.1. The concept of ERP customization

2.1.1 Concept of Misfit

The term "misfit" has been used by scholars when ascertaining the situation that comes about when implementing ERP software that does not mirror the business processes of the organization.

As the ERP system involves a standardized view on how a business operates and at the same time each business performs its operations uniquely, there is always a need to adjust the ERP system to some degree to fit with the organization (Brehm, Heinzl & Markus, 2001; Markus & Tanis, 2000). Since all organizations have unique ways of handling their business, a standardized system cannot be expected to completely satisfy the needs of a specific organization. This misfit is called ontological distance by Rosemann, Vessey and Weber (2004). Their view on the meaning of ontological distance is the extent of the difference between the capabilities of an ERP system and the capabilities needed by the organization. So the adjustment of ERP system becomes inevitable for the adopting organization. It involves changing the actual system and also enhancement of the total system by adding different attributes.

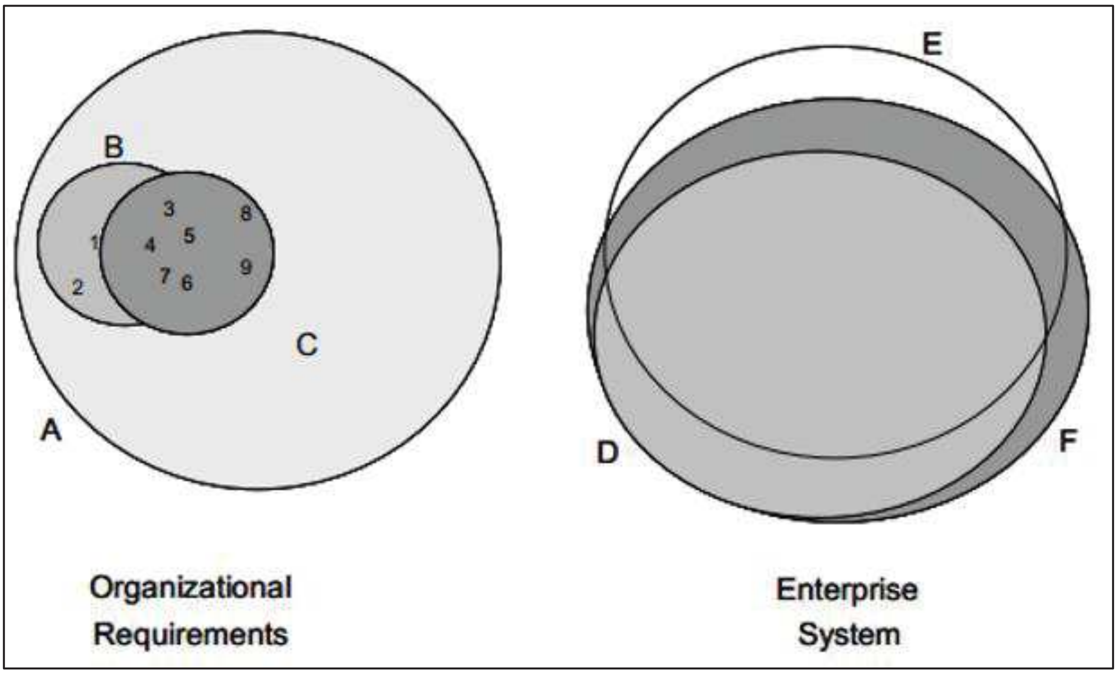


Figure 9. Classification of Distances

Misfits arose either from plant specific, company-specific or country-specific requirements that did not match the capabilities of the ERP package. And were clustered into three broad categories: data, process, and output. (Gattiker & Goodhue, 2005 -6).

Plant-specific reflect the difference in the process because of different product or procedure. Company-specific requirements reflect differences in the organizational structure, management styles and procedures that evolved over time in each organization. Country-specific factors are broader and focus on unique regulatory or social practices across nations or cultures. The impact of country-specific factors varies across functional modules. In areas such as accounting and finance, where international accounting standards promulgate some degree of global standardization, there were fewer misfits.

The observed misfits were clustered into three broad categories: data, process, and output, in line with a traditional software application perspective (see Table 1) (Soh, et.al 2000).

Table 1. Types of misfits and their resolutions.

Misfit Type	Example	Solutions
Data (Format)	ERP system requires name to be entered in the Western format as first, middle, and last name. Asian staff have a difficult time understanding which part of an Indian, Malay, or Chinese name should be considered a last name, which a first name. As such, one hospital simply uses the first name field to capture the entire name. However, the first name field is restricted to a maximum of 30 characters. Changing the field length would "touch the core."	Workaround within the ERP, (enter Asian name as Last name field.) Continue in First name field if name is greater than 30 characters.
Data (Relationship)	ERP system uses internally generated number as the patient ID. This ID number is used to link data tables within the system. However, all citizens of the country have a unique ID number used in all government systems. Hospitals have been using this number as the primary patient ID, as it allows them to interface with other government systems. Changing the unique key field to this external ID would "touch the core."	Workaround within the ERP, that is, still retain the internally generated number as the unique key but use the ERP's external ID field to capture person's national ID number.
Functional (Access)	The previous system allows doctors to track down patient location by querying the system. The new ERP system also provides this functionality but at a much higher cost. Doctors are now considered users and additional license fees have to be paid.	Workaround manually, (print daily listing of patient and location by doctor).
Functional (Control)	ERP does not allow validation routines based on organizational business requirements to be introduced without affecting the source code. Users need validation routines based on organizational business requirements.	Workaround manually. Rather than the rely on the system, must now actively educate the officers to look out for potential errors.
Functional (Operational)	ERP's patient management module does not have billing and collection from individual patient. Missing functionality includes allowing the patient to pay the bill by a fixed amount every month, tracking the outstanding amount per installment plan, producing reports on overdue items, allowing payment by check and counter collection.	Develop add-on module to ERP patient management system to handle billing and collection.
Output (Presentation Format)	ERP reports for materials management lacked heading information such as date, timestamp, and page number.	Used ERP's report writer software to change some ERP reports. Users learn to use other reports.
Output (Information Content)	Hospital identified numerous reports needed for reporting to government or for internal performance monitoring. Key parameters required by the organization were not available in the ERP standard reports.	ERP vendor to extract necessary data from ERP system into over 40 flat files, which will be downloaded into relational database software for users to manipulate data and create reports.

Table 1. Types of misfits and their resolution

Data misfits arise from incompatibilities between organizational requirements and ERP package in terms of data format, or the relationships among entities as represented in the underlying data model. Resolving these misfits is cumbersome, since this requires changing the structure and relationship of the table objects, which are viewed as prohibitive core changes to the ERP packages. From a user perspective: "it is hard to believe that something so sophisticated can't handle a simple modification like that in reality."

Functional misfits arise from incompatibilities between organizational requirements and ERP packages in terms of the processing procedures required. Three major types of functional misfits were noted: access, control, and operational. Access misfits occur when the access requirements needed to perform a task are not met. In such cases, further negotiation with the ERP vendor for additional user licenses may be necessary. Control misfits arise from missing validation procedures or checking routines.

The missing procedures do not affect day-to-day operation but relate directly to the management's risk tolerance level. Operational misfits occur when normal operational steps are missing or inappropriate, often due to the incompatibility of the embedded business model.

Output misfits arise from incompatibilities between organizational requirements and the ERP package in terms of the presentation format and the information content of the output. Given the tight implementation timeline, however, the customization of report format had to be done by the systems integrator at additional cost. More significant is information content misfit, especially where the reports are simply not available.

There are also concerns about the impact that international development teams and their cultures have upon ERP implementation success. There is a growing literature in the area of 'cultural fit'. Several models have been proposed that relate cultural and environmental factors to the international dimension. Soh et al. (2000) in their study of seven public hospitals in Singapore, defined a cultural 'misfit' as 'the gaps between the functionality offered by the package and that Their study suggested two processes that may be useful to 'harmonize business processes and organizational structures' (Gulla & Mollan, 1999), these being 'fit analysis' and 'job analysis.' (Rugg, & Krumbholz, 1999; Rugg et al., 2002) proposed a methodology for helping organizations to elicit an understanding of their culture, which can be modeled to assist in the selection and installation of the ERP system and its environment (see also (Rugg et al., 2002)). Hong and Kim, (2002) also considered CSF's in relation to 'organizational fit' and identified that 'beyond a certain level of organizational fit more processes adoption will only lead to lower implementation success'. A study by Huang and Palvia, (2001) suggested a framework for comparing ERP implementations in advanced and developing countries. Davidson (2002) considered cultural misfit issues and highlighted the North American-Western Europe centric nature of the ERP systems development. Krumbholz and Maiden, (2001) and Krumbholz, Galliers and Maiden, (2000) have also performed an investigation of the issues surrounding ERP implementations within different organizational and national cultures.

2.1.2 Measure taken to fill the gap

Historically, a common problem when adopting package software has been the issue of misfits," that is, the gaps between the functionality offered by the package and that required by the adopting organization (Soh et. al 2000). As a result, organizations have had to choose among adapting to the new functionality, living with the shortfall, instituting workarounds, or customizing the package. ERP software, as a class of package software, also presents this problematic choice to organizations.

The problem is exacerbated because ERP implementation is more complex due to cross-module integration, data standardization, adoption of the underlying business model ("best practices*'), compressed implementation schedule, and the involvement of a large number of stakeholders. The knowledge gap among implementation personnel is usually significant. Few organizational users understand the functionality of ERP enough to appreciate the implications of adoption. Similarly, few ERP consultants understand their clients' business processes sufficiently to highlight all critical areas of mismatches.

Specialization is the degree to which a system component is designed to exactly address the business needs of a particular organization. The overall degree of module specialization is dependent on a combination of two factors: module choice, and the degree of module customization. For instance, a best-of-breed module may already possess very specialized functionality geared towards firms in a certain industry without any customization. This module would be considered more specialized than a generic ES module. An organization may then decide to customize a chosen module and further increase its degree of specialization.

Module choice is simply the choice of which category of module (ES, best-of-breed, or custom) is chosen for a given business function, and which particular vendor (for ES and best-of-breed). ES modules are arguably the most generic modules, whereas best-of-breed modules tend to be more narrowly targeted towards a specific type of organization, industry, or region, and are less comprehensive (e.g., they support only a specific business functionality, such as demand forecasting). A best-of-breed package is usually not at the center of the IT portfolio of an organizational IS (at least for larger organizations), and is typically integrated with other modules from other vendors using an independent third-party integration layer. ES, on the other hand, tend to play a central role in an organizational IS, and come with an often proprietary integration layer provided by the ES vendor. Custom developments are typically the most specialized solutions, as far as their initial development is concerned.

Figure 10 demonstrates that as more customization is done to an ES or best-of-breed module, the module achieves a higher degree of specialization, or fit to the organization's specific needs. Taken to the extreme, a heavily customized ES solution may end up being almost as specialized as a custom-developed information system solution, as shown on the right of the figure. The issue of how heavily to customize ES is reflected in various articles in the trade press. Levin et al. (1998), for instance, point out that making too many changes is a source of problems, and that the choice to make minimal changes was one of the most important decisions made by an organization implementing the ES.

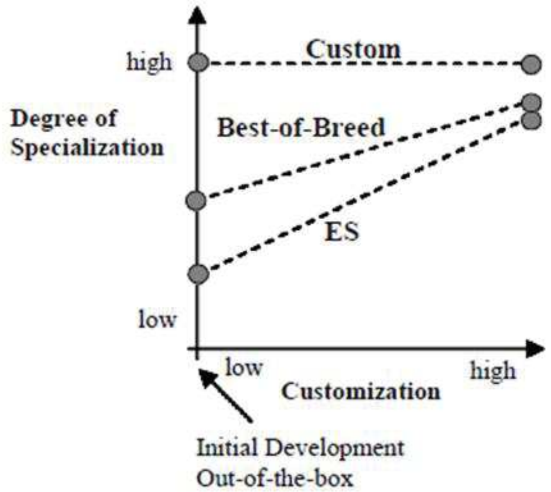


Figure 10. Approaches to attaining specialization

As Figure shows, the ultimate specialization of a module is a function of both the choice of category of the module (custom, best-of-breed, ES) and the amount of customization done (in the case of best-of-breed or ES). Stated differently, once a choice of best-of-breed or ES has been made (i.e. not a custom system), customization is a way to handle the problem of remaining mismatches between the organization's business processes and the process options provided by the ES or best-of-breed vendor. ES or best-of-breed modules employ business process and data definitions that often do not quite match the organization's needs. To close the gap, system modules must be customized or alternatively, the organizational processes must be altered to fit the system.

One marketplace response to the lack the feature-function fit in particular industry segments has been the emergence of "bolt-on" packages. Bolt-ons are extensive modifications of a basic ERP package developed by a third-party independent software vendor (under license agreements with the original vendor) to meet the needs of a particular customer segment. By means of bolt-ons ERP adopters can achieve greater feature-function fit with lower configuration effort, without losing the advantages of ongoing vendor support. Though the ongoing development efforts of ERP vendors and third-parties, many, but not all, business processes are now supportable by ERP packages.

When a misfit occurs, a spectrum of resolution strategies can be deployed (see Table 2). The resolution strategies tradeoff between the amount of organizational change and the amount of package customization required. Most resolutions require the users to work around within the alternatives offered by the package. There is usually some compromise in functionality. Generally, changing package source code was avoided because of the cost involved and the difficulty of maintaining future upgrades. Even when customizations are needed to provide critical functionality, they are done without changing the source code, through the development of add-on modules that are plugged into the ERP system's user exits. In general, such a strategy is likely to raise some problems during system testing, as the add-on modules may have some minor bugs, unlike the main ERP system. In addition, subsequent versions of the ERP software may not retain the same user exits, and this complicates the upgrade process.

1	Adapt to the new functionality in ERP (adopting the new operating processes embedded in ERP)
2	Accept shortfall in ERP functionality (compromising on the requirements of the organization)
3	Workarounds to provide the needed functionality without touching the ERP scripts • Manual ("by hand" rather than using a computer system)

	• ERP alternative (finding an alternative way to perform the function with the package
4	Customization to achieve the required functionality • Non-core customization (interfacing with add-on module or through query/report writer facility) • Core customization to amend the base code

Table 2. ERP Misfit Resolution Strategies (Soh, et.al 2000)

Brehm et al. (2001) provided some of the most common types of different ERP adjustments. The different types of adjustment are presented in an order where the influence of first adjustment type on the system is least and the last one has most impact on the system. In Figure 11, a small chart with the adjustment types is displayed.

	Adjustment Type
Low ↑ Impact on System ↓ High	Configuration Bolt-ons Screen masks Extended reporting Workflow programming User exits ERP programming Interface development Package code modification

Figure 11. Adjustment types & their impact on the system

Impact or risk of ERP system tailoring can be approximated by a formula that factors in the number of different tailoring types used, the level of usage of each type, the "weightiness" of each type (roughly indicated by the placement of the tailoring types in the typology, with configuration at the top of the chart representing light tailoring, and modification at the bottom representing heavy tailoring). Therefore, impact or risk of tailoring can be measured as the sum, over all tailoring types, of the tailoring type's weight factor (ranging from light to heavy) times a level factor (extent of use of the tailoring type, ranging from low to high).

Generally, vendors need to spend more time explaining the embedded data requirements and processes to the organization. Organizations need to acquire more skills to ask and probe for such details. It was surprised to find that the reference models that espouse industry best practices are at too high a level for an effective assessment of how the ERP system would actually affect the organizational processes. The process-focus of an event-driven methodology tends to gloss over potential data issues. Effective misfit analysis requires both comprehensive understanding of the critical organizational processes (an analysis activity) and detailed knowledge of this very complex software (a design activity). There is thus the need to merge the traditional system development separation of the analysis and design phases for ERP implementation.

Fundamentally, the misfit analysis reveals the severity of the knowledge gap in ERP implementation. The three key parties to this process—key users, IS department personnel, and the ERP vendor—each has different and specific knowledge (organizational requirements, existing IT infrastructure, package functionality, respectively) that is difficult to transfer to one another. While frequent interaction and joint problem solving appear to be the logical way to bring the disparate knowledge together, the varied backgrounds and interests of the three parties make it difficult to achieve an integration of this knowledge.

Hippel (1994) has suggested that where the information is sticky, the optimal strategy is to place the locus of problem-solving with the sticky source, in this case, the key users. Thus, the demand on users is not only to be competent in their business areas, but also to assimilate the package functionality in some depth. They must now consciously "get into the ERP software" to evaluate the appropriateness of the new configured system or the alternatives adopted. Organizations can facilitate the knowledge acquisition process by budgeting for vendors to spend time educating key users about the system, by shifting the ERP focus training earlier in the implementation process, by planning for detailed data, functionality and output walk-throughs, and by selecting vendors with significant industry knowledge. Most importantly, users should realize that it is no longer sufficient for them to be passive functional experts as in the traditional system development projects: They have a much bigger role in ERP implementation.

2.1.3 Definition of customization

Customization in this paper will refer to either interfaces or modification. Modifications (Davis, 2005) are code changes that the vendor does not support. This notion of "code changes" as a particular and influential form of customization is supported by other academic studies (Gattiker and Goodhue, 2004) as well as by practitioner journals. So, the conceptual definition of customization for the purposes of this paper is: Customization is a code change put into place because the ERP business process does not mirror the "desired" business process.

Several studies have demonstrated that the implementation of ERP systems requires the examination of many business processes and it is vital for the company's processes to be accurately aligned with those of the ERP system if the full benefits are to be realized (Redouane et al., 2006). This clearly indicates the need for carefully carrying out the customization during ERP implementation. Business process reengineering (BPR) is not merely the adaptation of an ERP system or the business processes of an organization, it is changing the way of an organization works and the process-orientated vision that the organization needs to integrate.

2.1.3.1. Configuration vs Customization

Enterprise systems promise “seamless integration of all the information flowing through a company, financial and accounting information, human resource information, supply chain information, and customer information” (Davenport, 1998). However, it is extremely important to note that achieving this integration depends on “configuring Configuration” (setting up) the system in particular ways. Configuration in this context means choosing which package modules to install and setting software parameters to represent.

Configuration (also called "customization" in SAP parlance) refers to setting parameters in the package to reflect organizational features; **modification** refers to changing package code to perform unique business processes, often resulting in loss of vendor support. We use the word tailoring to encompass both configuration and modification and a range of options in between.

Programming involves creating new software functionality. Configuration involves adapting the generic functionality of a package to the needs of a particular organization (usually by setting parameters in tables). (1) mapping organizational requirements to the processes and terminology employed by the vendor and (2) making informed choices about the parameter setting.

ES or best-of-breed modules can be adapted in two general ways. First, these modules are usually sold with mechanisms and tools to support some amount of modification of the standard "out-of-the-box" solution at relatively low cost by simply setting software switches or modifying tables that determine workflows. Vendors typically call this type of customization "configuration." Configuration only allows changes within certain boundaries limited by what the vendor has decided to include in the software. Some configuration is always required (Brehm et al., 2001), but it can vary substantially from one organization to the next. When these types of changes are judged insufficient, companies can engage in usually more expensive types of customization involving modifications, such as changes to the source code of programs or reserved tables. Note that in this paper, we use the term customization to incorporate all means of closing these process gaps, including configuration and modifications.

ERP systems do not neatly fit the traditional distinction between "custom-built" software and "off-the-shelf' packages (Brehm et al., 2001) in several important respects. First, the scope of ERP packages is much broader than that of early software packages (like mainframe-based financial software or PC-based personal productivity tools). ERP packages integrate many formerly discrete applications around a common database. They enable adopters to integrate data and processes throughout the organization, and they support nearly all functions.

Second, ERP packages allow for a great deal more flexibility in the way a company operates than traditional packages do. In traditional packages, business procedures were "hard coded;" making them inflexible. Adapting them to the unique business procedures of a particular organization usually required modifications changes in package code.

In contrast to the inflexibility of traditional packages, ERP packages are generally structured so that both data and many procedures are represented as parameters in tables many thousands of tables in the most elaborate packages. Implementation involves setting parameters to represent both fixed organizational data (such as the number and location of sales offices) and whether and how particular processes should operate. As a result, many more unique organizational circumstances can generally be supported by ERP systems without program modifications than is true for traditionally designed packages.

2.1.3.2. Types of customization (Strategic and None-strategic)

Customization has been used to explain implementation failures for years. However, the question of which types of customization have negative effects and which types of customizations have positive effects has not been fully explored. Case studies show that lack of customization sometimes causes negative consequences. What is the reason that some customizations are needed while others should be passed by? Using strategic alignment and systems agility as a basis for understanding the impact of customizations, we can gain insight into the impacts of ERP customization.

When business processes in an organization cannot be modelled in an ERP system without customization, the impact of a decision to not customize becomes relevant. The opposing forces of the requirement to customize to include business processes and the desire to successfully implement an ERP system without: additional complexity, additional maintenance costs, and less flexibility deserve further research. All customizations are not created equal, and a certain type of customization is beneficial. Specifically, strategic customizations will enhance the IT infrastructure strategic alignment with the business strategy. Non-strategic customization, such as consistency customization, will impact the system agility of the corporation.

Strategic customizations are important, as these types of customizations aid in strategic alignment. Consistency customizations are customizations made not for strategic reasons, but for the purpose of replicating a "status quo" business process.

Strategic customizations are any customizations that are made with the purpose of achieving a strategic goal or furthering a strategic initiative. The reason these are so important, is that a strategic customization should be in support of the strategy of the company, thus is aligned with the strategy of the company. When a modification or customization is made in support of the strategy of the company, this will further the alignment of IS strategy and business strategy, and the impacts should be positive.

The other type of customization that will be considered is a customization that is made for consistency purposes. Attention has been paid to customizations that are necessary because of a lack of fit between the ERP and the business processes; however, customizations are being made to mimic the status quo, or to mimic a poor business process. These types of customizations are not strategic, and should be differentiated from strategic customizations. These customizations are **"consistency" type customization**.

Though different types of consistency customization may exist as well as different types of strategic customization, for the purpose of this research and for parsimony, it was grouped into two categories: strategic customizations and consistency customizations. Consistency and strategic changes are not two ends of a continuum, but are separate concepts. This paper treats strategic customizations as separate and distinct from consistency customizations

2.1.3.3. Objective of customization

The objective of customization in ERP implementation is to achieve a fit between the ERP system and the process that the system supports. Customization is found to be the major annoyance in most of the ERP projects (Parthasarathy and Anbazhagan 2007). There are various customization possibilities for ERP implementation.

The success of an ERP system is assured when there is a perfect fit between the ERP system and the organizational processes it supports (Holland & Light, 1999; Robey et al., 2002). The significance of ERP systems is that they are packaged software solutions rather than customized systems.

The ERP systems come to the customers as a pack with all the required business processes. In traditional information systems development, the software is designed and developed to fit the organization. But in ERP systems, the organization is required to fit the ERP system to reap the full benefit of this packaged software solution. It has been identified that it is easier and less costly to mold business processes to ERP systems rather than vice versa (Davenport, 1998; Holland et al., 1999). A key issue in ERP implementation is finding a match between the organization's business processes and the ERP system by appropriately customizing both the system and the organization.

The benefits of specialization to the organization (either from custom IS module, or customized ES or best-of-breed modules) can include a reduction in process costs, better customer service, and better decisions based on more complete or more relevant knowledge (Schoemaker & Amit, 1994). If the system can’t or not customized to fill the gap, this would probably mean instituting some additional paper- or computer-based workarounds. Using these would likely slow the process, and introduce greater possibility of error. This would make the ES-supported business process more costly than an ideal process without cumbersome workarounds. In addition, some of the information contained in the workaround systems might not be visible to the ES, creating blind spots in reporting that could degrade decision making or customer service. Thus, the benefits of specialization, could be lower inventory management and order handling costs and better informed decisions.

2.1.3.1. Mechanisms and tools support modification

2.1.3.2. Customization in SAP standard

There are different tailoring type available for ERP misfit.

Tailoring Type	Description	Examples	Layer Involved
Configuration (customization, in SAP parlance)	Setting of parameters (or tables), in order to choose between different executions of processes and functions in the software package	Define organizational units; create standard reports; formulate available-to-promise logic; use of a standard interface to an archive system	All layers
Bolt-ons	Implementation of third-party package designed to work with ERP system and provide industry-specific functionality	Provide ability to track inventory by product dimensions (e.g., 2 500 m. lengths of cable do not equal 1 1000 m. length)	All layers
Screen masks	Creating of new screen masks for input and output (soft copy) of data	Integrate three screens into one	Communication layer
Extended reporting	Programming of extended data output and reporting options	Design new report with sales revenues for specific criteria	Application layer and/ or database layer
Workflow programming	Creating of non-standard workflows	Set up automated engineering change order approval process	Application layer and/ or database layer
User exits	Programming of additional software code in an open interface	Develop a statistical function for calculating particular metrics	Application layer and/ or database layer
ERP Programming	Programming of additional applications, without changing the source code (using the computer language of the vendor)	Create a program that calculates the phases of the moon for use in production scheduling	All layers
Interface development	Programming of interfaces to legacy systems or 3rd party products	Interface with custom-build shop-floor-system or with a CRM package	Application layer and/ or database layer
Package code modification	Changing the source-codes ranging from small change to change whole modules	Change error message in warning; modify production planning	Can involve all layers

Table 3. Identified different types of ERP package tailoring

Take SAP system as example, to illustrate the concept of customization(different from the concept in this paper), and to demo the possibility of customization and the tools used for customization In SAP, customizing is more synonym to configuration in this thesis, and enhancement and modification could be mapped to the concept of customization here. To clarify on the difference, we use the table 4 to demonstrate the mappings and difference.

In thesis	**Configuration**		**Customization**		
SAP	Customization	Personalization	Modification	Enhancement	Customer Development

Table 4. Customization in SAP

SAP system can be adjusted to meet needs in the different ways. SAP standard course (BC425 Enhancements and Modifications, Course Version: 92, Material Number: 50099785) is to prepare the reader to be able to make qualified changes to the SAP standard, and evaluate the different methods for modification and choose the right one for any given situation.

There are different tools to help the users to use different methods e.g. ABAP workbench, and can make and adjust modifications using the Modification Assistant.

1. Customization without modify SAP standard

SAP can be changed in different level, technically, from easier and straighter forward, which can be done by none technical person via configuration (here in SAP: Customizing or personalization), to more sophisticated which could involve ABAP programmer (Modification, enhancement or customer development – named Customization in this paper). But these tools are designed to append additional functionality to SAP, even change the process, but without change SAP source code (SAP standard).

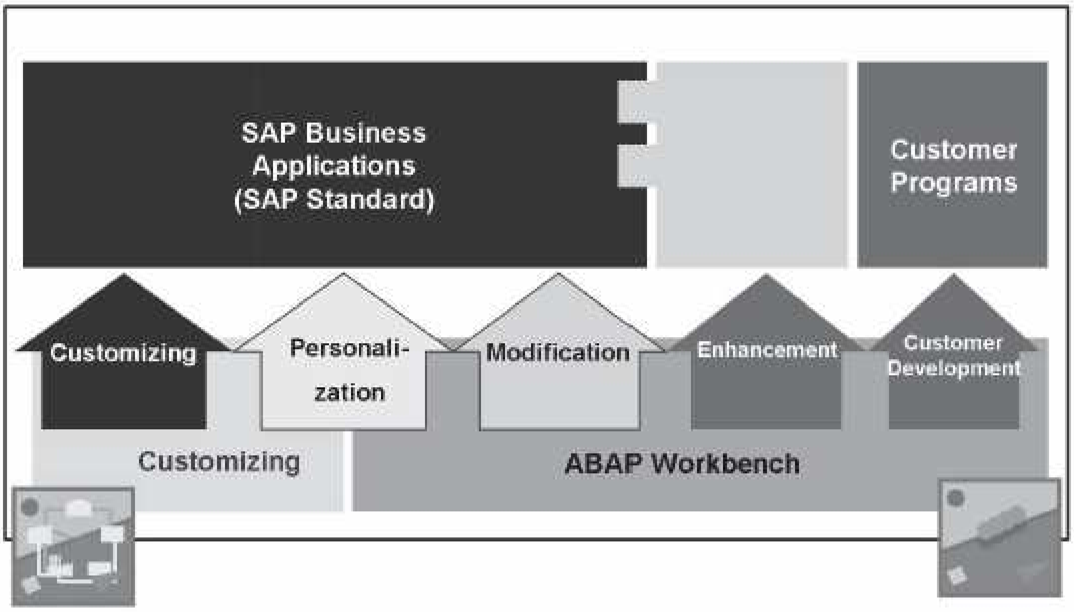


Figure 12. SAP Change Levels

1. Customizing (Configuration): Setting up specific business processes and functions for your system according to an implementation guide. Therefore, all possible changes have been thought through and organized.

2. Personalization: Making changes to certain fields' global display attributes (setting default values or hiding fields) as well as creating user-specific menu sequences. Personalization accelerates and simplifies the ERP System's processing of business cases. During personalization, individual application transactions are adjusted to meet the business needs of your company as a whole or even to the needs of specific user groups within your company. All unnecessary information and functions found in the transaction are switched off.

Personalization accelerates and simplifies the ERP System's processing of business cases. During personalization, individual application transactions are adjusted to meet the business needs of your company as a whole or even to the needs of specific user groups within your company. All unnecessary information and functions found in the transaction are switched off.

3. Modification: These are changes to SAP Repository objects made at the customer site. If SAP delivers a changed version of the object, the customer's system must be adjusted to reflect these changes. Prior to Release 4.0B these adjustments had to be made manually using upgrade utilities. As of Release 4.5A, this procedure has been automated by the Modification Assistant. Modifications are executed with the help of user exits (these are subroutines reserved for customers within objects in the SAP namespace) or 'Hard-coded' at various points within SAP Repository objects Customer developments are programs developed by customers that can call SAP Repository objects.

Modifications can cause problems: After an upgrade, new versions of SAP objects must be compared to modified versions of SAP objects you have created and adjusted if necessary. Prior to Release 4.0B, these adjustments had to be made manually using upgrade utilities. As of Release 4.5A, this procedure has been automated by the Modification Assistant.

Therefore, one should only make modifications if:

- Customizing or personalizing cannot satisfy your requirements.
- Similar enhancements or user exits are not planned by SAP developer.

4, Enhancement: This means creating Repository objects for individual customers that refer to objects that already exist in the SAP Repository and creating Repository objects unique to individual customers in the customer namespaces.

The diagram show the way how to address the functional gap in a sequential way,

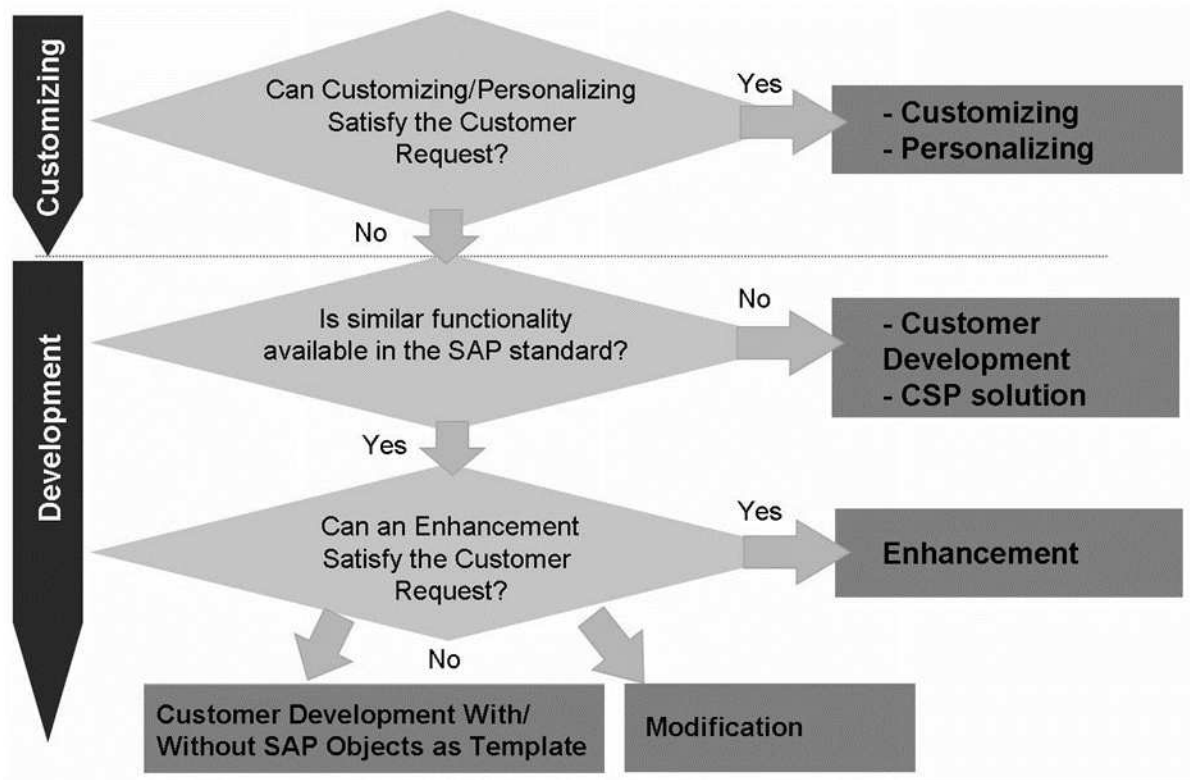


Figure 13. Procedure for Changing the Functionality

If your requirements cannot be filled by Customizing or personalization, one can either start a development project or use a Complementary Software Product (CSP) solution, if available. A list of CSP solutions certified by SAP is available in SAP Service Marketplace under the alias/software partner. A development project falls into the customer development category if the SAP standard does not already contain functions similar to the one you are trying to develop. However, if a similar SAP function exists, try to include it in your development project by either enhancing or modifying it, by using a user exit, or simply by making a copy of the appropriate SAP program.

There are different kinds of change levels available in the SAP System, ABAP Dictionary objects can be enhanced without having to modify them, and enhancements can be implemented to the R/3 standard using varies of methods: user exits, customer exits, Business Transaction Events, and Business Add-Ins.

Program exits allow customers to implement additional logic in application functions. SAP application programmers define where program module exits are inserted and what kind of data they transfer. SAP programmers also create an exit's corresponding function modules complete with short text, interface, and documentation, as well as describing each program exit's intended purpose in the SAP documentation.

You write the source code for the function modules yourself. If need be, you must also create your own screens, text elements, and includes for the function group.

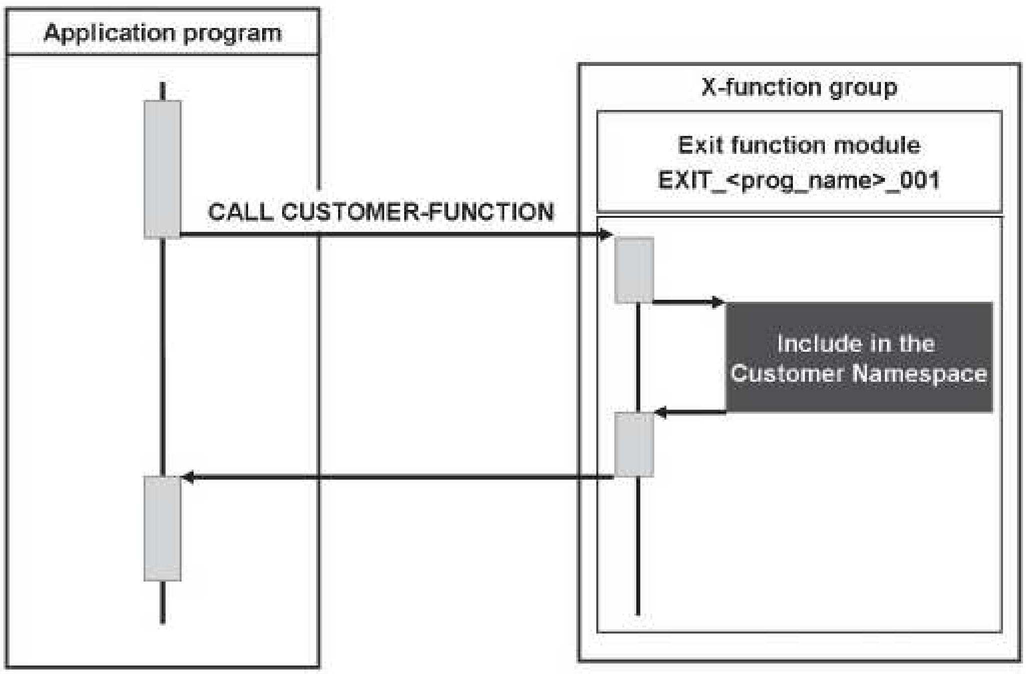


Figure 14. Program Exits: Architecture

Menu exits allow you to attach your own functions to menu options in SAP menus. SAP application programmers reserve certain menu entries in your GUI interface for this. You can specify the entry text yourself. Once you activate menu exits, they become visible in the SAP menu. When you choose the corresponding menu option, the system changes to a program exit that contains your customer-specific functions.

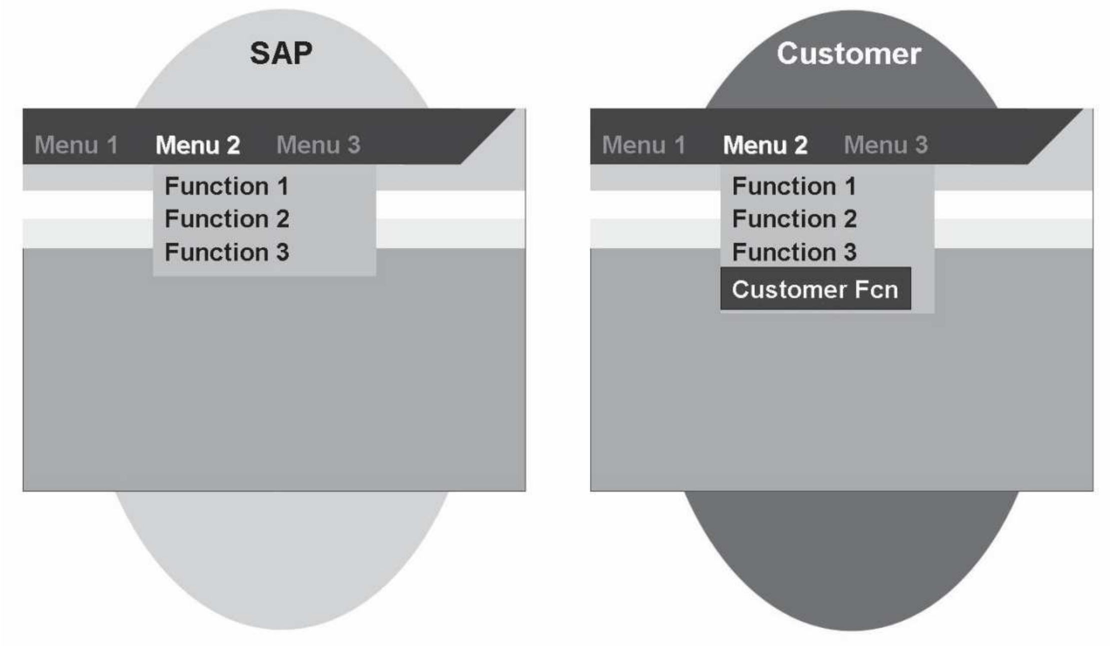


Figure 15. Menu Exits (Overview)

Screen exits allow you to make use of reserved sections of a main screen (subscreen areas). You can either display additional information in these areas or input data. You define the necessary input and output fields on a customer screen (subscreen).

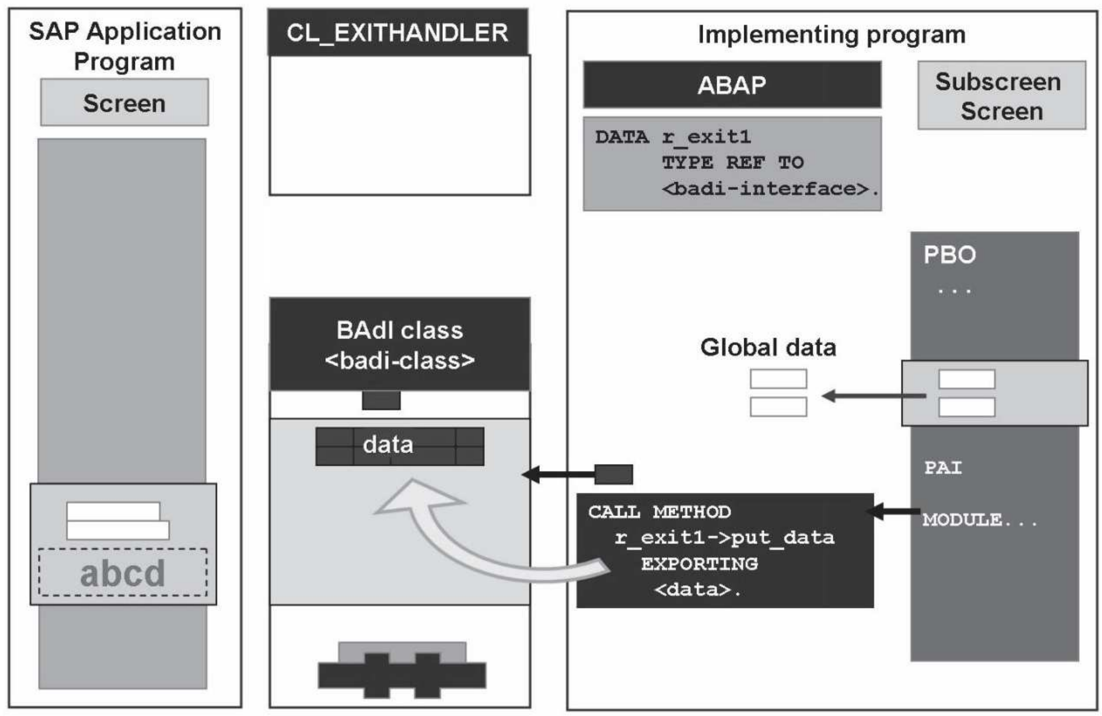


Figure 16. Screen PAI Step: Returning Data

Business Transaction Events

Software delivery has changed considerably from the earlier process: Previously, only two participants were involved – SAP (the producer) delivered the software directly to the end-user. Customers could enhance this standard using customer exits.

Due to strong component-orientation, today many more participants are involved in the software deliver process: SAP delivers the R/3 Standard as base software to an Industrial Business Unit (IBU), who then develop and offer encapsulated functions. The next link in the chain might be a partner firm, which builds its own Complementary Software Program (CSP) solution based on R/3. The last link in the chain is the customer, as before.

All of the parties involved in this process are potential users and providers of enhancements. This requirement cannot be satisfied by customer exits, which can only be used once. Consequently, SAP developed a new enhancement technique in Release 4.0, which allows enhancements to be reused.

Business Add-Ins

- **Disadvantages of earlier enhancement techniques**
  - **Could only be used once (customer exits)**
  - **No screen enhancement (business transaction events (BTEs)**
  - **No menu enhancement (BTEs)**
  - **No administration level (BTEs)**
- **Requirements for new enhancement techniques:**
  - **Reusable**
  - **All enhancement types (program / menu / screen exit)**
  - **Administration level**
  - **Implemented using latest technology**

	Customer Exits	Business Transaction Events	Business Add-Ins
Program Exit	+	+	+
Menu Exit	+	−	+
Screen Exit	+	−	+
Append Fields On Screens	+	−	(+)
Administration Level	+	−	+
Reusable	−	+	+
Filter-specific	−	+	+

Figure 17. Comparison with Other Enhancement Techniques

2. Customization with modifications of the SAP Standard

The aim of the Modification Assistant is to make modification adjustments easier. In the past, the granularity of modifications was only at include program level. Today, a finer granularity is available. Now, modifications can be recorded at subroutine or module level. This is because (among other reasons) the modifications are registered in a different layer. As well as providing finer granularity, this means that you can reset modifications, since the original version is not changed.

In the past, if you modified a include for which SAP provided a new version in an upgrade, a modification adjustment was necessary. The modification adjustment had to be performed line by line. The system provided little support. The Modification Assistant changes that situation: The granularity of the change recording has been refined. For example, if you modify a subroutine, the rest of the include remains unchanged. If SAP delivers a new version of the include, the system looks to see if there is also a new version of that subroutine. If this is not the case, your changes can be incorporated into the new version automatically.

User Exits

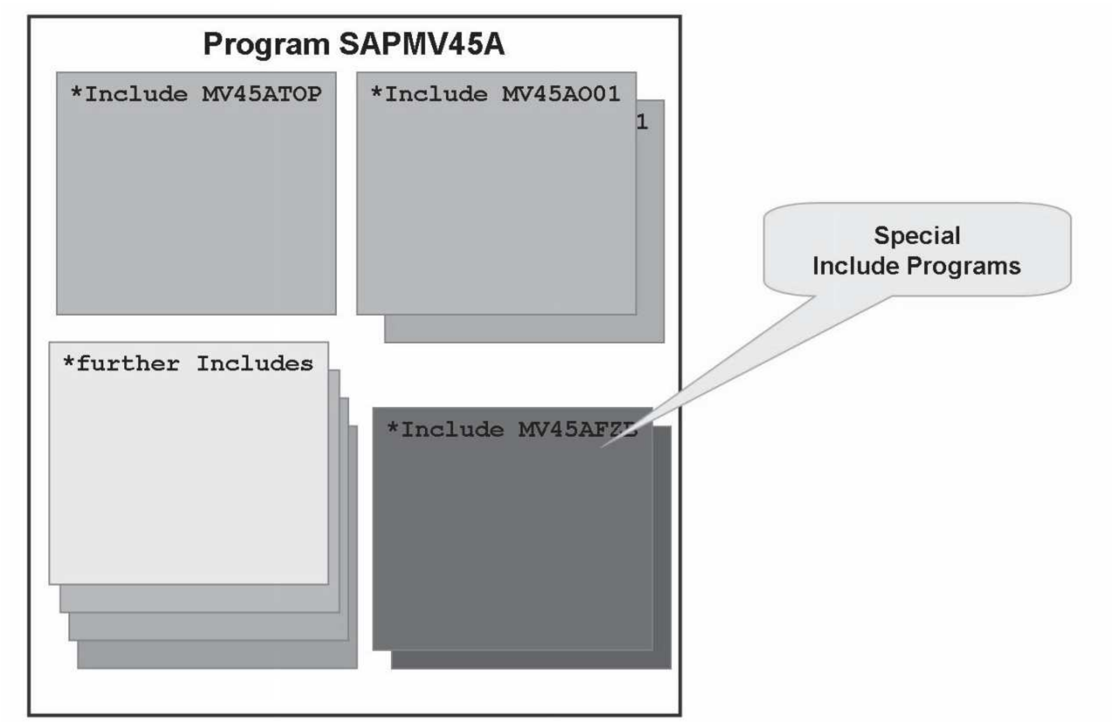


Figure 18. User Exits: Building an SAP Module Pool

User exits are a type of system enhancement and the original purpose of user exits was to allow the user to avoid modification adjustment. Using a user exit is a modification, since it requires you to change objects in the SAP namespace. SAP developers create a special include in a module pool. These includes contain one or more subroutines routines that satisfy the naming convention userexit_<name>. The calls for these subroutines have already been implemented in your program. Usually global variables are used. After delivering them, SAP never alters includes created in this manner; if new user exits must be delivered in a new release, they are placed in a new include program.

2.1.4. Customization is a must

2.1.4.1. Customization is inevitable

The success of an ERP system is assured when there is a perfect fit between the ERP system and the organizational processes it supports (Holland & Light, 1999; Robey et al., 2002).

Customization is an integral part of ERP implementation. The rate of customization is directly proportional to ERP success (Parthasarathy, et.al 2007). Customization tends to pose a challenge to time and the funds allocated. The challenge of successful management lies in balancing them and making both ends meet. It is a difficult task but the success speaks for the process. The major issues that require attention in the process of customizing ERP are strong knowledge about the current system and the likelihood of innovations in ERP.

Today, enterprises face many forces that compel them to take a larger view of their systems. These forces include globalization, regulatory changes, commerce, cost, multiple customer-access channels, product development cycles, changing business processes, etc. Companies ask for help from their own internal information systems (IS) organizations as well as from external services consultants, product developers, and packaged solutions vendors (Leishman, 1999).

From the viewpoint of system adaptation, Davenport (1998), Brehm (2001), and Glass (1998) say that ERP systems need to be changed to fit existing or reengineered business processes. From the viewpoint of organization adaptation, Boudreau and Robey (1999) and Robey (2002) say that organizations need to be changed to fit the ERP system. As user participation is limited during the development of ERP software, the gap between the ERP system and the organizational business processes is inevitable (Sawyer, 2000; Gefen, 2002). Clemon and Row (1991) explained the divergences among organizations in the use of IT and in the benefits they have gained from their usage. This is one of the major reasons for the organizations to choose different ERP customization options during ERP implementation.

ERP system is adjusted because it's embedded standard business process results in errors when the organization uses it (Light, 2005). Hossain and Jahed, 2010 discussed missing functionality as a reason for misfits between the ERP system and the business. Gap between the system and the organization in the form of functionality misfits, argued by Soh et al. (2000) is a common problem when adapting package software. They cited different misfits such as missing found in control procedures, operational steps and user requirements on reports in the system. Davis (2005) even claims adjusting the ERP system according to user needs is "the essence of customization ". The assumption is that the more adjustment of the system; the better fulfillment of user needs (Brehm et al., 2001; Light, 2005; Soh et al., 2000).

2.1.4.2. Customization as one of the critical Success factor

Customization is believed to be the critical success factor for ERP implementation (Markus & Tanis, 2000; Holland & Light, 1999; Everdingen et al., 2000; Hong & Kim, 2002). Hong and Kim (2002) assessed the impact of data, process, and user fit between ERP system and organizational requirements on implementation success. They found a positive correlation between the initial organizational fit and the implementation success. However, for most organizations such a fit can only be achieved through the mutual adaptation of the ERP systems and the organization processes (Lassila & Brancheau, 1999).

Carmel and Sawyer (1998) compared packaged software with traditional information systems. Their analysis shows that vendors of packaged software have to satisfy many customers with varying needs and requirements in order to capture the necessary market share and profit to justify their investment. Hence, customizing the ERP system and an organization's business processes become essential to fine-tune the performance of ERP implementation.

Numerous studies of the critical success factors for ERP implementation success conclude that the preferable way to implement ERP software is sans software modification (Nah & Zuckweiler, 2003). However, for reasons of misalignment and strategic alignment, customizations of enterprise systems are necessary. One estimate is that 20% of the processes in an organization cannot be modeled in an ERP system without customization (Scott and Kaindl, 2000). Software modification and customizations are needed for the ERP system to meet the needs of the organization; however, the issues associated with customization are far reaching.

(Gattiker and Goodhue 2005) Customization may be a response to a lack of fit between the organization's business processes and those envisioned by the ERP package designers. However, customization could potentially also be used to bring the ERP into line with the requirements of a nonstandard plant. Customization may, therefore, be an effective strategy for dealing with the unique needs of the extremely different plants.

2.1.4.3. Customization is of strategic importance

The resource-based view of the firm (RBV) tells us that to have sustained competitive advantage, a firm must have resources that must be valuable, rare, and difficult to imitate (Barney, 1991). A competitive advantage cannot be derived solely from a noncustomized, "out-of-the-box" packaged ES solution, as this solution is not going to be rare or difficult to imitate, since competitors can purchase the same package. This suggests that generic ES modules may be necessary to level the playing field if competitors have implemented them, or they may be advantageous when they operate as a utility (i.e. provide a good low-cost solution for everyone), but they won't generally be a source of sustained competitive advantage.

However, there are two ways that an uncustomized ES might contribute to a more sustainable competitive advantage. First, suppose the ES is part of a synergistic bundle of resources that provide competitive advantage, and at least one of the other resources is rare and very difficult for competitors to imitate. In this case, the ES may be critical for sustained competitive advantage, even though it is not itself difficult to imitate. Secondly, as it turns out, one possible rare and difficult to imitate asset that is synergistic with the ES asset might be the ability to successfully implement an ES, since they are notoriously difficult to implement (Haines et al., 2006). Thus, if one firm could implement the ES and quickly make it effective, and another firm had great difficulty making an

ES effective, the first firm might have competitive advantage over the second for some time.

As organizations implement enterprise systems, the issues of whether to "build or buy" new IT modules, and if buying, how much to customize, continue to be key concerns. A framework was built in order to better understand effective information system module choice and customization from a strategy perspective. Analysis of the strategic importance of the IS module can provide general guidance for the amount of specialization that is appropriate.

There is much literature that studies the importance of the strategic alignment of IS with the business (Henderson and Venkatraman, 1994; Hirschheim and Sabherwal, 2001; Sabherwal and Chan, 2001). IS alignment is an important, yet elusive goal (Davis, 2005). Henderson and Venkatramen (1994) put forth that IT Strategy as well as IT Infrastructure and business process should "fit" the business strategy. The focus by Henderson and Venkatramen (1994) on IT Infrastructure supports the assertion that this paper makes, that the infrastructure should support the strategy, specifically in customization choices. Another significant point to understand from Henderson and Venkatraman (1994) is the technology implementation perspective. Technology implementation is concerned with the strategic fit between the external articulation of IT strategy and the internal implementation of the IT infrastructure and processes with their corresponding impact on the overall organizational infrastructure and processes (Henderson and Venkatraman 1994). This perspective links IT infrastructure and IT strategy, then subsequently links to business strategy. Since ERP customization is part of the IT infrastructure, these links are critical to supporting the hypothesis that the nature of the customization will impact strategic alignment.

The definition of strategic alignment, "Strategic alignment means the fit between the priorities and activities of the IS function and the business unit. The goal in strategic alignment is for IS priorities, capabilities, decisions, and actions to support those of the entire business (Chan, 2002)".

Sabherwal and Chan (2001) focus on IS strategy and aligning the systems or business applications with business needs and using them to derive strategic benefits. An important finding is that it is necessary to understand the nature of the IT investment within an organization, not just the level of IT investment. There is attempt to build on the concept of "nature of IT investment" to include the types of systems, and specifically the nature of the system as being customized for strategic purposes versus customized for consistency purposes and the impact of such on strategic alignment.

The process of IS and Business alignment is addressed by Hirschheim and Sabherwal (2001). The argument in the paper is that IS Strategy can affect business strategy. This paper (Hirschheim and Sabherwal, 2001), however, addresses IS strategy at a high level, and does not account for the actions that IS can take to enable a strategy that is in alignment with the business. It is clear that IS strategy at a high level has been studied and indeed there is a correlation between this high-level strategy and business performance (defined any number of ways); however, there is not a study that looks at the specific actions that IS and the business can take as part of an implementation process, i.e. decisions regarding customization of enterprise software, and how these decisions affect strategic alignment.

Business processes cannot be separated from an enterprise system. The very nature of an enterprise system is an integration of business processes, data bases, business units, etc. The fit between the business process and the system has been studied (Gattiker and Goodhue, 2002) and determined to be important to positive business outcomes. Gattiker and Goodhue (2002) take the need for IS to be strategically aligned and study the application of this alignment at the subunit (department) level. Building on the view of that paper, one way to determine if the implemented system supports the strategy of the company is to look at if the implemented system contains customizations that are strategic, or merely consistent with the current operations of the company.

From a strategic point of view, the degree of specialization has two related consequences. First, specialization is usually necessary if a firm hopes to leverage information systems for continued competitive advantage, since unspecialized modules can be obtained by competitors with relative ease. Second, specialized modules are more likely to exactly meet business requirements, thus improving business efficiency and/or effectiveness. These two consequences are related since competitive advantage often comes from having unique and valuable business processes which are supported by effective IS modules. However, a problem arises because specialization does not come for free; in fact it can be quite expensive (Gill, 1999; Stedman, 1998). Excessive customization, as one form of specialization, has been associated with a number of failed ES implementations (Levin, Mateyaschuk, & Stein, 1998; Stedman, 2000), while other reports blame a lack of fit with the specific business requirements of the firm (Gattiker & Goodhue, 2002; Harris, 2000) as an obstacle to ES success. Thus, finding the right balance of specialization is critical, yet difficult to achieve.

1. Strategic ERP asset

For an IS module to be strategic, (a) the business function to which it relates must be strategically important, and (b) the information system module must play an important role in that business function.

Schoemaker and Amit (1994) suggest that a firm's "strategic assets" are capabilities that, (a) explain a large part of the performance differences between firms in the industry, and (b) have been consciously developed by the firm, and (c) are relatively difficult to purchase or imitate. In other words, if the firm is conscious of the fact that capabilities related to a business function are strategically valuable, rare, and inimitable, then that business function is strategically important.

The components of an organizational information system can be examined at different levels of granularity (Hopkins, 2000). The term "component" is still widely discussed and not yet formalized, even among researchers in the field of component-based systems development (Crnkovic et al., 2002). At its very essence, a component is a unit of composition. However, research on component-based systems development often takes on a very specific notion of what a component is, and tends to examine components at the level of objects, clusters of objects, or services (i.e., XML Web services). An entire application or application module can also be considered an IS component. Since this study focuses on ES, we deemed it suitable and practical to examine IS components at the relatively coarse level of ES modules (e.g., SAP R/3's SD module for sales and distribution). Each best-of-breed application package can also be thought of as a module of an organizational IS, as can each custom developed application in an organization's IS portfolio. In keeping with this level of granularity, three broad categories of IS modules are distinguished in this framework: enterprise system (ES) modules, best-of-breed modules, and custom built modules

2. Strategic vs Consistency customizations

Strategic customizations are important, as these types of customizations aid in strategic alignment. Consistency customizations are customizations made not for strategic reasons, but for the purpose of replicating a "status quo" business process.

Strategic customizations are any customizations that are made with the purpose of achieving a strategic goal or furthering a strategic initiative. The reason these are so important, is that a strategic customization should be in support of the strategy of the company, thus is aligned with the strategy of the company. When a modification or customization is made in support of the strategy of the company, this will further the alignment of IS strategy and business strategy, and the impacts should be positive.

The other type of customization that will be considered is a customization that is made for consistency purposes, customizations are being made to mimic the status quo, or to mimic a poor business process. These types of customizations are not strategic, and should be differentiated from strategic customizations. These customizations are "consistency" type customization.

Though different types of consistency customization may exist as well as different types of strategic customization, customizations are grouped into two categories: strategic customizations and consistency customizations.

Consistency and strategic changes are not two ends of a continuum, but are separate concepts. This paper treats strategic customizations as separate and distinct from consistency customizations.

3. Effect of customization on strategic alignment

From a strategic alignment perspective, Henderson and Venkatraman (1994) specifically address IT infrastructure and business strategy "fit". Since the ERP system is part of the IT infrastructure, and customization to improve alignment is a large part of the ERP system (Scott and Kaindl, 2000; Soh, et al., 2003; Soh, et al., 2000), decisions to make strategic customization should influence strategic alignment. Also, Davenport (1998) argues that the business goals should drive the system choices, supporting the need for customization to support the business strategy.

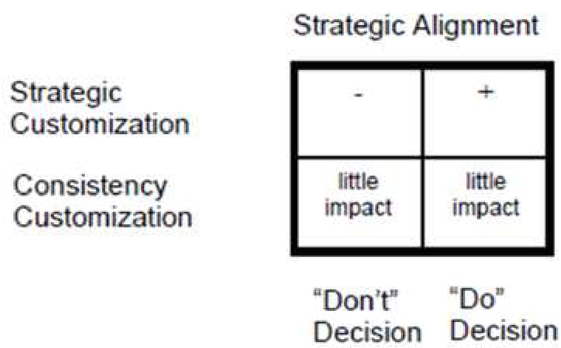


Figure 19. Effects of customization on strategic alignment

This 2x2 is a contingency framework stated that, Strategic customization that you don't make will have a negative impact on Strategic Alignment. Strategic customization that you do make will have a positive impact on Strategic Alignment. Consistency customization that you don't make will have little or no impact on Strategic Alignment. Consistency customization that you do make will have little or no impact on Strategic Alignment.

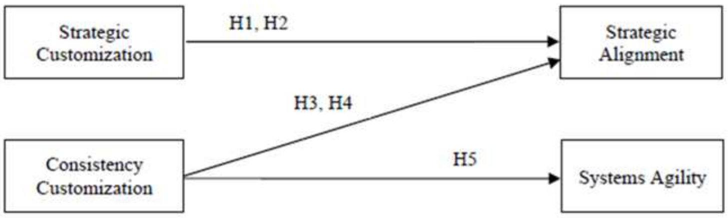


Figure 20. Customization type and its business objective

Gattiker and Goodhue (2002) effect on a subunit's (department's) ability to access necessary information, the ability to coordinate with other areas, and the overall fit between ERP and task needs. Specifically, in a case where vanilla ERP systems were implemented for non-strategic business subunits, the impact on the organization was minimal. This supports the hypotheses that customizations that are not strategic will have very little impact on the strategic alignment.

However, in terms of systems agility, the extent of the consistency customization will determine the impact of such customizations. Very complex consistency customizations are more likely to negatively impact systems agility than low complexity consistency customizations. Consistency customization that you do make will have a negative impact on Systems Agility.

2.2. Level of customization

Level or degree of customization, was defined as the degree to which an ERP system was altered to meet the needs of a business unit. Ng et al. (2013)

2.2.1 ERP adoption is a complex process

ERPs are information systems that manage the data for a company's main business processes, from customer orders to accountability. Their functions include data capture, processing, and customized distribution to any end user (Serrano & Sarriegi, 2006). Technical changes are costly and can lead to schedule slippage because they are complex and need significant testing. To avoid high maintenance costs or to deploy a standard corporate model in an international group, some corporations implement ERP systems without, or with minimal, customization (Ghost et al., 2002).

It is found that the major research contribution for customization of ERP packages is the framework proposed by Luo and Strong (2004) for supporting management decision-making on customization choices. Of course, Light (2005) has identified the various problems in customization of ERP packages, but no solution has been suggested to overcome those problems.

The various risks in information system projects are financial, technical, functionality, project and political. Of all these risks, functionality risk is the worst, affected due to increased customization in ERP projects. The risk factor may come into play if a significant amount of customization is required (Keil & Tiwana, 2006).

2.2.1.1. Phase of ERP adoption

An organization's experience with an enterprise system can be described as moving through several phases, characterized by key players, typical activities, characteristic problems, appropriate performance metrics, and a range of possible outcomes. Each enterprise system experience is unique, and experiences may differ considerably, depending, for example, on whether the adoption of the enterprise system is initiated by IS specialists or by businesspeople, involves external consultants or is done largely in-house, follows a process of strategic IT business planning or business process reengineering or does not follow such a process, and so forth.

The chartering phase comprises decisions leading up to the funding of an enterprise system. Key players in this phase include vendors, consultants, company executives, and IT specialists, although the precise constellation of players may vary. (Sometimes vendors sell directly to company executives, with minimal IT involvement; other times the decisions are driven by IT specialists, with minimal executive involvement.) Key activities include building a business case for enterprise systems, selecting a software package (though this decision may be deferred until the project phase), identifying a project manager, and approving a budget and schedule. A large number of errors or problems can arise during this phase. The business case for investing in an enterprise system can be incomplete or faulty; the organization may seriously underestimate the need for business and organizational change in conjunction with the software implementation; objectives and metrics for the initiative may be left undefined (Ross, 1999). The outcome of this phase may be a decision not to proceed with the enterprise system or a decision to proceed. If the latter, the chartering decisions passed on to the next phase may be sound or unsound. An example of an unsound charter is a build-to-order company purchasing an ERP package designed for a make-to-stock business (Markus and Tanis, 2000). Another example is the decision not to allocate sufficient resources for change management and training (Ross, 1999). A third is the decision of a decentralized company to require more standardization of business processes than is necessary to achieve business benefits (Davenport, 1998). Still another is the choice of a highly inexperienced project manager.

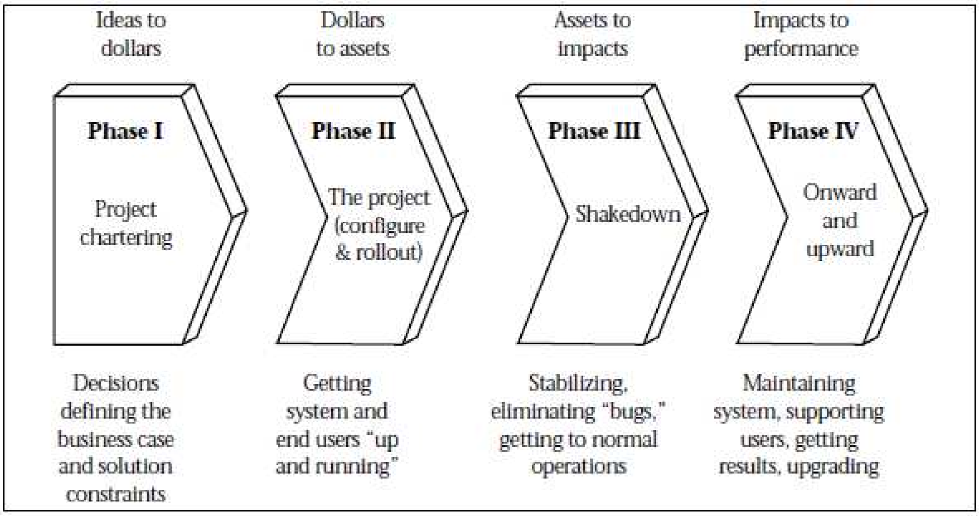


Figure 21. Phase of ERP implementation

The project phase comprises activities intended to get the system up and running in one or more organizational units. Key players include the project manager, project team members (often nontechnical members of various business units and functional areas), internal IT specialists, vendors, and consultants. Again, the constellation will vary, depending on the decision to do the project in-house, with outside assistance, or on an outsourced basis. Key activities include software configuration, system integration, testing, data conversion, training, and rollout. Again, a large number of errors and problems can occur. Project teams may be staffed with inadequate representation; teams may lack requisite knowledge and skills; teams may embark on extensive, unnecessary modifications; data cleanup, testing, or training may be inadequate. In addition, of course, the business conditions characterizing the chartering phase may have changed: The company may have fallen into financial distress, it may have merged with another company, or it may have shifted business models. Some projects are terminated owing to cost or schedule overruns or severe technical problems. Others result in the rollout of the operational enterprise system functionality to one or more organizational units. If the latter, the enterprise system functionality, operational performance, and organizational preparation may be sufficient to fit the organization's goals and/or needs, or they may be insufficient for "success."

Table 5. Characteristics in each phases of ERP implementation

Phase Name, Description, and Key Actors	Typical Activities	Common Errors or Problems	Typical Performance Metrics	Possible Outcomes
Chartering ("ideas to dollars") • Decisions leading up to project approval and funding • Executives, selected IT specialists, enterprise systems vendor, and/or consultants (may be IT driven with low executive involvement	• Idea of adopting enterprise systems surfaced • Business case for investment developed (may be highly informal) • Definition of key performance indicators and process of measurement	• Overselling by software vendors and implementation consultants • Failure to link technology plan to business strategic plan • Unrealistic business case and project parameters • Key performance	• Not usually formally measured • Possible metrics include quality of business case, fit with business strategy, relevance of key performance indicators, adequacy of schedule and budget, soundness of project parameters,	• ES idea abandoned as unlikely to provide business benefits • Decision to proceed with a project with certain parameters (schedule, scope, and budget) • Business case for Project unsound,

or executive driven with low in-house IT involvement)	• Current state analysis (may be deferred or not done) • Selection of software, hardware platform, networking, database, implementation partner, project manager (may be partially or totally deferred to project phase) • Initial plans for how system will be rolled out, supported, and maintained, upgraded, etc. (may be deferred)	indicators not or poorly defined, including the measurement process and ownership of this • Selection of inappropriate software, hardware, integrator, and/or project manager; inadequate contracting with external parties • Inadequate contracting with vendors and consultants • Lack of long-term support and migration strategy	and constraints	creating potential for problems later • Business case for project is sound

• Communication to organization • Organizational changes and/or incentives related to enterprise system and/or organizational performance improvement, if any (may be deferred) • Decision to proceed, approval of project plan	• Failure to recognize need for business change; underestimating change management difficulty • Misunderstanding organizational requirements, particularly as related to need for data access and reporting

The shakedown phase is the organization's coming to grips with the enterprise system. The phase can be said to end when "normal operations" have been achieved (or the organization gives up, disinstalling the system). The project (or consulting) team may continue its involvement or may pass control to operational managers and end users and whatever technical support it can muster. Activities include bug fixing and rework, system performance tuning, retraining, and staffing up to handle temporary inefficiencies. To a large extent, this is the phase in which the errors of prior phases are felt in the form of reduced productivity or business disruption but new errors can arise in this phase too. For example, the organization may come to rely excessively on knowledgeable project team members rather than building the enterprise system knowledge and skills in all relevant operational personnel. As mentioned, some enterprise systems are terminated during the shakedown phase, as in the case of Fox-Meyer Drug (Bulkeley, 1996). Alternatively, organizations may achieve (or declare) "normal operations." If the latter, the impacts attributable to the organization's use of the system may fit its goals or business needs, or they may fail to do so.

The onward and upward phase continues from normal operation until the system is replaced with an upgrade or a different system. It is during this phase that the organization is finally able to ascertain the benefits (if any) of its investment. Key players include operational managers, end users, and IT support personnel (internal or external). Vendor personnel and consultants may also be involved, particularly when deliberations about upgrades are concerned. Characteristic activities of this phase include continuous business improvement, additional user skill building, and post-implementation benefit assessment; however, these "typical" activities are often not performed. A common problem of the onward and upward phase is the loss of knowledgeable personnel who understand the rationales for prior configuration choices and how to improve the business processes through the use of the system. Several ultimate outcomes are possible: The organization may be unwilling to undertake further improvements or upgrades. The organization may decide that its investment has been unsuccessful in meeting goals or business needs. Or the organization may decide its experience has been a success. If the latter, the organization's competitive position may or may not have been improved as a result of its use of enterprise systems.

Each enterprise system experience runs a different course, but across the variations, regularities can be found.

- Many different things can go wrong in each phase of the enterprise system experience cycle. Furthermore, not all problems or errors are immediately detectable (and, hence, they are not all immediately correctable).
- There are several possible outcomes for each phase. One is an "optimal" outcome, for example, in the chartering phase, the decision to proceed with an enterprise system project that has a sound business case. A second outcome is a "termination" outcome, such as the decision not to proceed with the enterprise system because analysis revealed an unacceptable business case. A third outcome might be called "continuation with undetected and uncorrected problems" or "unresolved experience risk." The subsequent phase inherits these unresolved risks.
- This third outcome is analogous to what sociotechnical systems theorists call a "variance" (Markus & Tanis, 2000). In industry, variances are not necessarily detected right away; if they cause problems, they may do so only much later in the production process after much money has been expended in working the raw material. Similarly, requirements definition errors in software

development may not show up until the system is put into production. Unresolved variances in each phase of an enterprise system experience are passed on to the next phase, where they may or may not be detected and appropriately resolved (depending on probabilistic processes). So, for example, some variances in the chartering phase may remain uncorrected until they show up in the onward and upward phase as a lack of business benefits. In general, the cost of fixing problems increases with delays in recognizing and correcting variances.

Generally speaking, different actors are involved in different phases of the enterprise system experience cycle. While there may be some continuity across phases (for example, oversight by an executive steering committee during the project phase), handoffs to a different group of people (with different specialties, experiences, and skills) increase the likelihood that variances passed on from earlier phases will not be caught and resolved until they create significant problems. For example, project teams rarely catch and correct significant errors (e.g., failure to match the project to business strategy) in the business case that forms their "charter."

Of course, not all variances end up causing problems and requiring fixing or rework. Whether or not variances cause problems depends on probabilistic processes such as bad luck, changing business conditions, interactions with other variances, and so on. For example, a badly configured enterprise system requiring expensive rework may not be a problem if the organization's financial position remains sound. Furthermore, it is possible for external conditions and the organization's decisions and actions to interact in such a way that the outcome is better than it was at a prior point, increasing the standard of optimal success. For example, successful implementation of ERP software, while perhaps not providing immediate business value to the adopting organization, might nevertheless position that organization to take advantage of supply-chain integration, thus improving its competitive position relative to competitors.

If there is risky in the chartering, when bad luck occurred during the project phase, the company's decisions had the effect of increasing rather than decreasing risk. When major problems finally materialized during shakedown, the organization did not have the time or the resources to overcome them.

2.1.1.2. Factors in Enterprise System success

As a result of ERP vendor propaganda, many business leaders believe that implementing an ERP system is as simple as “snapping Lego bricks together”. But the reality of ERP implementations is complex” (James & Wolf, 2000). The successful optimization and integration of enterprise processes through ERP systems present significant hurdles for all corporations. Barber and Frolick (2003) posited that the adopting organization will realize the full benefits of an ERP system only if the implementation is done in a holistic manner with appropriate IT governance.

At any one moment in time (phase), an enterprise system adopting organization faces a situation that involves conditions and events (some of them outside its direct control) with an ability to make plans and take actions (that is, goal-directed or "motivated" behavior). These elements of the situation are the factors in (influences on) the outcomes that become inputs at the next moment in time (phase).

The organization adopting an enterprise system faces several starting conditions such as competitive position, industry, financial position, prior relevant experience, size, structure, and management systems that may predispose it to success or failure. While there are undoubtedly threshold levels for some of these conditions, they generally cannot be said to be necessary (or sufficient) for the success of the enterprise system, since organizations have been known to succeed or fail despite them. But these factors come into play in the enterprise system experience in two ways.

First, organizations' goals and plans for enterprise systems may or may not be realistic when viewed objectively in light of these conditions. Dell, for example, decided (after some experience) that an enterprise system was not sufficiently flexible for its rapid growth. For another example, an organization on the brink of bankruptcy may not have enough time and money to realize the benefits of an enterprise system. Starting conditions define the needs and opportunities of organizations relative to enterprise systems (whether or not organizations recognize them for what they are).

Second, starting conditions may not remain the same over the course of the enterprise system experience. After a company decides to customize the enterprise system software, the vendor delivers the needed functionality. After the company has configured the enterprise system for a particular way of doing business, the company merges or sells off a major line of business. Sometimes changes in conditions favor the organization's plans. But probably more often, changing business conditions derail plans. Successful organizations modify goals, plans, and execution to bring their behavior back into line with the environment.

The organization's goal-directed enterprise system behavior can be defined in four categories: goals, plans, execution, and responses to unforeseen problems. First are the goals themselves. Some goals are more conducive to success than others, some are too unambitious to be motivating, and others are unrealistic in light of the objective characteristics of the enterprise system and the organization's starting conditions. Given the great complexity and expense of enterprise systems, for example, some analysts argue that only companies seeking to streamline business processes, to standardize data, or to standardize processes can achieve a positive return on their enterprise system investment (Markus & Tanis, 2000). Plans are another factor in the equation. Plans (and policies) such as not to customize, to reengineer first (last, or not at all), and to phase the rollout are essential to keeping the project phase on track. Enterprise system integrators often claim to have "the methodology" that will guarantee success, but not all plans are created equal. The organization's plans for an enterprise system must be linked to its starting conditions and goals. Traditional organizations may need much more change management activity than those in the volatile high-tech sector. The need for a particular business capability may necessitate a risky big-bang rollout (Markus & Tanis, 2000).

The best laid plans are worthless if they are not followed. Good execution is something that a consultant's methodology cannot guarantee. If configuration tasks exceed the schedule, cutting the time allotted to testing and training may not guarantee failure, but, given these choices, success will require more than a little luck.

No matter how well an organization executes plans well designed to meet its carefully thought-out goals, conditions may change and unforeseen problems may arise. Successful organizations successfully resolve problems by changing their goals, plans, and actions to get a favorable outcome.

Starting conditions, changes in conditions, goals, plans, and actions interact (Markus & Tanis, 2000). Resulting from these interactions are unresolved risks and problems (as well as opportunities, although avoiding failure is usually the primary concern). Unresolved risks and problems themselves interact with changing business conditions and the organization's actions in response to them. If the experience is not terminated, the interactions in one phase result in starting conditions for the next. In economic terms, the course of the enterprise system experience exhibits "path dependence." The final outcome may be very close to optimal success (itself a moving target) or suboptimal on one or more dimensions.

2.2.2. Avoidance of customization

Since ERP implementation often requires extensive customization, such projects are exposed to functionality risks that are similar to those associated with in-house software development. One way to keep the ERP projects away from functionality risks is to minimize the degree of customization. Both technical knowledge and domain knowledge are necessary for accomplishing successful integration with other interdependent systems that might already be in place in the organization. Requirements volatility can still be an issue as business needs may change during the ERP implementation.

Somers and Nelson (2003) discuss about a number of factors with negative influence when adjusting an ERP system. They argue that customization is associated with increased costs, longer implementation time and the decrease of maintenance and upgrade support from the ERP vendor. These are also supported by Parr and Shanks (2000), Soh et al. (2000), and Luo and Strong (2004). Davis (2005) and Portougal (2005) also support the fact that customization leads to problems with the maintenance.

According to Brehm et al. (2001), both ERP vendors and consultants usually discourage modifications of the ERP system. Vendors can prevent this by regulating modifications in license agreements. Vendors, in form of consultants, may also refuse to make changes because of high development and maintenance costs. They may also deny support if changes are made. Shang and Seddon (2006) argue that ERP vendors usually recommend not to use customization, because of software development risks and the need for re-customization due to new releases and updates. The implementation of an ERP system requires a wide range of expertise and knowledge about software and hardware of system, project and change management (Ng et al., 2003). Kumar et al. (2003) report that major causes for problems with ERP implementation are unavailability of skilled people and escalation of costs. Light (2005) says that developers and consultants may be limited in experience and knowledge for customizing the system. Luo and Strong (2004) argue that when doing more advanced changes to the system, a key requirement is to understand the meaning and consequences of each change. Complexity of the system and its customization is a negative factor for adjustments (Davis, 2005 and Brehm et al., 2001). Ng et al. (2003) argue that adjustment of ERP systems may be the foundation for a complex ripple effect which have negative impact on the whole system.

2.2.2.1. Risk of customization

The various risks in information system projects are financial, technical, functionality, project and political. Of all these risks, functionality risk is the worst, affected due to increased customization in ERP projects. The risk factor may come into play if a significant amount of customization is required (Keil & Tiwana, 2006).

(Chen et al. 2009) In terms of scope management, many authors have cautioned that customization would likely increase the cost and risks of ERP implementation and the difficulty for upgrades and migration to future releases (Chen et al., 2009). Indeed, unchecked customization contributed to the poor outcome of the first ERP implementation. However, some amount of customization will always be necessary to meet specific business requirements (Themistocleous et al., 2001), especially in a multinational company with different regional requirements. To capitalize on business opportunities, changing system requirements is a viable option from a managerial perspective, but this represents a great economic cost to any company that trades system functionalities for business agility. The conflict between the need to meet business needs and the need to control system complexity causes tension between management and IS professionals, and the pressure to resolve the conflict creates a sense of obligation in the system implementer to change system requirements to meet business needs. This, in turn, reinforces an unspoken commitment to adopt the "change" option, even though there are viable alternatives (e.g., maintenance, off-the-shelf package, or no change). Creeping requirements can be especially destructive because of their implicit nature, which can mean that their negative impacts are never fully and explicitly recognized, acknowledged, or addressed. Any changes made to honor creeping requirements will be interpreted as a reinforcement of an earlier promise or commitment—whether or not that is the intent of the MIS department. As a result, MIS can be kept from committing their limited resources to what matters most to enterprise projects, such as reliability, functionality, and training. The chain effect of disagreement and interference during the system requirements acquisition can affect project outcomes.

Implementation of Enterprise Resource Planning (ERP) systems has been a source of pain for organizations since the inception of ERP software. One of the sources of pain is customization. Beyond being a source of pain in implementation, customization affects the organization in an on-going fashion through increased maintenance costs, increased complexity, and less flexibility of the system. For these reasons, many have argued that a "vanilla" implementation, i.e. without customization, is the "best" way to implement ERP systems. However, when business processes in an organization cannot be modeled in an ERP system without customization, the impact of a decision to not customize becomes relevant. The opposing forces of the requirement to customize to include business processes and the desire to successfully implement an ERP system without: additional complexity, additional maintenance costs, and less flexibility deserve further research. All customizations are not created equal, and a certain type of customization is beneficial. Specifically, strategic customizations will enhance the IT infrastructure strategic alignment with the business strategy. Non-strategic customization, such as consistency customization, will impact the system agility of the corporation.

2.2.2.2. Factors influencing Level of customization

The factors influencing on the choice of adjustment of ERP systems originate from three domains: the customer, the consultant and the system. The factors within customer domain are attitude towards customization, costs, knowledge, process design, time and user needs. Attitude towards customization, customization possibility and knowledge are in the consultant domain. Complexity, external software, functionality and maintenance are within the ERP system domain. All factors, which were derived from the literature, have been validated by empirical study.

ERP implementation issues and a summary is provided in Table 6. From this literature review, Parthasarathy and Anbazhagan (2007) find that the customizations that must be carried over from one version of enterprise software to the next are the biggest technology headache in ERP implementation. Hence, in this study they have exemplified the application of analytical hierarchy process (AHP) to a framework to enable the top management and ERP consultants to find a suitable feasible customization option in ERP implementation which will increase the success rate of the ERP software.

Review of literature	**ERP implementation issues**
Amrit Tiwana & Mark Keil (2006)	Risk factors may come into play if a significant amount of customization is required.
Redouane El Amrani, Frantz Rowe & Benedicte Geff-oy-Maronnat (2006)	It is vital for the company's processes to be accurately aligned with those of the ERP system if the full benefits are to be realized.
Mark Keil & Amrit Tiwana (2006)	Ease of customization is judged to be an important criterion in ERP implementation.
Robert C. Beatty & Craig D. Williams (2006)	Over-customizing the standard ERP software modules will make the organization unable to take any ERP upgrade

	initiative.
Nicolas Serrano & Jose Maria Sarriegi (2006)	ERP is an information system which needs customization to reap its full benefits
Ben Light (2005)	It is difficult for ERP vendors to keep pace with changing industry requirements and to nuance their products for use by a range of customers.
Botta-Genoulaz, Millet & Grabot (2005)	ERP systems must be flexible enough to support newly discovered customer trends.
Konstanflons Chertouras (2004)	Consultants play a crucial role in ERP customization. They tailor the system according to business processes.
Diane M. Strong (2004)	Adjusting the software to fit the organization should be the only form of ERP customization.
Boudreau & Robey (1999); Robey, Ross, & Boudreau (2002)	Organization needs to be changed to fit the ERP systems
Fiona Fui-Hoon Nah & Janet Lee-Shang Lau (2001)	Customization is one critical success factor for ERP implementation.
Sawyer (2000); Gefen (2002)	User participation is limited during the development of ERP software
Jeanne W. Ross (1999)	Process change is inevitable with an ERP because we have to fit the organization around the software.
Bingi, Sharma, & Godla (1999); Holland & Light (1999); Reel (1999); Sumner (2000)	BPR and minimum customization lead to successful ERP implementation.
Davenport (1998); Brehm, Heinzl, & Markus (2001); Glass (1998)	ERP systems need to be changed to fit existing business processes

Table 6. ERP Implementation Issues

To what extent a system can be customized is determined by the tools provided by the ERP vendor and consultant's knowledge on system and developing tools (Luo & Strong, 2004).

FACTOR	MOTIVATION
THE CUSTOMER	
Attitude towards customization	The customer is holding this attitude. It originates from the customer.
Costs	It carries an influence on the choice of adjustment taken by the customer.
Process design	The design of the processes found in the customer business. It originates from the customer.
Time	It carries an influence on the customer to choose adjustment type to implement.
User needs	It originates from the customer.
THE CONSULTANT	
Attitude towards customization	The consultant is holding this attitude. It originates from the consultant.
Customization possibility	The possibility for customization, either provided by the vendor or accessibility by the consultant. It carries an influence on the consultant.
Knowledge	The system development knowledge possessed by the consultant. It originates from the consultant.
THE SYSTEM	
Complexity	How complex the system and the adjustment types are. It originates from the system.
External software	The external software to be implemented. It carries an influence on the system.
Functionality	The missing and existing functionality in the system. It originates from the system.
Maintenance	The work connected with maintaining the systems. It originates from the system.

Table 7. Perspectives on factors influencing on the adjustment

1. Willingness

One factor that influences the amount of tailoring is the organization's willingness to adapt its practices to the package, when the two differ (and when the package's processes would actually work for the business, which as mentioned above, is not always the case). The business practices of many organizations have evolved over time, acquiring idiosyncrasies that may not be strictly necessary or efficient. Nevertheless, the organization may be unwilling to abandon them. Thus, many ERP adopters must face a painful choice when adopting a package that works differently than they do. First, they can adopt the business process built into the software, making the necessary organizational changes such as departmental reorganization and shifts in job duties. Second, they can just live with the lack of fit between the package and their procedures (Martin et al., 1998), which entails problems and inefficiencies such as redundant manual processes and other workarounds. Finally, they can try to adapt the ERP package to the organization's existing business process. This is where tailoring comes in.

2. Cost

The organizational fit of an ES is an important factor for a successful implementation (Hong & Kim, 2002). Importantly, all customization involves at least some extra costs. These fall into three general categories. The first is the development costs of planning and making the changes, and assuring that the changes are correct. For simple configuration changes within the bounds set by the ES vendor, these costs are relatively minor, but costs go up as more invasive modifications are performed. The second category is the cost of integrating the specialized module with other modules. The third is maintaining the customized module over time, including often being forced to redo customizations as later releases of the ES or best-of-breed software become available.

Cost of ERP systems adjustments arise not only during implementation of the adjustments, but also from maintenance. The reason for costs to be an influencing factor is that adjustment is generally associated with high costs (Luo

& Swong, 2004), Parr & Shanks 2000, Soh et al. 2000, Somers & Nelson 2004). When asked about the influence of costs on choosing adjustment of the ERP system, the vendor or consultant made a calculation of cost for the extra effort needed for adjustment and its maintenance; and then the customer had to make decision whether it is worth or not. Obviously, it affects the customer. Customers might evaluate alternative ERP vendors when the costs associated with adjustments and its updating are high.

The tailoring types are likely to affect upgrading in different ways. For example, parameters set during configuration should be unaffected by a new release. This is a major task of the vendor and one of the benefits adopters expect from packages. However, if some new functions are provided in the upgrade, the adopter may be required to set parameters to configure them. The other tailoring types require greater effort since more system layers are involved. For example, screen masks may have to be reprogrammed if the underlying fields have been changed in a new release or if new fields have been added, but not if only the logic has been changed. A modification of package code will have to be thoroughly tested and may have to be reprogrammed every time a data field, software function, or variable is changed in a new release.

The level of usage of tailoring types will also influence the effort required for upgrading ERP systems. The more complex a tailoring effort (i.e., large, interdependent with other changes, or not protected against overwriting with new software code), the more likely it is to require greater effort in maintenance and post-implementation.

3. Time

Project schedules were revised in 50% of the organizations. The main reasons stated were that organizations under-estimated work volume. The packaged software was not plug and play; many customizations and modifications were needed. Sometimes the companies re-engineered their processes along with implementing ERP, which took more time than expected.

Longer time is generally needed for adjusting ERP system during implementation and maintenance. It is considered as an influencing factor on the choice of adjustment by previous research (Luo & Strong, 2004; Parr & Shanks, 2000; She et al., 2000; Somers & Nelson, 2004). Consultant determine the time needed on the extra efforts required for adjustments. The customer then has to decide whether these extra efforts are worth or not. Furthermore, there is also extra time needed for adjustments during upgrades. Every adjustment needs to be run to make sure that they follow the upgrade.

4. Knowledge

According to Markus and Tanis (2000), adjustment of the system is happened, as customer wants to keep its legacy systems and use other external software. It is due to the lacking of ERP systems in providing support for all the necessary functions of business. Brehm et al. (2001) claim that interface development and integration is done in the system due to the external software which the customer wants to keep and continue to use.

Because customizations are built as part of a development effort, many times during an implementation time frame, customizations may have minor bugs

(Markus, Axline, Petrie, & Tanis, 2000; Soh, et al., 2000) that the vendor supplied ERP software would not. These bugs can cause delays in development during the implementation of an ERP, and affect the successful implementation. Customizations have been found to have negative effects on the outcome of ERP implementation projects (Gattiker and Goodhue, 2004; Levin, 1998; Parr and Shanks, 2000). The example case in Gattiker and Goodhue (2004) where the entire implementation budget was spent on just four of 20 plants illustrates the problems that customization can bring to bear on an ERP implementation project. In general, less customization will mean shorter implementation times (Levin, 1998), thus the inclusion of "vanilla" implementation in so many ERP implementation critical success factor studies (Nah & Zuckweiler, 2003).

In the customer domain, knowledge refers to the system development knowledge possessed by the customer. If the customer do not possess this knowledge, it is more difficult for them to know what adjustments are possible and suitable. In the literature, knowledge is only seen from the viewpoint of the consultant to influence the adjustment (Kumar et al. 2003; Light, 2005; Luo & Strong, 2004; Ng et al, 2002). However, from the viewpoint of the customer, it exerts an influence on the chosen adjustment as well. If there exists high system development knowledge in the customer organization, then internal system developers take care of the adjustment of ERP in-house. If customers has knowledge on that area, they always play a role on which adjustments to be done. They suggest suitable adjustments. Vendor prefer customers to make adjustments by themselves and to create value for their customers. To ease adjustment of the system by the customer, vendor have a number of tools and provides education to them.

5. Complexity

Organizational complexity and geographic dispersion, which influence the scope of tailoring effort. Davis (2005), Brehm et al. (2001) and Ng et al. (2002) discuss complexity as a factor affecting adjustment. When the system or the type of adjustment is too complex, changing of system is generally avoided and vice versa. Complexity highly affects their way of adjustment. It makes the adjustments a lot more difficult to realize, and it is hard to understand and foresee the future consequences of the adjustments in that situation. So, they avoid making changes of the core of the ERP. Nastek also describe complexity about the process of going through all adjustments during maintenance due to this factor.

Adjustment depends on customization possibility, which refers to whether or not the consultant has access to the ERP package code, or development tools provided by vendor (Brehm et al., 2001; Luo & Strong, 2004). Some ERP system have rich tools available for customization.

External software can, for example, be legacy system, newly purchased systems, or chosen external modules. Brehm let al (2001) and Markus and Tarus (2000) consider this as a factor for adjusting the ERP system. Vendor claim that their customers often have other system, which they want to integrate and continue. Integration with external software is one of the most common adjustment types they do. Another form of external software is the use of add-ons from outside the current ERP.

According to Hossain and Jahed (2010), lack of functionality in an ERP system, errors in the functionality, better functionality available in other system are commonly found. There is also a difference between perceived functionality and the actual functionality (Hossain and Jahed, 2010). Sometimes the software does not have the functionality required by customer or there is better functionality for a certain customer available in other vendor's module. IFS argue that the functionality of today's ERP systems has increased a lot and they are even more flexible. Therefore, adjustment is not as necessary today as it was before. And vendor sometimes use modules from other ERP vendors due to its better functionality.

Tushman and Nadler (1978) stated that when an individual subunit's local task characteristics or its local external environment differ from other organizational subunits, then that subunit may well require unique, nonstandard systems in order to cope with its particular circumstances. By contrast, ERP systems tend to impose standard processes and data on organizations—and on the plants in those organizations (Davenport 1998). Existing research has documented that the fit between an ERP's standard processes and the organization's business conditions is an important issue (Somers and Nelson 2003). However, we must also consider the possibility that there can be a poor fit between an ERP and an individual plant's business conditions.

Once organizations have chosen a particular ERP vendor and system, they must configure the system by considering the overall corporate needs. (We are assuming, for now, that the organization avoids customization, bolt-ons, and the like.) In other words, standard processes and data definitions are defined to meet the needs of the overall company and its plants a type of intra-company consistency which many organizations consider beneficial (Cooke and Peterson 1998; Kumar et al. 2002; Mabert et al. 2000). However, because all subunits are subject to the same set of configuration decisions that are made at the organization level, if one plant has very different business processes than the majority, that plant may experience problems because the ERP gives it little local level flexibility (Gattiker and Goodhue 2002; Jacobs and Bendoly 2003; Jacobs and Whybark 2000).

Draw on organizational information processing theory (OIPT) (Gattiker and Goodhue, 2005). OIPT suggests highly integrated systems will fit some organizational subunits better than others, and that interdependence and differentiation are two characteristics that might influence the level of fit. Specifically, when ERP is implemented, subunits that are highly interdependent, that is, very dependent on other subunits may benefit substantially. However, subunits that are very different from the other subunits in the ERP implementation may incur costs (such as suboptimal business processes or dependence on employee work arounds). In brief, since ERP systems provide integration and standardization, their impact will be influenced by the interdependence and differentiation between sub-units of the organization.

The complexity added by customization is an issue for organizations implementing ERP systems. An ERP system is already a complex system, requiring massive amounts of organizational change as part of the implementation process (Barnes, 1999). The added complexity of customizing the ERP system is problematic.

6. Vendor

A major part of maintenance is done by implementing released updates from the ERP vendors. Somers and Netson (2004) argue that vendors decrease future support and upgrades for maintenance when heavy adjustment is made.

Because complex maintenance, due to heavy adjustment, might demand reconfiguration and retesting (Brehm et al., 2001); Davis, 2005; Ng et al., 2002). Upgrading a heavy adjusted system might also require reimplementation of the ERP system. Luo and Strong (2004) recommend only a light customization to ease the updates. This results in high effect on the customers who have heavily adjusted their ERP systems. On the other hand, the consultant have to adapt the vendor's ERP system during maintenance. To ease the maintenance, a usual strategy is to use predefined macros and scripts and not to change them. The cause is to have as small problems as possible with future upgrades. External applications are also avoided because of the maintenance risk connected with it.

The problems associated with ERP customization do not end with implementation. Customization of an ERP will have maintenance and upgrade impacts (Zrimsek and Geishecker, 2002). Each time a change is required to the system, the effect of the change on the customization will have to be assessed by the organization, as the software vendor will not support these customizations. Many times, this requires bringing in an expert to help with this assessment. These additional requirements reduce flexibility or agility of the system. As well, ERP software vendors do not usually support customizations in future versions of the software. For example (give own example) an upgrade of accounting software is required each year to be compliant with tax law. If a company is using an ERP system with customization, the effect of the tax law upgrade will have to be tested with the customization of the system to ensure processing continues as expected. The added complexity required by customization of ERP systems reduces system agility as well.

Brehm et al. (2001) mentioned the same issue 'maintenance' as Somers and Nelson (2004), Davis (2005), Portougal (2005) and Ng et al. (2002) did. They describe maintenance as the work to correct errors, implement new functionality, up-gradation and adjusting the system to external changes. Vendors, as implementers, may refuse to modify the ERP system because of the associated maintenance costs and risks (M.M.Hossain and M. A.Jahed 2010). Another factor for adjustment, supported by Alvarez (2002), Gibson et al. (1999) and Light (2005), is the attitude of implementer towards customization.

Somers and Netson (2004) argue that vendors decrease future support and upgrades for maintenance when heavy adjustment is made. Because complex maintenance, due to heavy adjustment, might demand reconfiguration and retesting (Brehm et al., 2001); Davis, 2005; Ng et al., 2002). Upgrading a heavy adjusted system might also require reimplementation of the ERP system. Luo and Strong (2004) recommend only a light customization to ease the updates and so do Gibson et al. (1991).

Package vendors and consultants provide (for a fee) a variety of support services that can reduce the burden on system adopters. The support services provided by package vendors include help-desks and an ongoing stream of releases and upgrades to fix bugs, add new functionality to the package, include changes necessitated by external factors (e.g., human resources changes related to new tax laws), keep pace with competition in the software marketplace, and accommodate technical developments (e.g., the Internet) (Bingi et al., 1999). But vendor support does not entirely relieve the ERP system adopter from maintenance and post implementation activities. While the vendor is responsible for correcting bugs in the source code, the adopter sometimes has to implement changes in the program code to fix urgent bugs.

Further, the adopter is solely responsible for correcting bugs in the configuration (e.g. wrong parameter settings). Hirt (1999) show that ERP maintenance activities are distributed across the vendor, the adopter, and external consultants. Table 8 categorizes ERP maintenance activities according to (Swanson & Beath, 1989) with extensions by Pressman (2005) and Krogstie (1995), of the tailoring types and by using them to a greater or lesser degree. A company's tailoring choices may not be best for its situation: several researchers have noted the occurrence of "unnecessary modifications" made out of ignorance of package functionality (Markus and Tanis, 2000).

Maintenance activities	Vendor	Adopter	External Consultants	Technically oriented	Business oriented
Corrective	✓	☑		✗	
Adaptive	✓			✗	
Perfective					✗
- non-functional (e.g. EnjoySAP GUI)	✓	☑	✓		
- functional	✓	✓	✓		
Preventive	✓			✗	

(Legend: ✓ = main task for this participant; ☑ = secondary task for this participant; ✗ = is related to)

Table 8. ERP maintenance activities: participants & characteristics

7. Consultant

Deciding the degree of customization for an ERP system and the business process is a crucial decision which needs to be taken by the organization with the help of consultants, as it is indispensable in an ERP's success. In general, the ERP vendors have the opinion that the higher the degree of customization, the lower the performance of the ERP software (Leishman, 1999). The process of customization will not take place properly unless there is a strong working knowledge of ERP systems. Customization not only accounts for ERP's success but also for achieving user satisfaction. As ERP is basically packaged software, and each organization's strategies, structures, and systems are different, substantial customization is necessary.

The consultant’s attitude towards adjustments is, in general, negative; they make as few adjustments as possible. The consultant discourages the willingness of the customer towards adjusting the system (Brehm et al., 2001). Light (2005) and Shang and Seddon (2006) argue that the most successful ERP implementation projects are the ones where a standard model is adopted. Customization is not recommended because of its negative impact. Vendor recommend that customization be avoided to a large extent because it can result in ruining of core functionality. They try to convince the customer that customization of the system is not the best solution.

Outsourcing skills from consultants came out as a widely accepted method in ERP implementation. And also found incompetent consultants as a major challenge in implementation. It was obvious from the results that in implementing ERP systems firms faced more behavioral and management related challenges; such as the end user not being ready, resistance to change, lack of training, turnover of key project persons and lack of project planning, rather than pure technical glitches such as software bugs and configuration difficulties.

The degree of knowledge, on system development, possessed by the consultant affects adjustment of the ERP. Higher knowledge leads to greater competence and possibilities for adjustments; and better judgment regarding feasibility of adjustments (Kumar et al., 2003; Light, 2005; Luo and Strong, 2004; and Ng et al., 2002). It is always possible to gain more knowledge and to develop new techniques for different type of adjustments. Vendor have high knowledge and experience with ERP implementation, they may implement all available adjustment possibilities.

Project scope was rarely revised, whereas about 37% of the responding organizations revised their budget and 50% revised their schedules. The main reasons stated for budget revisions were the high costs of consultants. Consulting dollars also represented as high as 70% of the total project costs in one project. Training costs were next on the list of reasons for exceeding budget. Training was costly and retraining was often required due to high turnover of employees and changes in the systems. Extended project schedules, reported in 50% of the cases, also contributed to budget revisions.

2.2.2.3. Attitude toward customization

The amount of adjustments of ERP system depends on the attitude of adopting organization towards adjustments to fit it with the business (Gibson et al., 1999). Also Alvarez (2001) mentions willingness of the organization to adjust the system. The basic reason for adjusting the system is to make the ERP accepted by the members of the organization.

In line with what Alvarez (2001), Brehm et al. (2001) and Gibson et al. (1999) argue, the attitude towards customization is the degree of willingness held by the customer to customize the system. The customers often use the Software Modification & Enhancement or System Exploration strategies, as they have the will to customize the ERP system. For example, if the customer recently has implemented a sales system or if the users have been working in the same system for a long time, the willingness to adjust the ERP system with these may be higher. The customer attitude towards customization varies. Generally the customer wants to adjust the system more than its necessity. To avoid adjustments in the system, consultant try to convince the customer to make few adjustments and instead go for change in their processes.

2.2.3. Over customization (Excessive)

Because the ERP packages are integrated as well as flexible, setting parameters in one module of the package can have unintended consequences in other modules, and increasing the skill and effort required to configure the package well. Further, the sheer size and complexity of these packages means that implementers may be unaware of exactly what an ERP package can and cannot do, leading to configuration errors and unnecessary modifications (Markus and Tanis, 2000).

One has to be very careful during the process of customization as over-customization will result in a system with reduced flavor of an integrated system and will fail miserably to reap the full benefits of a packaged software solution. ERP vendors deploy technical consultants and functional consultants for carrying out this hectic process. The objective of customization in ERP implementation is to achieve a fit between the ERP system and the process that the system supports.

Closely related to the strategic alignment of business processes and IT infrastructure is the agility of the organization's systems or systems agility. Agility is a relatively new concept in academic and practitioner literature; however, related concepts have been studied extensively. For example, strategic flexibility from the strategic management literature, as Chen (2004) notes, is a closely related construct. Strategic flexibility was studied back in the early 1980's in terms of exit barriers (Harrigan, 1980) and was defined as a firm's ability to redeploy its assets without friction. More recently, strategic flexibility was defined by Shimizu and Hitt (2004) as "an organization's capability to identify major changes in the external environment, to quickly commit resources to new courses of action in response to change, and to recognize and act promptly when it is time to halt or reverse such resource commitments effectively, quickly, and at less cost to meet business needs.

The definition of strategic flexibility provided by Schimizu and Hitt (2004) is very close to many of the definitions that are available for agility. Table 9 ((Davis, 2005) quickly addresses many of the definitions currently in use.

1	Sambamurthy et al (Sambamurthy, Bharadwaj, & Grover, 2003)	".. .agility encompasses a firm's capabilities related to interactions with customers, orchestration of internal operations, and utilization of its ecosystem of external business partners. Operational agility ensures that firms can rapidly redesign existing processes and create new processes for exploiting dynamic marketplace conditions."
2	D'Aveni; Goldman et al 1995; as cited by Sambamurthy et al 2003	"Agility is the ability to detect opportunities for innovation and seize those competitive market opportunities by assembling requisite assets, knowledge, and relationships with speed and surprise."
3	Zaheer and Zaheer (Zaheer and Zaheer, 1997)	Breaks agility into two parts alertness and responsiveness.
4	Haeckel (Haeckel, 1999)	Defines adaptive companies in terms of sense-and-respond organizations, stating that truly adaptive corporations must ". manage information in a particular way; it must be managed as a system; and its leaders and employees must commit themselves to very different behaviors and responsibilities" essentially stating that sense-and-respond organizations function very differently than traditional organizations. It is believed that Haekel is referring to the adaptability of corporations as a form of agility for corporations.
5	Gartner (Gartner,	"Agility is the ability to respond quickly and effectively to rapid

	2001)	change and high uncertainty."
6	Dove 2001 (Dove, 2001)	"Agility is the ability to manage and apply knowledge effectively, so that an organization has the potential to thrive in a continuous changing and unpredicted business environment. Agility implies not only the ability to

Table 9. Definition of strategic flexibility

One of the differences between strategic flexibility and agility is the need for proactively sensing changes as opposed to simply being flexible in terms of reaction to change. The concept of agility also more clearly accounts for the business process change internal to the organization as part of organizational change in a responsive and sensing capacity. Part of the internal ability to be agile is systems agility. Chen (2004) further examined agility and defined systems agility as the ability of a firm to change their information systems effectively, quickly, and at less cost to meet business needs (Chen, 2004). Chen's definition of systems agility is used for the purposes of this paper. One component of system agility as defined above is the flexibility of the system. An attractive characteristic of ERP software is flexibility (Gattiker and Goodhue, 2002; Soh, et al., 2003). Customization of ERP can limit the flexibility of the ERP (Soh, et al., 2003); thus, organizations should consider whether customization is needed as this decision will impact the system agility. By and large, consistency customization reduces system agility.

Needless complexity will decrease system agility. Needless complexity is created if a system is customized for reasons other than strategic reasons. The argument is that customization creates a more burdensome system, which diminishes the efficiency of the system and thus diminishes system agility.

2.2.4. Under customization (Deficiency)

Conventional wisdom holds that "vanilla implementations" of ERP packages such as SAP R/3, Oracle Applications, are much more likely to be successful than implementations that require modifications of package code (Brehm et al., 2001), but (Brehm et al., 2001), Markus and Tanis (2000), and Soh et al. (2000) have reported that many companies have had to modify ERP software to meet essential business needs.

Because of the way ERP packages are designed, some tailoring is always required to get them up and running. But the extent of the tailoring can vary from one organization to the next, based on a number of factors. One factor is the degree of fit between the features and functions of the package and the business processes of particular organizations. The earliest releases of ERP packages were developed for "generic" organizations (usually manufacturing) and not particularized to different industry sectors. This usually resulted in a relatively low degree of fit between package and organizational features, and a great deal of effort was required to make an appropriate configuration. Today, most ERP packages come in different industry-specific "flavors," but in some cases the degree of fit may still be low.

The ERP adopter is likely to face trade-offs between meeting business requirements and managing the project risk associated with tailoring. Therefore, the more willing an ERP adopter is to change organizational business processes, the more likely it is that the ERP adopter will pursue business objectives through light, rather than heavy, tailoring types.

We are assuming, for now, (Cooke and Peterson 1998; Kumar et al. 2002; Mabert et al., 2000) that the organization avoids customization, bolt-ons, and the like. In other words, standard processes and data definitions are defined to meet the needs of the overall company and its plants—a type of intra-company consistency which many organizations consider beneficial. However, because all subunits are subject to the same set of configuration decisions that are made at the organization level, if one plant has very different business processes than the majority, that plant may experience problems because the ERP gives it little local level flexibility (Gattiker and Goodhue 2002; Jacobs and Bendoly 2003; Jacobs and Whybark 2000).

2.2.5. Desired customization

One of the most salient characteristics of ERP packages is that they are in fact packages—that is, software programs developed by independent software vendors for sale to organizations that use them. Packages are designed to meet the general needs of a class of organizations, rather than the unique needs of a particular organization, as is the case in custom software development. By adopting standard packages, organizations can substantially reduce the costs, risks and delays associated with custom software development. And they can benefit from the on-going support services provided for packages by vendors and consultants. The costs, benefits, and risks of ERP packages are related to the nature and extent of ERP system tailoring.

The prime goal of customization in ERP implementation is to ensure that the company's requirements match with the ERP solution. Luo and Strong (2004) designed a framework (refer to Table 10) for supporting management decision-making on ERP customization choices. There are nine customization options available to management and ERP consultants. Companies have three types of technical customization options: module selection, table configuration, and code modification and three process customization options: no change, incremental change, and radical change in the business processes.

The cell "Fit process to system" means minor system process changes are necessary and this can be achieved by redesigning the business process to system process. System conversion refers to a situation where business process change is not desirable and customizing system process to business process is desired. System conversion and process adaptation suggest that minor business process changes are desirable and customizing system process to business process is therefore essential. The last cell in the framework, "System and process reengineering," is least preferred in ERP implementation as it involves total redesign of business and system processes. It is evident that the incremental change of business process customization will lead to total quality management (TQM) (Hammer & Stanton, 1999). In Table 10, the cell "No customization" refers to the business process that fits the system process and in which no customization is necessary. Process adaptation deals with the system process that is ideal and business processes which are close to it. Process conversion refers to the business process that is far from system process. The cell "fit system to process" indicates that business process change is not necessary and it is better to fit the system process to the business process. The cell "mutual adaptation" is meant for making minor modifications to both the system process and the business process.

Parameter	No Change (NC)	Incremental Change (IC)	Radical Change (RC)
Module Customization (M)	No Customization (MNC)	Process Adaptation (MIC)	Process Conversion (MRC)
Table Customization (T)	Fit System to Process (TNC)	Mutual Adaptation (TIC)	Fit Process to System (TRC)
Code Customization (C)	System Conversion (CNC)	System Conversion and Process Adaptation (CIC)	System and Process Reengineering (CRC)

Table 10. Level of customizations

Finding the right balance of specialization for IS modules is a difficult task, as it is difficult to formalize and measure what the optimal degree of specialization is. However, linking IS module specialization with its strategic importance appears to be one way of addressing this issue. Strategic importance is a reasonable criterion for guiding specialization efforts. ES projects can be unsuccessful if organizations do not find the balance between cost and benefits of specialization for each module individually.

An assessment of the strategic value of an IS module can give us some further insight into the appropriate amount of specialization, and lead to a less precise but more easily used guide. Organizations are suggested to invest in specialization for IS modules that are strategically important. But it is also important not to overestimate the strategic value of IT (Carr, 2003). Firms need to focus spending on IT on areas that can indeed serve as a catalyst for strategic differentiation (Brown & Hagel, 2003).

A business function may have high-strategic importance without having a high involvement of IS. If an IS module is strategically important, any mismatches between the firm's desired business processes and those supported by the uncustomized ES would have a large negative impact. Therefore, knowing the strategic importance of the IS module gives a quick-if rough-guide to the appropriate amount of customization. While this assessment provides guidance of how much an IS module should be specialized from a strategy perspective, other factors can influence the actual specialization. One example are industry specific regulations: If existing or new regulations are required for firms in a certain industry (i.e., BASEL II in the financial industry) and the ES vendor has not yet addressed this issue, a firm may be forced to customize their ES solution, although this specialization does not provide any strategic benefit. The organizational environment (i.e., potential resistance to change) as well as project management (i.e., choice of consultants) may also contribute to decisions to perform ES module customizations. Any specialization activity that is not congruent with overall IT and business strategy needs to be carefully assessed and questioned. While some incongruent customization may be unavoidable in the short term (as in the case of new mandatory regulations), organizations should be developing a longer-term solution that realigns with the overall strategic direction (i.e., urging an ES vendor to incorporate new regulations in their standard solution).

2.2.6. Decision on Level of customization

The decision to customize is complex (Haines and Goodhue, 2004) and are therefore made with a trade-off in mind. Several studies have discussed the issues and concerns inherent in the customization decision (Haines and Goodhue, 2004; Parr and Shanks, 2000).

It has been argued (Parr et al., 2000) that there are three archetypal categories of ERP implementations. These are 'comprehensive', 'middle level' and 'vanilla'. Essentially, these categories are a grading in project scope from the most extensive to simplest and are based on a set of ERP implementation characteristics. These include physical scope (multisite, multinational boundaries versus single site for example), technical scope (involves decisions either to modify or accept the ERP as is), module implementation strategy (essentially a modular or 'big-bang' approach), the level and type of re-engineering involved and resource scope. In this categorization scheme. Comprehensive implementations are inherently large and complex and IT projects with these characteristics are high risk with a significant probability of failure (Willcocks and Sykes, 2000). Implementation was also more complex and involved an earlier version of the ERP software and, consequently, involved development of a specific module and extensive programming for reports.

The major problem faced with the decision to customize or not to customize is the conflicting objectives of "vanilla" software for a successful implementation and customization to include legacy business processes. Organizations may make a decision not to customize, only to be forced to customize after implementation when a serious strategic threat to the organization manifests (Gattiker and Goodhue, 2002). Therefore, more attention to the nature of customization as part of the decision making process is required. And check the impacts of strategic and consistency customizations.

According to (Haines 2006), deciding how much customization to undertake

1. Determine the strategic importance of each relevant IS module. For low-importance modules, be very skeptical of claims that a distinctive process is of high value. The presumption should be that these IS modules can likely be provided by an ES or best-of-breed with little or no customization.

2. For IS modules with high-strategic importance, consider each increment of customization independently. Be careful not to do away with important distinctive processes or capabilities by customizing too little.

3. Consider trends in the evolution of the standard solutions and the costs of customizing. For IS modules of low-strategic importance, new versions of standard systems may rapidly remove the need to customize. For IS modules of high-strategic importance, advances in the standard systems may require rapid action to maintain an edge over competitors who might buy those standard systems.

From a strategic alignment perspective, it is important to create a "strategic fit" between the IT infrastructure and an organization's business and IT strategy to achieve business value (Henderson & Venkatraman, 1993). This leads to a four-quadrant guide to IS module specialization. The four-quadrant guide is useful for understanding and evaluating customization decisions made by the organization.

In terms of the benefit-cost ratio, an organization should make sure the specialization of its IT modules fits or matches their strategic importance. This can be seen in the diagram in Figure 22, which shows four quadrants of strategic importance-specialization fit. The model suggests that the best outcomes would come from quadrants I (low strategic importance and low specialization) and II (high strategic importance and high specialization.) Poorer outcomes would come from quadrants III (high strategic importance and low specialization) and IV (low strategic importance and high specialization).

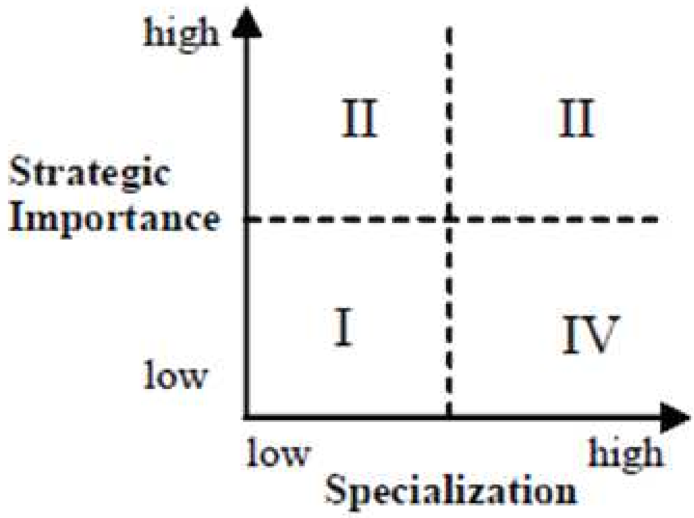


Figure 22. Strategy/specialization matrix

In quadrant I, very little customization is done. The main benefits were reduced IT costs, largely through significant reduction of data entry, and process improvements through "best practices" provided through the ES in the area of account consolidations. This, in turn, potential future costs for adaptations to software upgrades for the ES were avoided. This is a "plain vanilla" case, where a generic solution is used because benefits from customization would not justify any significant specialization costs.

In quadrant III, high Importance, low customization, the company avoid any customization and implement a "plain vanilla" ES. It will result in under customization. And in quadrant IV: low strategic importance, high customization, considerable time and effort was put into customizations, and the system ended up being highly customized overall. Many costly and arguably unnecessary customizations were made in the financial module, which is of low-strategic importance. As there were no clear guidelines on how to approach customization, the company cannot differentiate between strategically important and less important modules in deciding how much to customize. Customizations were usually granted whenever an end user demanded it. As a consequence, customization costs accumulated, and the entire implementation cost would be much higher than initially planned for the project. Customization costs outweigh the process gains. In this case, time and resources that could have been directed towards more important modules or project management were directed at customizations with questionable business value.

"Perfect fit" with business requirements may not coincide with the optimum of specialization, as costs increase proportionally with increasing specialization efforts, but the margin of gained benefits eventually become increasingly smaller as the "perfect fit" is approached. Over-specialization, beyond this optimum, does not yield sufficient benefits to offset the costs, and can reduce a firm's bottom line. However, identifying a precise optimum in practice is difficult, as a variety of factors and stakeholders influence actual decisions to choose or customize IS modules.

2.3. Ease of customization

Keil and Tiwana (2006) suggest that buyers consider 'what changes to the system are required' in order to meet requirements. Johannsen (1980) notes that flexibility is an important consideration in selecting packaged software. By this, he means whether the package can be 'easily changed and adapted'.

ERP systems have gradually been designed, developed, and improved by ERP vendors in response to new technologies and emerging business requirements (Mabert, Soni, & Ven-kataramanan, 2003). Ease of customization is judged to be an important criterion, while ease of implementation and vendor reputation was not found to be significant (Keil & Tiwana, 2006) in the implementation success factors.

Goldenberg (1991) also emphasizes the importance of being able to customize the software package. He suggests that the buyer even consider the possibility of purchasing the source code where possible in order to have the ability to customize the software. Bernroider & Koch (2001) report that adaptability/flexibility of the package is an important factors and that smaller organizations put a higher value on this factor with 68% of respondents from small and medium companies and 50% from large companies rating this as 'very important'.

2.3.1. Concept of easy of customization

Ease of Customization/Flexibility/Adaptability refers to the extent to which this package can be easily modified to meet your organization's unique needs. Pivnicny & Carmody (1989) list 'application implementation and ongoing support' as one of nine criteria for evaluating packaged software. Bernroider & Koch (2001) found that time to implement is an important factor and present evidence that smaller organizations put a higher value on 'short implementation time', with 37% of small and medium companies rating this factor as 'very important' as compared with 30% of large companies who rated it as 'very important'. Romanow et al. (1998) note that the time and cost required to implement the package surfaced as a key factor in one company's packaged software selection process.

2.3.2. EOC is a factor for recommend purchase

Functionality, reliability, cost, ease of customization and ease of use are all statistically significant factors that influence likelihood of recommending ERP purchase. Johannsen (1980) notes that flexibility is an important consideration in selecting packaged software. By this, he means whether the package can be easily changed and adapted'.

Table 11. Product/vendor selection criteria (percentage respondents)

Functionality of the system (79%)
Systems reliability (64%)
Fit with parent/allied organization systems (64%)
Available business best practices in the system (50%)
Cross module integration (50%)
System using latest technology (43%)
Vendor reputation (43%)
Availability of regular upgrades (29%)
Compatibility with other systems (29%)
Vendor's support/service infrastructure (29%)
Ease in customizing the system (29%)
Lower costs of ownership (14%)
Better fit with company's business processes (14%)

The fact that a better fit with the company's processes was not being considered by many organizations also indicates that most of the organizations either modified the software to achieve the fit (29% of the respondents valued ease of customizing the systems) or re-engineered their processes or managed with systems not fitting well with their processes. This observation is interesting as achieving a fit between the systems and the business processes has been stressed by several authors in the literature to be crucial for realizing the potential benefits of ERP (Henderson and Venkatraman, 1992; Davenport, 2000).

2.4. Experience influence on customization

Venkatesh et.al. (2003) identifies four key moderating variables (experience, voluntariness, gender, and age) that have been found to be significant in conjunction with these technology acceptance models. For the time limitation, we don't want to check and verify if these four variables behavior the same in our model. However, experience is of interest in our model.

Beside from the findings that, determinant for behavior intention is more salient for no experience or limited experience user's (Gattiker 2005) , there are finds that, effects of customization on perceived ease of use were stronger for respondents with more hands-on experience with the system Venkatesh (2000).

Karahanna et al. (1999) conducted a between-subjects comparison to study the impact of innovation characteristics on adoption (no/low experience) and usage behavior (greater experience) and found differences in the predictors of adoption vs. usage behavior.

Experience was not explicitly included in the original TRA (Venkatesh et.al. 2003). However, the role of experience was empirically examined using a cross-sectional analysis by Davis et al. (1989). In contrast, Karahanna et al. (1999) found that attitude was more important with increasing experience, while subjective norm became less important with increasing experience. Within TAM2, subjective norm was salient only in mandatory settings and even then only in cases of limited experience with the system (i.e., a three-way interaction). The effect of subjective norm was more salient for women in the early stages of experience (i.e., a three-way interaction). And it was found that he determinants of intention varied over time, with some determinants going from significant to nonsignificant with increasing experience.

Several process models (Markus and Tanis, 1999; McAfee, 2002; Ross and Vitale, 2000) suggest that ERP impacts on the organization may improve with time. A survey by CIO Magazine (Cosgrove Ware, 2003) suggests that most companies do not achieve the anticipated benefits after one year, but the majority do reap them beginning in the second year. In general, it appears that companies (and the subunits that make up those companies) may experience a performance dip initially after implementation (Ross and Vitale, 2000). However, often performance improves thereafter. Therefore, in a plant within an ERP implementation, greater time elapsed since ERP implementation is associated with greater coordination improvements of ERP accrued to that plant, and in a plant within an ERP implementation, greater time elapsed since ERP implementation is associated with greater task efficiency improvements of ERP accrued to that plant. (Gattiker 2005)

Venkatesh and Davis modelled and empirically tested the determinants of PEU and found that an individual's computer self-efficacy is a strong determinant of PEU, whereas objective usability affects ease of use only after direct experience with the system.

2.5. Position influence on customization

Another moderate of interest to us is the role of the respondents. As there are various risks in information system projects and of all these risks, functionality risk is the worst, affected due to increased customization in ERP projects. The risk factor may come into play if a significant amount of customization is required (Tiwana & Keil, 2006).

The results of Amoako-Gyampah's (2004) study demonstrates that there are significant differences of seven CSFs of the implementation of ERP systems do exist, and approved that perception difference of Managers and End-users. Managers do have options in the decision not to customize, only to be forced to customize after implementation when a serious strategic threat to the organization manifests (Gattiker and Goodhue, 2002).

2.6. Using customization to predict project success

It was found that organizational fit of ERP is indeed critical in explaining ERP implementation success. In addition, Hong and Kim (2002) found that both ERP and process adaptations interact with organizational fit of ERP on ERP implementation success. We learned that ERP and process adaptation are only effective when organizational fit of ERP is relatively low. Beyond a certain level of organizational fit, more adaptation will only lead to lower implementation success. We also learned that, since ERP adaptation also shows a significantly negative direct correlation with implementation success (while process adaptation only shows interaction effect), as many ERP vendors have claimed, process adaptation may be a safe choice than ERP adaptation when organizational fit of ERP is low.

Therefore, for successful ERP implementation, ERP implementation managers as well as top management should be able to assess the fit between their organization and the target ERP system before its adoption and, once adoption is decided, should measure and manage the impact of ERP and process adaptations from a risk assessment approach as suggested in Brehm et al. to minimize the potential business disruptions and user resistance.

The ERP package tailoring typology can be used to predict success both during the initial implementation phase and during the maintenance and post implementation phase of the ERP system life cycle. The authors raised hypothesis, and to be verified via empirical research (Brehm et al., 2001).

Implementation phase. As noted earlier in this paper, conventional wisdom holds that ERP systems should be implemented without modification, because modification is a risk factor that contributes to project failure. There are many options between configuration and modification and that implementation risk is a function of an organization's type, nature and extent of tailoring. The greater the "impact" of tailoring on the ERP system, the more likely it is that the ERP system implementation project will encounter difficulties and suffer on cost, schedule and performance metrics.

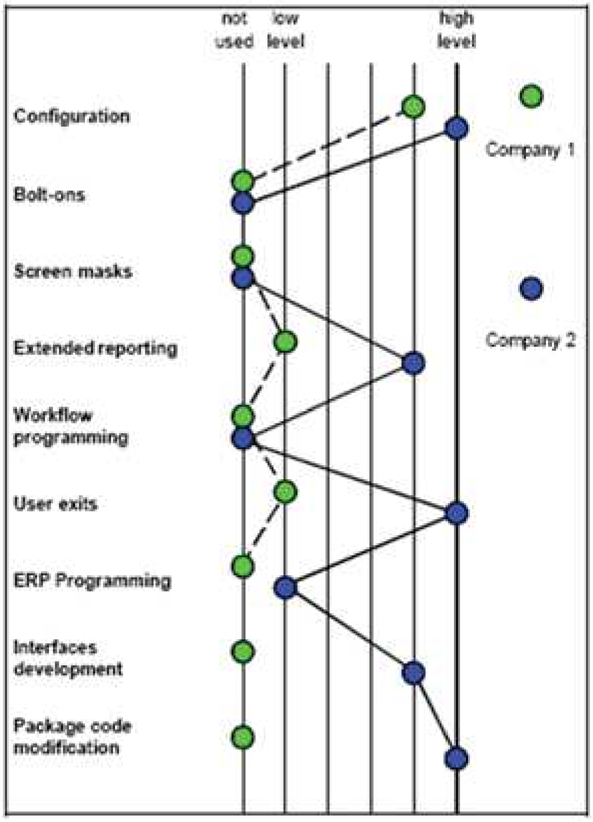


Figure 23. Measuring the impact of ERP system tailoring

On the other hand, tailoring increases the degree of feature-function fit between the ERP system and the organization, which is likely to result in an easier "implementation" in human terms lower resistance, reduced training needs, less organizational adaptation as well as in greater business success. Thus, the greater the "impact" of tailoring on the ERP system, the more likely it is that organizational adaptation to the ERP system will be easy and that the system will meet the needs of the business.

2.7. Conclusion

This chapter has concentrated on the ERP customization, thereby highlighting the interest of apprehending the effect customization on ERP acceptance. First of all, we clarified on the concept of customization in our research, by comparing customization with configuration and change to ERP standard. There are comprehensive tools and technology in customization domain. The major concern for customization is that, normally vendor don't provide support for the change to ERP standard, and could incur problem in future maintenance. However, it is not necessarily change the ERP standard, customization as a code change can be done without change ERP source code if unnecessary.

Since ERP system involves a standardized view on how a business operates and at the same time each business performs its operations uniquely, it is inevitable to involve customization in ERP implementation. From strategic perspective, a competitive advantage cannot be derived solely from a noncustomized, "out-of-the-box" packaged ERP solution, and customization is a must.

However, there are various risks in information system projects, financial, technical, functionality, project and political. Vendors and consultants are keener on helping the project manager to meet the budget and time target than to reap more benefit for business performance. Thus, customization usually had been avoided, and insufficient customization are more common than over customization, even there are propaganda by ERP vendors that, over customization is an issue in ERP implementation.

ERP is a complex system, customization is even more challenge. Ease of customization will help the company to reduce the cost and risk to conduct right level of customization. Vendors, implementation partners, and IS managers have realized the problems associated with customization and have worked to devise approaches to make customizations more manageable and less costly. New tools and technologies that support customizations (Scheer & Habermann,

2000) have been developed, and it is going to change the view on customization, and encourage the companies to focus more on business benefit from strategic and long term point of view, instead of employ work around or even worse, to change the business process to fit in the ERP system.

As discussed, there are different perspective of ERP success, but more dominant one from the project manager point of view is the budget under control and project go live on time. It is influencing their decision on customization. And from exiting literature, experience is a moderator for ERP acceptance, we discussed the different result of experience influence on expectancy, and present the conflict that, respondents with lower experience could have stronger expectancy on the performance, effect and social influence, but they may have lower expectancy on customization influence.

CHAPTER 3. MODEL SEARCH

3.0. Introduction

As discussed in chapter 2, we found that customization is a must in ERP implementation, strategic customization is of critical importance to the company. However, as ERP is a complex system, to avoid the risk and the perception of the companies' potential long term cost, companies may not interested in customization, especially in project phase. So we assume there are more lack of sufficient customization than over customization. To approve this assumption, we are going to propose our hypothesis, and develop the research model with assumptions associated. To make our research more effective, we are going to build our model based on the UTAUT framework, because of its comprehensiveness and experience from existing literature authors who have employed and extended the UTAUT models.

ERP adoption is an innovation and a complexity excise. Many obstacles faced in ERP implementation, among them, user's acceptance of the new system is a major problem. Two approaches (variance theory and process theory) are commonly used in the literature for study of organizational behavior. Process theory, which are employed to identify ERP stages or phases with considering the events and behaviors, seems helpful to understand when the issues e.g. users' acceptance could happened and how importance the resistance from the users could damper the ERP adoption. We also use the "ERP Systems Experience Cycle" framework to demo the different levels of business transformation, its related potential performance improvement which is a link between the acceptance of ERP system and the potential performance expectancy.

To clarify on the reasons why UTAUT is going to be adopted as the mainframe, we will go deep dive on the mandatory of ERP acceptance which is different from the volunteer technology acceptance.

Finally, based on the model combined by customization with UTAUT, and hypothesis will be presented for further empirical research.

3.1. ERP acceptance and success

3.1.1. ERP acceptance a complex exercise

ERP adoption is a complex exercise in technology innovation and organizational change management (Markus and Tanis, 2000). Two broad approaches are commonly used in the literature for study of organizational behavior in general, and of innovation in particular: the variance theory and the process theory (Mohr, 1982). In the variance theory approach the investigator attempts to identify characteristics of the organization, the environment or the factors that lead to organizational adoption of innovations (Dean, 1986).

While variance theory excels at explaining the variation in the magnitude of certain outcomes, it tends to do not so well when the outcomes are uncertain, as in the case of ERP adoption. By contrast, process theory provides powerful explanations even when necessary causal agents cannot be demonstrated as sufficient for the outcomes to occur. Studies in the process theory approach consider the events and behaviors occurring within an organization that is considering an innovation. A common track within this approach is to inductively develop stage models, which identify a set of stages or phases, relatively, fixed in number and sequence, through which organizations pass on their way to innovations. There are many theoretical models proposed by researchers that trace the innovation path from adoption decision to investments and resource creation to the desired outputs of productivity increases, organizational performance improvements, realized business value and the like (Dean, 1986; Soh and Markus (1995). In this study, innovation was conceptualized as a decision-making process consisting of three broad phases of adoption, implementation (Rogers, 1983) and post-implementation (Soh and

Markus, 1995). Soh and Markus add a post implementation phase to Rogers's model, stating the importance of the conversion of capabilities developed by innovation into business value. Soh and Markus' framework describes the information technology (IT) investment to business value process as a series of three linked models, namely, the IT conversion process, IT use process and competitive process.

The major obstacles faced in the ERP implementation project are, problems in transition to new systems, unavailability of skilled people, high turnover of key project persons, cost escalations, and difficulties in estimating the project requirements came up as major obstacles faced by the organizations. Organizations also faced various problems in data-conversion, user acceptance of new systems, and time lag in attaining comfort levels in operating with new systems and processes.

There was significant resistance from staff in about 25% of the responding organizations and about 10% of the organizations also faced resistance from managers. Co-ordination between functional groups was a larger challenge as the new systems were based on a process view of the organization and necessitated ample cross-functional co-ordination. In-house resource constraints were faced by most of the organization.

Table 12. Major obstacles faced in the ERP implementation project

Difficulties in changing to new from old system (50%)
Unavailability of skilled project people (42%)
Turnover of key project persons (42%)
High costs of implementation (42%)
Difficulties in estimating project requirements (42%)
Significant resistance from staff (25%)
In house resource constraints (25%)

Unclear strategic direction and vision for the use of ERP (25%)
Knowledge gap between implementers and users (25%)
Co-ordination between functional groups (25%)
Lack of commitment from top leadership (25%)
Significant resistance from managers (8%)
Technical difficulties in configuration (8%)
Incompetent consultants (8%)
Bugs in the software (8%)
Support and training from parent (8%)

3.1.2. ERP adoption process

To delineate the ERP adoption process, the "ERP Systems Experience Cycle" framework (Markus and Tanis, 2000) which is based on Soh and Markus' (1995) model was adopted. The framework models an organization's experience with ERP systems from adoption to success as moving through four phases characterized by key players, typical activities, characteristic problems, appropriate performance metrics, and a range of possible outcomes. Project configuration and shakedown phases of the framework, more commonly known as implementation phases. These phases include decisions and typical activities in the adopting organization following adoption decision and leading to configuration and stabilization of ERP systems in the organization. The project configuration phase is comprised of activities intended to get the systems up and running in the organization. While Shakedown is a critical phase in ERP experience where the organization comes to grip with their ERP systems (Markus and Tanis, 2000). The Shakedown phase has been defined to continue until the normal operations are restored. Many typical activities and key actors characterize the Project Configuration and Shakedown phases.

The extent of organizational change represents the degree of company transformation that the entrepreneur plans as a consequence of a technological innovation. This measure depends on the evaluation of the organizational and economic impacts, such as the competence of the internal staff or their expected resistance to change to the adoption of a new technology. Venkatraman (1994) classifies five main levels of transformation (Figure 24):

(1) Local automation of existing procedures. This strategy is pursued only for automation of local, independent procedures. It requires minimal efforts and the corresponding expected results are enhancements in business process performance. Benefits coming from this strategy are easily duplicable, as most of standardized solutions. Therefore, it is unlikely to obtain competitive advantage by simply automating existing procedures.

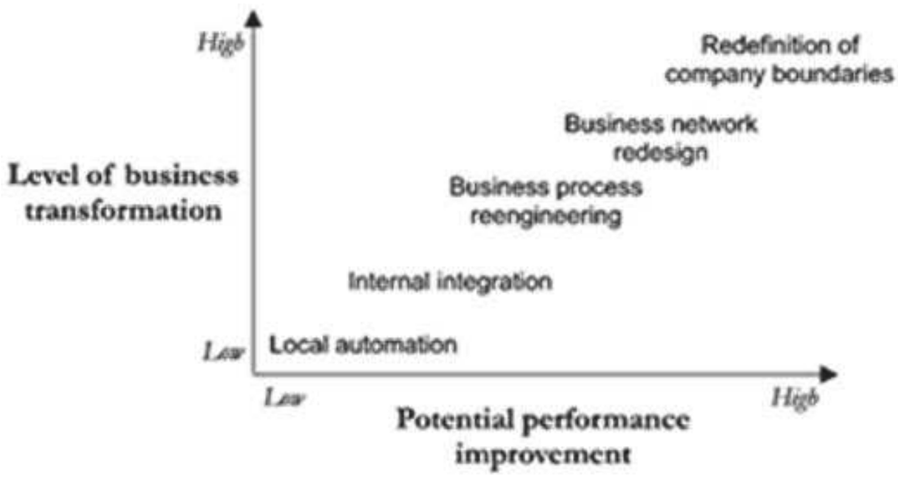


Figure 24. Levels of business transformation & potential performance improvement

(2) Internal integration of existing business processes. It aims at integrating the business processes and the company IS in order to create competitive advantage. The required integration has to be pursued both at the technological and organizational level: whenever necessary, people belonging to different business functions have to cooperate to reach common objectives. Together

with the necessary automation effort, this strategy requires an integration effort; however, in both cases the business process structures remain unchanged. (3) Business process reengineering. It involves the partial or complete redesign of business processes, affecting not only the company procedures, but also its organizational structure. (4) Business network redesign. Changes overcome the boundaries of the company and could affect the entire network of its external relationships. For instance, electronic data interchange (EDI) can represent the technology chosen to pursue this strategy, but a great effort has to be put into business process integration, through a continuous information exchange and competence sharing. Under these conditions each partner can exploit the competencies of the business network instead of adopting expensive solutions of vertical integration. (5) Redefinition of company boundaries through the creation of inter-organizational relationships. The information communication technologies (ICT) allow the redefinition of the competitive environment through the creation of strong inter-organizational relationships (joint ventures, long-term contracts, licensing agreements).

3.1.3. ERP acceptance is mandatory

This perspective conceptualizes mandated systems use as one of the many, sometimes conflicting, behaviors expected of individuals in the fulfillment of their organizational role responsibilities. Systems use might conflict with an individual’s personal beliefs, other role responsibilities, or both. When personal beliefs and/or expected behaviors conflict with one another, individuals are likely to experience negative affective outcomes, which can ultimately result in negative organizational outcomes.

The centrality of usage to information systems research is emphasized by its central position in such well-established literature streams as innovation diffusion, technology acceptance, and information systems success. In these research traditions, use is largely treated as a voluntary act determined by individuals' beliefs regarding a given technology and social norms. If organizational mandates are considered, they are treated mostly as a function of social pressures rather than job design. Mandated individual use, however, can go beyond the exertion of social pressure. When the technology is wholly integrated into individuals' work systems, usage is not a choice or the result of social pressure. Rather, it is the only way in which work can be accomplished. In such a context, the question of interest is whether beliefs are congruent with usage, and, if not, what impact that has on individuals who are mandated to behave in a manner potentially inconsistent with their beliefs.

Jasperson et al. (2005) defined a mandatory adoption decision as one in which the organization integrates an IS into a work system such that the system must be used in order to accomplish work tasks. In such a context, usage is less a product of volition than it is job design (Taylor & Todd, 1995), and is determined more by the organization's goals than an individual worker's beliefs (Hennington, 2008). This is unfortunate given the likelihood that mandated system use is the predominant context in organizations. Thus, IS research and practice would benefit greatly from developing a greater theoretical understanding of the nature and impacts of mandated technology use.

3.1.4. Reference model UTAUT on ERP acceptance

The term "innovation" has been used in three different contexts: "an invention", "a new object" (Tushman et al., 1986), and "a process" (Daft, 1978). The "process" context is most applicable as most organizations develop and deploy ERP systems with purchased technologies and products invented by vendors. IT systems and technologies are not an innovation in themselves (Clemens and Row, 1991) and organizations cannot depend on advanced information technologies to produce sustainable advantages because of their ready availability to all their competitors at a price (Clemens and Row, 1991; Powell and Dent-Micallef, 1997). An organizational innovation process that includes the use of IT systems and technology, and the development of complimentary business and human resources will be more important in drawing competitive advantage from technology implementation than will IT systems themselves (Powell and Dent-Micallef, 1997).

As discussed in chapter 1, UTAUT model, which was developed based on the former eight technology acceptance models are comprehensive and are capable to handle the acceptance in mandatory company environment, which is important for ERP system.

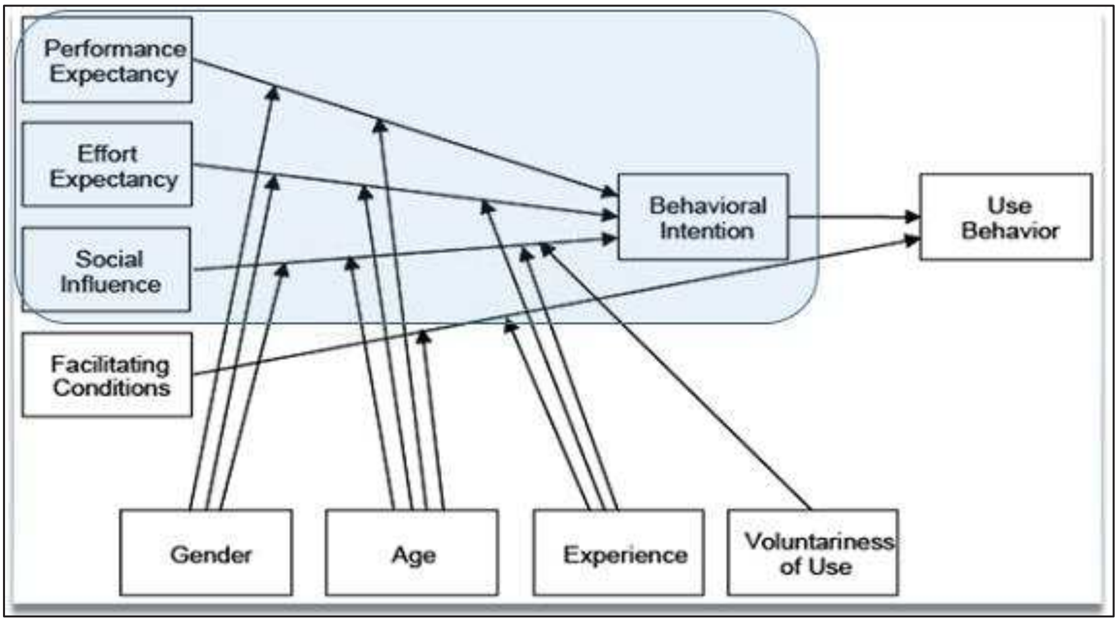


Figure 25. UTAUT model & Scope in our research

With the above literature review, a research model is proposed as shown in Figure 25 for this study. The figure presents the proposed research model, which is derived from UTAUT as proposed by Venkatesh et al. (2003) with few adjustments. The behavioral intention and user behavior factors have been combined and replaced by intention to use ERP system. The ‘‘intention to use ERP system’’ explained the behavioral intention and subsequently the actual ERP system use.

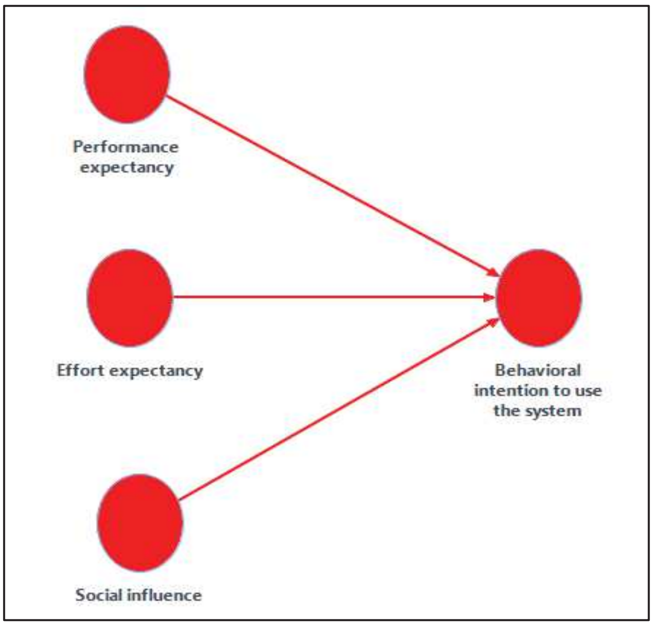


Figure 26. UTAUT model adoption

3.2. The model of customization influence on UTAUT

3.2.0. Customization Level (CL) influence the Behavioral Intention (BI)

The purpose of our research is to check if and how customization has influence on ERP acceptance or behavioral intention. Thus, we have a general hypothesis that, H0: Customization level has significant influence on behavioral intention, the higher customization done, the higher behavioral intention to use. CL has significant positive influence on BI

H0: CL has significant positive influence on BI

3.2.1 Customization Level (CL) influence the Performance Expectancy (PE)

Once organizations have chosen a particular ERP vendor and system, they must configure the system by considering the overall corporate needs. (We are assuming, for now, that the organization avoids customization, bolt-ons, and the like.) In other words, standard processes and data definitions are defined to meet the needs of the overall company and its plants a type of intra-company consistency which many organizations consider beneficial (Cooke and Peterson 1998; Kumar et al. 2002; Mabert et al. 2000). However, because all subunits are subject to the same set of configuration decisions that are made at the organization level, if one plant has very different business processes than the majority, that plant may experience problems because the ERP gives it little local level flexibility (Gattiker and Goodhue 2002; Jacobs and Bendoly 2003; Jacobs and Whybark 2000).

When an ERP system is not a good fit for a plant's unique business processes, making do might compromise performance. Or plant personnel might revert to informal, nonintegrated systems (e.g., spreadsheets, legacy systems) that meet local needs but do not facilitate coordination beyond plant boundaries (Gattiker and Goodhue 2004; Soh et al. 2000). Either way there is a performance drop.

One estimate is that 20% of the processes in an organization cannot be modelled in an ERP system without customization (Scott and Kaindl, 2000). It will impact the performance expectancy, effort expectancy and finally impact intention to use the system.

Such misalignments are a serious problem (Berry and Hill 1992). Sia and Soh (2002) categorize ERP misfits as surface (having to do with user interface and the like) or deep structure (fundamental misfit between the model/package and reality) and as pervasive (exogenous, stemming from external sources) or non-pervasive (such as different part numbers in different plants). Misfits that are both deep-structure and pervasive are the most problematic. Clearly many misfits between an ERP configuration and a manufacturing facility are deep structure misfits.

Using customization to solve function misalignment has been suggested by prior work (Rajagopal et al. 2002, Soh et al. 2002)) misalignment was addressed by using two different approaches—non-core and core customization. While the former includes the modification to the interface of an add-on module or a query/reporter writer facility, implementing the latter entails the revision of the base code. (Chou and Chang, 2008)

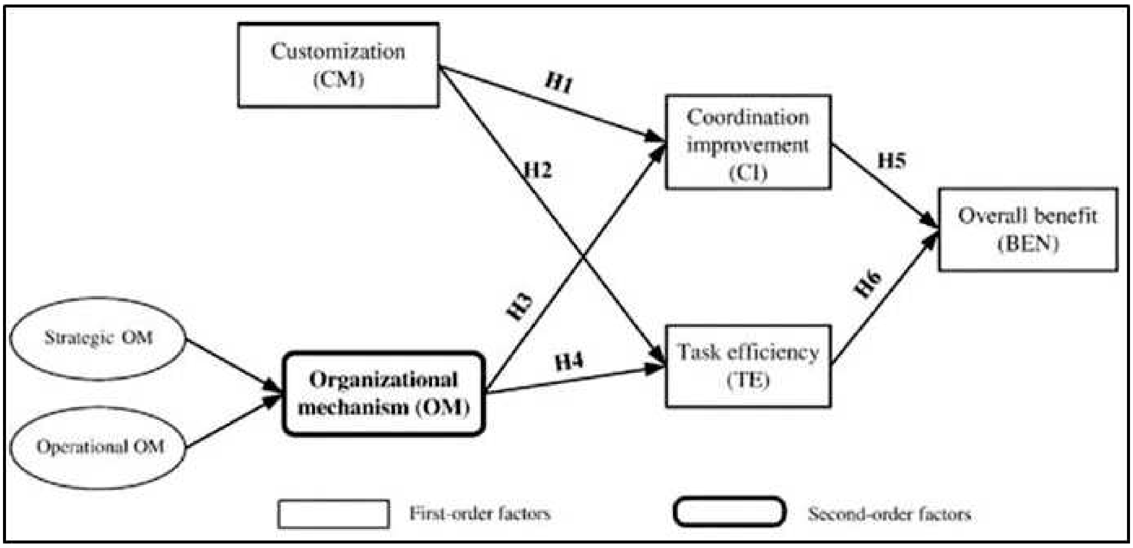


Figure 27. Customization & Organization mechanism influence on performance and task efficiency (Chou and Chang, 2008)

Conceptually, since ERP systems provide integrated data and (arguably) so-called best practice business processes, key intermediate benefits for ERP might include higher quality data for decision making, efficiency gains in business processes, and better coordination among different units of the firm. By studying the factors leading to these intermediate benefits, and the extent to which each intermediate benefit contributes to overall impact, we can better understand the pathways through which ERP does (and does not) help organizations.

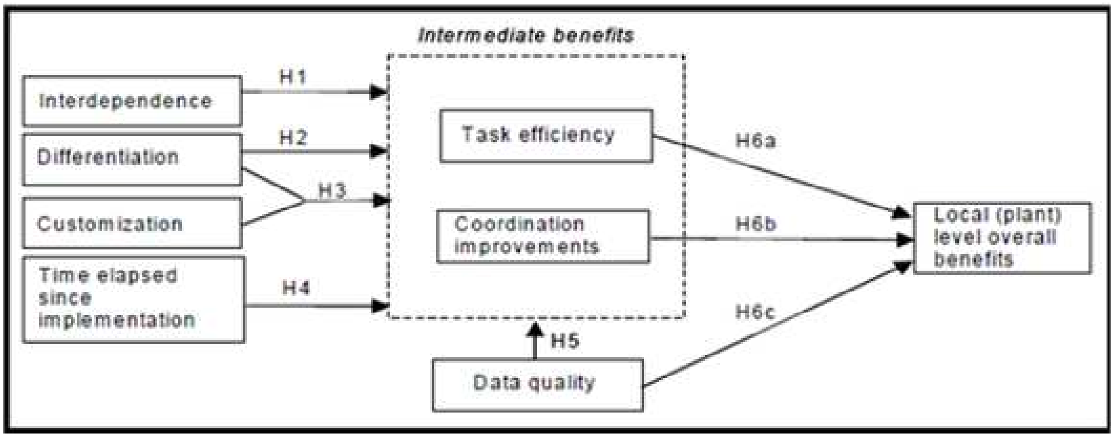


Figure 28. Intermediate benefits and the reference model for customization

There are three important benefits through which ERP could deliver overall plant level benefits to firms: better information (data quality), more efficient internal business processes (task efficiency), and better coordination between different units of the firm (coordination improvements).

ERP is more likely to enhance task efficiency when interdependence is high. Without integrated systems, interdependent subunits need to resort to relatively time consuming methods of sharing information with one another (fax, telephone). By contrast, ERP can provide instant access to information, making employees more efficient. The more interdependent plants are, the more ERP will improve efficiency. Again, what is conceptually a moderating relationship becomes a main effect when ERP implementation is held constant.

Thus we propose that: Customization level has significant influence on performance expectance, the higher customization done, the higher performance expected.

H1: CL has significant positive influence on PE

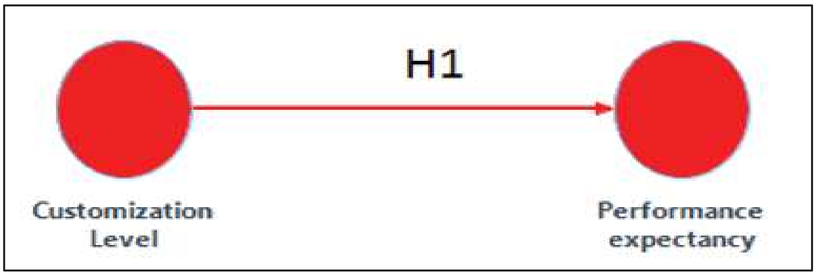


Figure 29. Customization level influence the performance expectancy

3.2.2 Customization level (CL) influence the Effort Expectancyccc (EE)

(Gattiker and Goodhue, 2005) suggested that customization would moderate the effect of differentiation. The data do not support this; however, there is a significant main effect of customization on task efficiency.

In a plant within an ERP implementation, the greater the differentiation of a plant from the other plants in an organization, the lower the ERP related coordination improvements accrued by that plant. And in a plant within an ERP implementation, the greater the differentiation of a plant from the other plants in an organization, the lower the ERP-related task efficiency improvements accrued by that plant.

As suggested by prior work, customization led to integration because a well-designed ERP customization has the capability to integrate the vastly ignored manufacturing information with the popular administrative functions of an organization. This also implies that different sub-units of an organization will share the same information, which is available to those needed in real time, about various business functions in the organization. As a result, knowledge dissemination and sharing are rather smooth. Given that customization has the capability to address misalignment and facilitate integration, we expect that customization positively affects both task efficiency and coordination improvements. For a firm that has implemented ERP, greater customization is associated with greater coordination improvements of ERP accrued to that firm. For a firm that has implemented ERP, greater customization is associated with greater task efficiency of ERP accrued to that firm.

The other type of customization that will be considered is a customization that is made for consistency purposes. These customizations are "consistency" type customization. An example of a consistency customization is when an organization has reporting requirements that include certain headers, footers, and general formatting of data that is not readily available from any of the thousands of generic reports available from the ERP system. The organization may have to code this sort of change, rather than even use the reporting tool available from the ERP software. This type of change is not strategic. This type of customization only re-enforces a pre-ERP way of reporting with no added strategic value. This is a "consistency" type customization.

As the best practices provided by the ERP vendors and consulting firms may not supply models of every process to every industry (Swan et al. 1999), this implies that it is difficult to achieve the expected "connections” among the databases and activities related to a certain business process, unless ERP data items, ERP processes, and ERP input/output screens are either appended or altered (Gattiker et al., 2005). In other words, function misalignment is when ERP functionality does not fit with the organizational requirements.

Thus we assume that: Customization level has significant influence on effort expectance, the higher customization done, the lower effort (easier) expected.

H2: CL has significant positive influence on EE

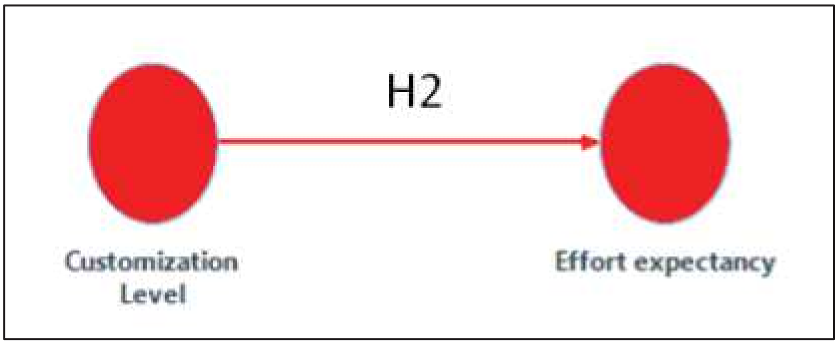


Figure 30. Customization level influence the effort expectancy

3.2.3 Customization Level (CL) influence the Social Expectancy (SE)

Although subjective norm does not capture the usage context explicitly, it does reflect the extent to which individuals feel social pressure to adopt and use a technology, which is indicative of the extent to which they perceive the behavior to be mandatory. The problem is that subjective norm was initially excluded from TAM. Davis et al. (1989) opted to leave it out, arguing that the construct was not well understood and that computer usage was thought to be mostly voluntary. As a consequence of excluding subjective norm, much of the subsequent TAM-based research has also failed to capture data pertaining to social influences and little is known about the adoption context. Further, many studies do not make the context explicit, which has been acknowledged as a limitation of technology acceptance research (Hennington, 2008). Several authors have also cited failure to gather data related to the context of use as a study limitation (Gallivan & Srite, 2005). Hennington (2008) argue that this distinction calls into question the appropriateness of using TBP in studying mandated IS use.

Social influence is the degree to which an individual perceives that important others believe he or she should use the new system. Three constructs related to social influence: subjective norm, social factors, and image. Social influence has an impact on individual behavior through three mechanisms: compliance, internalization, and identification (Venkatesh and Davis 2000; Warshaw 1980). ERP is more mandatory task in working environment, and customization is a technical concept, which is not directly associated with subjective norm from business point of view.

The authors of TAM did not retain subjective norms as a factor influencing behavioural intention. According to them, when the context is set by the use of a computer technology for work or more generally to perform a task effectively specifically, the use of the system is not susceptible to social influence. In this context, willingness to use the system or not is rather sensitive to the perceived ability of the system to effectively support the achievement of a particular task in a certain context. Furthermore, Davis and colleagues found that attitudes had low power to mediate between perceptions and intention to use technology. Some authors have then chosen advocate not taken into account in the study of the attitudes of acceptability, as Taylor and Todd (1995) for example, observed that attitudes are not a determining significant use of intentions. Others, including Yang and Yoo (2004) find that the concept of attitude may have been ill defined and poorly operationalized. They propose a distinction attitude between cognitive and affective attitudes. The explanatory and predictive power of attitudes becomes significant (with a particularly large weight attitude). However, their proposal has a limitation: their definition of what they call affective attitudes maintains the confusion that can sometimes exist between emotions and attitudes. And they found that the twenty- two studies that examine (and based all their work on the TAM), only ten include the concept of attitudes. This is a therefore inconsistent results regarding the role played by attitudes in issue of acceptance and reveals a real blur is built on this. Thus, until recently, it was suggested that the core of TAM has only ease of use perceived, the perceived usefulness and usage intentions.

Thus we assume that: Customization level has significant influence on social influence, the higher customization done, the higher social influence expected. However, as there are different opinion, we will test the hypothesis and explain it after that.

H3: CL has significant positive influence on SI

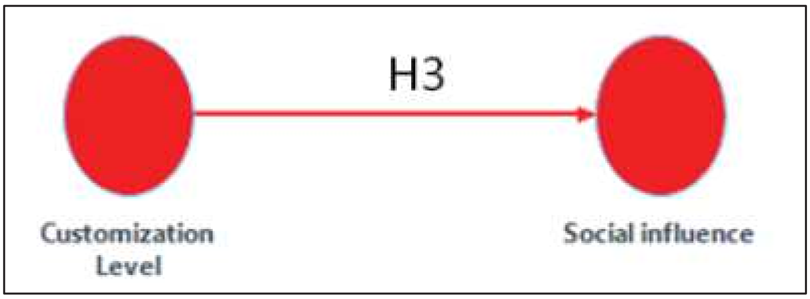


Figure 31. Customization level influence the social expectancy

3.2.4 Ease of Customization (CE) influence the Customizations Level (CL)

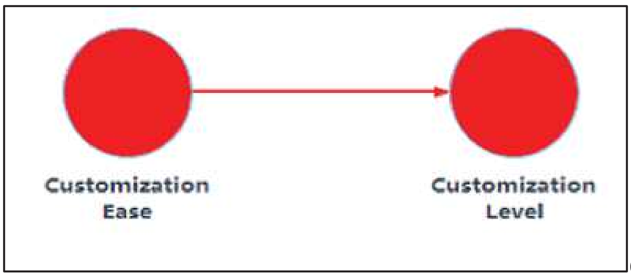
Ease of Customization/Flexibility/Adaptability refers to the extent to which this package can be easily modified to meet your organization's unique needs. Johannsen (1980) notes that flexibility is an important consideration in selecting packaged software. By this, he means whether the package can be easily changed and adapted'.

Brehm et al. (2001) and Ng et al. (2002) discuss complexity as a factor affecting adjustment. When the system or the type of adjustment is too complex, changing of system is generally avoided and vice versa. Complexity highly affects their way of adjustment. It makes the adjustments a lot more difficult to realize, and it is hard to understand and foresee the future consequences of the adjustments in that situation. So, they avoid making changes of the core of the ERP. Nastek also describe complexity about the process of going through all adjustments during maintenance due to this factor.

Adjustment depends on customization possibility, which refers to whether or not the consultant has access to the ERP package code, or development tools provided by vendor (Brehm et al., 2001; Luo & Strong, 2004). Some ERP system have rich tools available for customization.

Thus we assume that: Ease of customization has significant influence on customization, the easier customization can be done, the higher customization level expected.

H4a: CE have significant positive influence on CL



C

Figure 32. Ease of customization influence customization level

3.2.5 Ease of Customization (CE) influence on the Effort Expectance (EE)

ERP software packages strive to support essentially all the processes in a firm's value-added chain. For example, SAP R/3 currently stores over 1000 predefined processes that represent financial, logistics and human resources best practices in a repository called 'business engineer'.

In an effort to be comprehensive and to be all things to all people, SAP R/3 offers so many options in 10,000 tables that implementation is often extremely complex, necessitating the services of expensive consultants. Yet despite the scale of offerings, most customers inevitably find that at least 20% of their needed functionality is missing from the package. Enhancing functionality is very important, since alternatives to cope with unmet needs, including forcing business processes to fit the software and bolting on customized programs, add to the time and cost of implementation. Moreover, some alternatives, such as using work around, and modifying the software, increase the difficulty of upgrading to new releases of the ERP package.

Thus we assume that: Ease of customization has significant influence on effort expectancy, the easier customization can be done, the lower the effort expected.

H4b: CE has significant positive influence on EE

Figure 33. Ease of customization influence effort expectancy

3.2.6. Ease of Customization (CE) influence on the PE and SI

As discussed before, the fourth most important factor was ease of customization. There is anecdotal evidence that many packaged software implementations run into trouble because of difficulties that arise in customizing the software to the needs of the organization. Thus, it was surprising that ease of customization was not ranked higher in the follow-up survey, they asked: 'Why do you think that MIS managers place a relatively low emphasis on ease-of-customization?' One respondent made the following observation: This is basically the psychology of the manager. Most managers want to get moving and their target is to get the package selected and implemented. Ease of customization is something that comes up later in the life cycle.

Ease of customization is judged to be an important criterion, while ease of implementation and vendor reputation was not found to be significant (Keil & Tiwana, 2006). Functionality and reliability of packaged software depend solely on the degree of customization.

As the ease of customization is more related to technical user or the programmer, there may not direct link between the technical capability and the performance expectance of the user, but do have indirect influence through customization level.

Thus we assume that: ease of customization does not have significant influence on performance expectance and social influence, but do have indirect influence through customization level.

H4c: CE does not have direct significant influence on PE & SI

3.2.7. Role moderate CL influence on the PE EE & SI

The decision to customize is complex (Haines and Goodhue, 2004) and are therefore made with a trade-off in mind. Several studies have discussed the issues and concerns inherent in the customization decision (Haines and Goodhue, 2004; Parr and Shanks, 2000).

As the ERP project success is more responsibility of the decision make, chose to customize could mean more risk and can bring more uncertainty of the budget and the time. To avoid the risk, managers or decision maker could choose not to customize or do customization as less as possible.

Since results of Amoako-Gyampah's (2004) study demonstrates that there are significant differences of seven CSFs of the implementation of ERP systems do exist, and approved that perception difference of Managers and End-users (Position). We assume that, to avoid the risk, and to ensure the project success in time and within the budget, ERP implementation decision maker will be cautious and conservative when evaluate the level of customization.

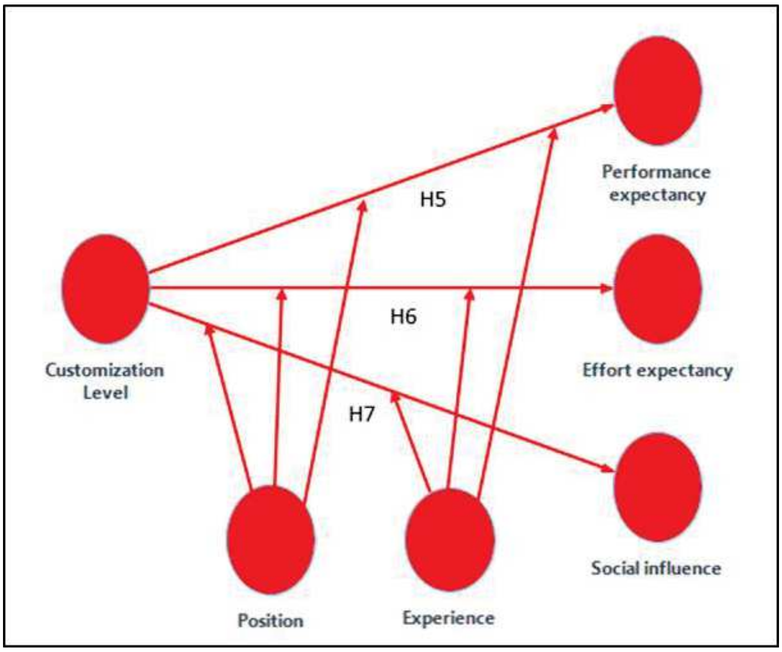


Figure 34. Position and experience as moderator in the effect of customization on PE EE and SI

Hypothesis 5a: The influence of Customization level on Performance Expectancy will be moderated by role, such that, the effect will be stronger for Normal User (NU) than Decision Maker (DM)

H5a: Influence of CL on PE will be stronger for NU than DM

Hypothesis 5b: The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker

H5b: Influence of CL on EE will be stronger for NU than DM

Hypothesis 5c: The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker

H5c: Influence of CL on SI will be stronger for NU than DM

3.2.8. Experience moderate CL influence on the PE EE & SI

As discussed in chapter 2, there are different finds in the moderating effect of experience. Aside from the findings that, determinant for behavior intention is more salient for no experience or limited experience user's.(Gattiker 2005) , there are also finds that, effects of customization on perceived ease of use were stronger for respondents with more hands-on experience with the system Venkatesh (2000).

Thus, we assume the experience as moderator to influence of customization on the performance expectance, effort expectance and social influence are not significant.

Hypothesis 6a: Experience does not moderate the influence of Customization level on Performance Expectancy

H6a: Experience does not moderate the influence of CL on PE

Hypothesis 6b: Experience does not moderate the influence of Customization level on Effort Expectancy

H6b: Experience does not moderate the influence of CL on EE

Hypothesis 6c: Experience does not moderate the influence of Customization level on Social Science

H6c: Experience does not moderate the influence of CL on SI

3.3. Theoretical model of research and assumptions

To study how customization influence the ERP acceptance, we extended the UTAUT model, and include two variables, customization level and ease of customization. As time limit, we don't include the use behavior, as we assuming based UTAUT model, the behavioral intention is strong predictor of use behavior.

And we include two control variables, position is new for UTAUT, we assuming the reason why (Gattiker 2005) didn't include it in the model is because the UTAUT are used more widely, and users are not in enterprise domain only. However, it is a worthy trial to check the effect of position in ERP implementation, as it was identified by Alzoubi (2016) in the ERP acceptance domain that, respondents with difference age, gender, experience and position do have different perspective on the ERP acceptance. And another moderator the experience, is directly adopted from UTAUT. As discussed before, there are different findings in the effect of experience on the behavioral intention, we will check and verify our hypothesis in the analysis.

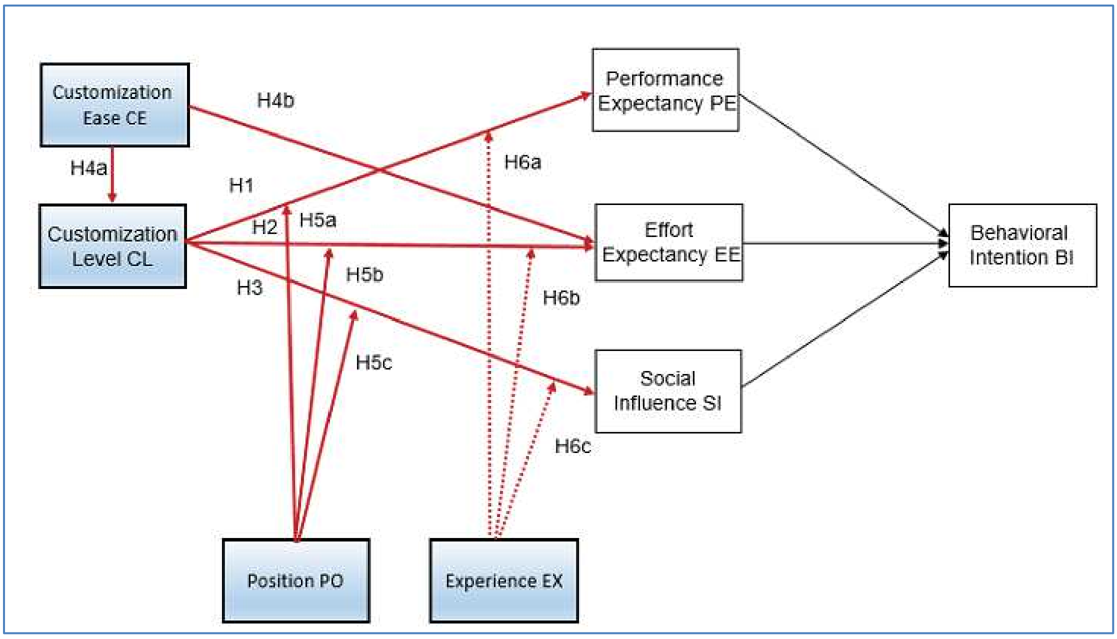


Figure 35. Our research model
of Customization influence on the Behavioral intention

Summary of model and hypothesis:

H1: CL has significant positive influence on PE

Hypothesis 1: Customization level has significant influence on performance expectance, the higher customization done, the higher performance expected.

H2: CL has significant positive influence on EE

Hypothesis 2: Customization level has significant influence on effort expectance, the higher customization done, the lower effort (easier) expected.

H3: CL has significant positive influence on SI

Hypothesis 3: Customization level has significant influence on social influence, the higher customization done, the higher social influence expected.

H4a: CE have significant positive influence on CL

Hypothesis 4a: Ease of customization has significant influence on customization, the easier customization can be done, the higher customization level expected.

H4b: CE has significant positive influence on EE

Hypothesis 4b: Ease of customization has significant influence on customization, the easier customization can be done, the lower social influence (easier) expected.

H4c: CE does not have direct significant influence on EE & SI

Hypothesis 4c: Ease of customization does not have significant influence on performance expectance and social influence, but do have indirect influence through customization level.

H5a: Influence of CL on PE will be stronger for NU than DM

Hypothesis 5a: The influence of Customization level on Performance Expectancy will be moderated by role, such that, the effect will be stronger for Normal User (NU) than Decision Maker (DM)

H5b: Influence of CL on EE will be stronger for NU than DM

Hypothesis 5b: The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker

H5c: Influence of CL on SI will be stronger for NU than DM

Hypothesis 5c: The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker

3.3.1 Additional three hypothesis adopted directly from UTAUT

H6: PE has significant positive influence on BI

Hypothesis 6: Performance Expectancy has significant influence on behavior intention.

H7: EE has significant positive influence on BI

Hypothesis 7: Effort Expectancy has significant influence on behavior intention and intention to use.

H8: SI has significant positive influence on BI

Hypothesis 8: Social Influence has significant influence on behavior intention and intention to use.

3.4. Conclusion

In this chapter, we first introduced the ERP adoption as an innovative approach for the companies, and then employed the process theory to understand when the issues of users' resistance could happened and how importance it could hinder the ERP adoption. We also use the "ERP Systems Experience Cycle" framework to demo the different levels of business transformation, its related potential performance improvement which is a link between the acceptance of ERP system and the potential performance expectancy.

We also explained further user acceptance and its mandatory feature in ERP implementation. Finally, based on the model combined by customization with UTAUT, our hypothesis are proposed, here is a summary for the hypotheses.

Table 13. Summary of hypotheses

Hypotheses		
H0	Customization level has significant influence on behavioral intention, the higher customization done, the higher behavioral intention to use.	CL has significant positive influence on BI
H1	Customization level has significant influence on performance expectance, the higher customization done, the higher performance expected.	CL has significant positive influence on PE
H2	Customization level has significant influence on effort expectance, the higher customization done, the lower effort (easier) expected.	CL has significant positive influence on EE
H3	Customization level has significant influence on social influence, the higher customization done, the higher social influence expected.	CL has significant positive influence on SI
H4a	Ease of customization has significant influence on customization, the easier customization can be done, the higher customization level expected.	CE have significant positive influence on CL
H4b	Ease of customization has significant influence on effort expectancy, the easier customization can be done, the lower the effort expected.	CE has significant positive influence on EE
H5a	The influence of Customization level on Performance Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker	Influence of CL on PE will be stronger for NU than DM
H5b	The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker	Influence of CL on EE will be stronger for NU than DM
H5c	The influence of Customization level on Social Influence will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker	Influence of CL on SI will be stronger for NU than DM
H6a	Experience does not moderate the influence of Customization level on Performance Expectancy	Experience does not moderate the influence of CL on PE
H6b	Experience does not moderate the influence of Customization level on Effort Expectancy	Experience does not moderate the influence of CL on EE

H6c	Experience does not moderate the influence of Customization level on Social Science	Experience does not moderate the influence of CL on SI
H6	Performance Expectancy has significant influence on behavior intention	PE has significant positive influence on BI
H7	Effort Expectancy has significant influence on behavior intention and intention to use	EE has significant positive influence on BI
H8	Social Influence has significant influence on behavior intention and intention to use	SI has significant positive influence on BI

Part II

CHAPTER 4 PARADIGM AND DESIGN OF RESEARCH

4.0. Introduction

In the previous chapter, we developed a model of research integrator of the UTAUT with customization. To model our research, we have developed different assumptions which highlight the interactions and correlations between the different concepts mobilized in our research. This chapter discusses on the one hand, the methodology used to study the assumptions made in the preceding chapter and, on the other hand, the methods of analysis of the results to test and validate our model.

In this chapter, we address three main stages of our research, namely (1) the paradigms of scientific research and their use in the discipline of the information system acceptance, (2) the paradigmatic positioning of our research, and finally (3) the design of our research. So we are starting this chapter in reviewing the different paradigms in the social sciences namely positivism, post-positivism and critical theory that derives from as well as the constructivism. In order to better understand these paradigmatic currents, we will present their characteristics ontological, epistemological and methodological, relating to the first two characteristics, in order to have a global vision on the nature of reality, the basis of knowledge, the relationship of the researcher at the time with reality, and with its object of research, and finally the way in which it is going to guarantee the scientific nature of the knowledge. This will allow us to justify in a second part our way of designing the reality, in other words our ontological orientation, our epistemological positioning, and the methodology that derived. In the third part, we will present, with more detail, our process of methodological research. After that, we will present the theoretical design of our research model and the approach taken to test and validate our theoretical model. To do this, we will discuss our choice of the target population, the sampling method, the design of the questionnaire and the mechanisms of its administration, as well as the methods of analysis of empirical data that we have deployed, namely, a statistical analysis univariate and multivariate results, the exploratory analysis using the Partial Least Square – Structure Equitation Model (PLS-SEM) with SmartPLS.

4.1. Paradigms & discipline of technology acceptance

4.1.1 The paradigms of scientific research: general approach

Research reflect the reality of the world, especially in management sciences, addressing the research paradigm is an essential concept in the positioning of the researcher in relation to the theory and its arguments. Made for this, and to better position ourselves, we will present the paradigms of scientific research. Then we will present separately our positioning ontological and epistemological and our methodology that stems from it. Of course, we cannot, in the context of this chapter, deepen these concepts relating to the philosophy of science and to present the differences between the different schools of thought. Here, it is to justify, at best, our positioning ontological, epistemological, and methodological

To organize a reasoning and scientific approaches, researchers mobilized mental models and frameworks of references in the form of a belief system, called paradigms. The term "paradigm" was made popular by Kuhn (1962) in his book The Structure of scientific revolutions. For this author, the concept of the paradigm constitutes as many templates, diagrams intellectuals, or frames of reference in which a researcher can register to better apprehend its object of research. The concept of the paradigm refers to a vision of the world, a general point of view and a way to understand the complexity of the social world (Patton, 2001). By relying on the contribution of Kuhn (1970), Morgan (1980) defines the concept of the paradigm as a way of seeing society or even a series of metaphorical assumptions perceptual (postulates) having for object the conceptualization of the social world (Audet and Larouche, 1988). The concept of the paradigm has also been addressed by several authors of the philosophy of science. In this sense, Guba and Lincoln (1994) define a paradigm as "a set of basic beliefs (or metaphysical) which relate to the first principles or ultimate. It represents a vision of the world that defines, for its holder, the nature of the "world", the place of the individual in its midst, and the range of possible relations with this world and its parties.”

Generally, the nature of the questions of research influence the research paradigm, and in turn, the paradigm influence the choice of the appropriate methodology to the object of research (Saikouk & Spalanzani, 2013). As Morgan (2007) emphasized, the paradigmatic approach is essential in scientific research because it allows you to better orient the attention and the choice of the researcher toward the factors that have the most impact on the object of research. For example, to test the validity of a theory in a paradigmatic approach positivist or post-positivist, it would be more appropriate for the researcher to mobilize a methodology of quantitative research (Creswell, 2003; Morgan, 2007).

Thus, a paradigm is defined by both a set of ontological assumptions about the nature of truth, but also, by a set of epistemological assumptions, making reference to the way that knowledge is defined (Burrell and Morgan, 1979). For any research, it is essential to have a degree of consistency between the ontology of research, epistemology, the methodology chosen and its object of research. In this meaning, Guba and Lincoln (1994) stipulated that the paradigms of research are often characterized by an ontological dimension, making reference to the assumptions which concern the nature of reality, a dimension epistemological making reference to the foundations of knowledge and the way in which these knowledge are transmitted and finally, a methodological dimension referring to the processes which allow access to such knowledge. Krauss (2005) stipulates that these three dimensions are inter linked, each dimension may involve the other in the sense that they are mutually reinforcing. More exactly, the ontology involves the philosophy of real or simply "the reality" (Healy and Perry, 2000); the epistemology addresses the way by which the researcher can know this reality, it represents the relationship between the reality and the researcher and the methodology is the technique used by the researcher to explore this reality by identifying the methods used for achieving knowledge (Krauss, 2005). That said, building on the work of (Guba and Lincoln, 1994), we can distinguish four main paradigms mobilized in the work of scientific research, namely: the positivism, post-positivism, critical theory and constructivism. By crossing these main paradigms with the three characteristics of paradigms that we have presented above, these authors have class the fundamental beliefs (metaphysical) of alternative paradigms of research.

4.1.2. Epistemological Positioning

The determination of the epistemological posture is an essential step in any scientific research credible. The use of a method of research is often the result of a methodological choice adapted to the epistemological positioning of the researcher. Piaget (1967), defines the epistemology "in first approximation as the study of the constitution of knowledge valid". It refers to the theory of science or the philosophy of science or even as the theory of knowledge. According to Hoddinott et al., and Gavard-Perret (2008), epistemology allows you to apprehend several questions that the researcher, particularly in management sciences, should be put in advance of his study, namely: "What is knowledge? How is it developed? What is its value?" As well the epistemology or the nature of knowledge mobilized in a research led the researcher to question the nature of the knowledge produced and therefore on the nature of reality which can be apprehended through this knowledge, that is to say on the nature of reality knowable" (Perret and Seville, 2007). To identify the philosophical position of the researcher, it is essential to see in what position it is located in relation to the major paradigms which can encompass the vision of the researcher in relation to the world (Bourdieu, 1992). The epistemological positioning refers in particular to the four major currents conventional: positivism, post-positivism, critical theory and constructivism (Guba and Lincoln, 1994). In contrast, the boundaries between these various epistemologies are sometimes blurred and the overlaps are multiple (Miles and Huberman, 2003). To introduce the four epistemological positioning, we rely mainly on the typology of Guba and Lincoln (1994).

4.1.2.1. The positivism

The positivist paradigm has its origins of the science of nature. The positivism, based on the work of the French philosopher Auguste Comte (1798-1857) who said that “the word positive refers to the real"(The bears withness, 1995). The positivism is the most dominant in the science of the organization. He argues that science or the creation of knowledge must be limited to what can be observed and measured. The positivism considers that reality has an ontology: the object and the subject are by nature independent (Girod-Seville and Perret, 1999), which implies the existence of a reality and comprehensible from laws and mechanisms of constant and unchanged. In positivism, the reality exists in itself, it does not change. It is thus that the main objective of a positivist research is the explanation of the reality. The knowledge of reality takes a form of generalizations independent of the time and the context. Knowledge is not specific to a particular context. The reality must be studied in all objectivity independently of the researcher and of the most neutral possible (Pourtois and

Desmet, 1988), depending on the ontological hypothesis which considers that "the essential reality of the existential reality" (The bears withness, 1995). Thus the researcher and the object of research are independent without it being possible to influence each other. Generally, the scientific knowledge is a knowledge verified that takes the form of laws of cause and effect according to the deterministic hypothesis (Le Moigne, 1995) or the value judgments, the prejudices of the researcher, representative a bias, are rejected by following rigorous approaches. (Le Moigne 1995), Stressed that in a positivist position, the reality and the social world are external to the researcher. As well, the truth is seen objectively as being the one and only truth. In effect, the positivist researcher must insulate itself completely from its subjectivity (Pourtois and Desmet, 1988) to exclude any value judgment not based on the basis of realistic assumptions which allow a knowledge verifiable, and acknowledgeable rebuttable. The positivism relies exclusively on theories that can be directly tested. The knowledge produced remain true until they are refuted in the direction or the research questions and the hypotheses are proposed and subject to empirical tests in order to check. The methodology generally adopted by the researchers of positivist posture is primarily experimental.

4.1.2.2. The post-positivism

The criticisms of the nature strictly empirical positivist paradigm has led to the development of post-positivism (or postmodernism). In ontological term, the post-positivist is a realistic criticism. As we mentioned above, the positivism, the social world exists objectively in the form of an image in the spirit. To ensure objectivity, researcher use of external factors such as critical traditions, whose main role is to compare the results with existing knowledge, and community critical, as editors, referees and professional peers (Guba and Lincoln, 1994)

Thus, the validity of knowledge replicated, which are probably true, is performed through the falsification (Croom, 1999). In methodological terms, this paradigm relies on the criticism of previous research. The aim of the methodology is remedied to a few gaps by ensuring the research with a collection of data relating to situations, and of the opinions in order to better understand the meaning that people give to their actions. For this reason, quantitative methodologies, mainly mobilized in this paradigm, are drawn from the qualitative techniques.

4.1.2.3. Theory criticism

In ontological terms, this paradigm is characterized by a historical realism. In other words, the reality is determined by social values and historical, expanding with the time (Croom, 1999). The reality can be apprehended by the researcher if it is produced and reproduced in time from a set of factors social, cultural, political, economic, and ethnic, and who is then crystallized in a series of structures that are considered as "real", i.e. natural and unchanged. In epistemological terms, the authors consider that this paradigm is transactional and subjectivist because the researcher and its object of research are in continuous interaction. This paradigm assumes that the vision of the world of the researcher and its values influence fully the object of research. In other words, the values of the researcher shape the results of the research. The validity is supported by a clear description of the assumptions and values of the researcher. The research is regarded as a form of social criticism and cultural (Croom, 1999).

The authors stipulate that the traditional distinction between ontology and epistemology is challenged in this paradigm. Indeed, scientific knowledge is strongly conditioned by the continuous interaction between a researcher and its object of research. While the methodology in this paradigm is both dialogical and dialectical, in the meaning or the transactional nature of research requires a dialog between the researcher and the subjects of research, and where this dialog must be dialectic in nature to transform the ignorance and misunderstandings in a conscience more enlightened and informed (Guba and Lincoln, 1994).

4.1.2.4. The constructivism

In ontological terms, the constructivist represents a relativistic vision of the world. The constructivism is opposed to positivism because it refutes the existence of a reality independent of the subject who observes, "The world is unknowable and the knowledge is phenomenological" (Kant, 2000). In effect, the reality according to the constructivist paradigm remains unknowable because any phenomenon studied is submitted to the value judgment of the researcher. Whereas the objective of the positivism is the discovery of laws required of researchers, the constructivism contributes to construct, with researchers, the reality of the social world. To Guba and Lincoln (1994) the realities are machine alike: in the form of multiple mental constructs intangible, based on the social and the experience. These realities present themselves as being of nature's local and specific, and depend on their form and content of the persons and groups who maintain the buildings. In epistemological terms, the constructivist paradigm is both transactional and subjectivist. The researcher and the object of his research are supposed to be in continuous interaction to create the knowledge. In addition, and as for the critical theory, the classical distinction between ontology and epistemology disappears (Guba and Lincoln, 1994). Finally, in this paradigm, the methodology is both hermeneutics and dialectic. On the one hand, the knowledge is of a variable nature and personal, because the construction of the knowledge can be obtained from the interaction between the researcher and the respondents. On the other hand, the construction of knowledge is done by the interpretation of the researcher by using techniques conventional hermeneutical, and are compared and contrasted through a dialectical exchange. The final goal being to achieve a building of consensus which is better informed and more sophisticated than the one of the constructions of the predecessors (Guba and Lincoln, 1994).

In addition, other authors suggest other paradigmatic dimensions which influence the social sciences research and allow to group the theories in these recent (Brunelle and Morgan, 1979).   For this fact, they have chosen two axis: (1) a First axis affects the assumptions related to the nature of the social sciences from subjectivism to the objectivism, and (2) a second which concerned the assumptions related to the nature of the company ranging from the radical change to the social regulation. To finish, without wanting to relaunch the debate further on the paradigmatic positioning, and without taking the radical visions, we consider that, in spite of classifications and work on the paradigmatic perspectives, the most important one for the researcher, particularly in management sciences, is to distinguish between the different orientations of scientific paradigms, (in terms ontological, epistemological and methodological).

4.1.3 The paradigms of research in the discipline of the technology acceptance

As in any discipline, the discipline of the technology acceptance includes several research paradigms. And it was found that paradigms positivist or post-positivist are the more utilized in the discipline of the technology acceptance. Then comes the paradigm of critical theory. Another paradigm entitled the participatory paradigm, which has not been addressed in the context of our thesis. The postulates of the participatory paradigm are relatives of constructivism, particularly as regards the interaction between the researcher and the social world with as main difference the existence of the reality in which the human spirit contributed to its constitution. These results confirm what we have advanced previously concerning the dominance of positivism, which often focus more on quantitative methodologies. The root causes of this dominance, which is also more and more disputed, may be, according to Aastrup and Halldorsson (2008), reduced to three causes: namely (1) the myth of positivism, which emerged from the natural sciences, the recital of this fact as the unique scientific paradigm, (2) the need for the generalization as a way of judging the rigor and the quality of a search, and finally (3) the dominance of the horizontal discourse, that is to say, the discussions that are on the same level of abstraction.

In methodological terms, several journals and theses have been made to put the light on the methodologies used in the field of acceptance of computer technology. Ganesan et al. (1999) have suggested four main categories, namely (1) the concepts and models non-quantitative, (2) the empirical research and case studies, (3) the analytical frameworks, taxonomies and the literature reviews, and finally (4) the quantitative models. As we mentioned previously, the majority of research in management science is essentially positivist or post positivist, with methodologies dominated by the quantitative approaches or hybrid combining quantitative and qualitative approaches.

4.2. Paradigmatic principles of our research

Positioning within a particular paradigm allows you to bring out the ontological orientation, the epistemological positioning and the methodological approach that we should adopt in order to better respond to our research question.
Taking into account all the paradigms presented above, and the need to develop an epistemological position (Miles and Huberman, 2003), we will position us, for our part, in the paradigm post-positivist, and more particularly, the critical realism, different from the naive realism (positivism) to after (Guba and Lincoln, 1994), according to which there is an external reality which is independent of the researcher, but this reality can only imperfectly be apprehended. Of course, the critical realism incorporates only some fundamental principles of positivism and rejects others, of the fact of a growing challenge, also sustained by the post-positivist, of the rigidity of the positioning purely positivist, which is the origin of some of the problems in modern society (Paromaki and Wight, 2000).

In the context of our research, after having chosen the paradigm post-positivist, we will introduce the different elements of our positioning paradigmatic.

4.2.1. Ontology and epistemology adopted

We recall that we have made the choice to adopt a positioning post discovery of the reality would never be reached. In sum, we consider, by relying on the remarks of Robson (2011), that in contrast to positivism, which considers that researcher and its object of research are totally independent of each other, for the post-positivism the observation of reality, source of access to the truth, is influenced by the value judgments, the existing theories and the prior knowledge of the latter.

And in our research, the ERP customization and factors influence the ERP acceptance is a reality that exists independently of us. To do this, our role as researcher in this field, is to approach the dynamics of the ERP customization, its history, its dimensions and its consequences on the management and acceptance of ERP systems. For this reason, we relied on (1) the theory of ERP customization , and the UTAUT, (2) the literature review of work having mobilized these two concepts in the field of ERP implementation, (3) our knowledge gained in the course of survey design and data analysis, but also (4) our values and our personal beliefs. This gives our model an objective scope of what is the reality of the ERP customization and system acceptance, which is a vision relatively biased by errors of observation or interpretation which will be the subject of the work of future research.

4.2.2. Methodological Choice

We recall that the role of the ontology is to point out the nature of reality for the researcher, the epistemology allows to define the nature of the relationship between the researcher and the object of research, and the methodology refers to the way in which the researcher can reconstruct the knowledge on this reality. As well, we are moving toward a paradigm post-positivist which place the researcher in a posture of realistic criticism. This posture we are oriented toward the adoption of the following approaches:

1. An exploratory qualitative study will be adopted, and a survey instrument is preliminary of using in the empirical study.

2. The realization of a first review of literature of the ERP customization and information system acceptance in order to highlight our conceptual framework.

3. For the development of our first conceptual model, we have submitted our model to the criticism of several professionals, in order to ensure its theoretical rigor and of its practical relevance.

4. Based on the review of literature, we adopted theoretically the measurement scales to operationalize the variables of our conceptual framework propose, using a phase of pre-test. The objective of this step is to confirm on the facial validity of our theoretical model. Exploratory factor analysis (EFA) via principal component analysis (PCA) will be used to discover the critical factors, and verify the scales adopted.

5. A quantitative study by the mobilization of the methods of PLS-SEM include in the aim to analyze and validate the structure of our theoretical model, before that, CFA (Confirmatory Factor Analysis) was employed to check the validity and reliability.

Given that our paradigmatic positioning is post-positivist, we have adopted these approaches in order to consolidate the validity and relevance of our arguments. In addition, we consider that our theoretical model allows to represent the reality, imperfectly observable of the ERP acceptance. However, any research is subject to a number of means. In this sense, the rigor in the adoption of measurement instruments and the choice of statistical tools are solid and appropriate, allow us to minimize, reduce or control the risks of error which can occur in the research process.

In situations where theory is less developed, researchers should consider the use of PLS-SEM as an alternative approach to CB-SEM. This is particularly true if the primary objective of applying structural modeling is prediction and explanation of target constructs. The estimation procedure for PLS-SEM is an ordinary least squares (OLS) regression-based method rather than the maximum likelihood (ML) estimation procedure for CB-SEM. PLS-SEM uses available data to estimate the path relationships in the model with the objective of minimizing the error terms (i.e., the residual variance) of the endogenous constructs. In other words, PLS-SEM estimates coefficients (i.e., path model relationships) that maximize the R^2 values of the (target) endogenous constructs. This feature achieves the prediction objective of PLS-SEM. PLS-SEM is therefore the preferred method when the research objective is theory development and explanation of variance (prediction of the constructs). For this reason, PLS-SEM is regarded as a variance-based approach to SEM.

There are four critical topics relevant to the application of PLS-SEM (Hair, Ringle, & Sarstedt, 2011; Hair et al., 2012a; Hair et al., 2012b; Ringle, Sarstedt, & Straub, 2012): (1) the data, (2) model properties, (3) the PLS-SEM algorithm, and (4) model evaluation issues.

4.2.3 PLS-SEM & SmartPLS

Applications of PLS-SEM have grown exponentially in the past few years, and two journal articles published before the first edition provide clear evidence of the popularity of PLS-SEM. The two articles have been the most widely cited in those journals since their publication our 2012 article in the Journal of Academy of Marketing Science(Hair et al, 2016), “An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research,” cited more than 800 times according to Google Scholar, has been the number one highest impact article published in the top 20 marketing journals, according to Shugan’s list of most cited marketing articles (http:// www.marketingscience.org; e.g., Volume 2, Issue 3). It has also been awarded the 2015 Emerald Citations of Excellence award. Moreover, Hair et al. (2011) article in the Journal of Marketing Theory and Practice, “PLS-SEM: Indeed a Silver Bullet,” has surpassed more than 1,500 Google Scholar citations.

Research has also brought forward methodological extensions of the original PLS-SEM method, for example, to uncover unobserved heterogeneity or to assess measurement model invariance. These developments have been accompanied by the release of SmartPLS 3, which implements many of these latest extensions in highly user-friendly software. This new release is much more than just a simple revision. It incorporates a broad range of new algorithms and major new features that previously had to be executed manually. For example, SmartPLS 3 runs on both Microsoft Windows and Mac OSX and includes the new consistent PLS algorithm, advanced bootstrapping features, the importance-performance map analysis, multigroup analysis options, confirmatory tetrad analysis to empirically assess the mode of measurement model, and additional segmentation techniques. Furthermore, new features augment data handling (e.g., use of weighted data) and the graphical user interface, which also includes many new options that support users running their analyses and documenting the results. In light of the developments in terms of PLS-SEM use, further enhancements, and extensions of the method and software support, a new edition of the book is clearly timely and warranted.

SEM is among the most useful advanced statistical analysis techniques that have emerged in the social sciences in recent decades (Hair 2016). SEM is a class of multivariate techniques that combines aspects of factor analysis and regression, enabling the researcher to simultaneously examine relationships among measured variables and latent variables (assessment of measurement theory) as well as between latent variables (assessment of structural theory). Considering the ever-increasing importance of understanding latent phenomena, it is not surprising that SEM has become one of the most prominent statistical analysis techniques today. For many years, the predominance of LISREL, EQS, and AMOS, among the most well-known software tools to perform this kind of analysis, led to a lack of awareness of the composite-based PLS-SEM approach as a very useful alternative approach to SEM. Originated in the 1960s by the econometrician Herman Wold (1966) and further developed in the years after (e.g., Wold, 1975, 1982, 1985), PLS-SEM has become an increasingly visible method in the social science disciplines. Figure 36 summarizes the application of PLS-SEM in the top journals in the marketing and strategic management disciplines, as well as MIS Quarterly, the flagship journal in management information systems research.

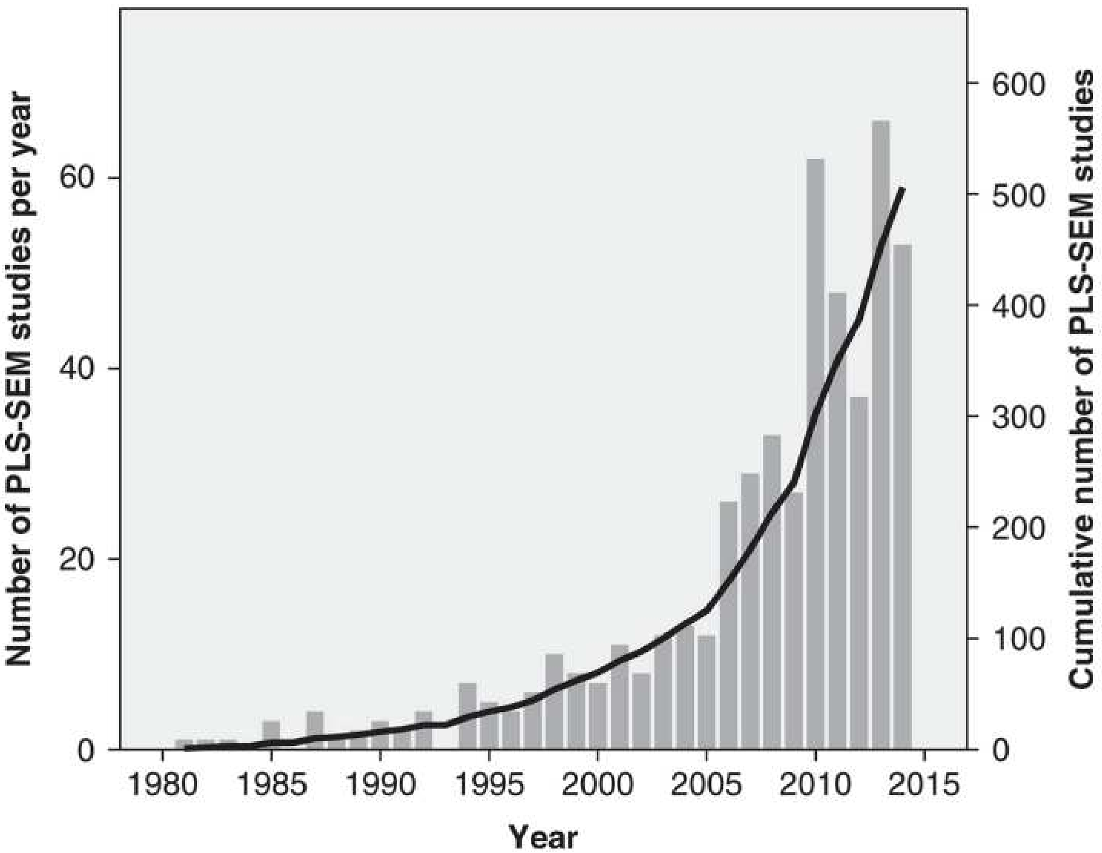


Figure 36. Number of PLS-SEM Studies
in Management, Marketing, and MIS Quarterly (Hair et al., 2016)

PLS-SEM use has increased exponentially in a variety of disciplines with the recognition that PLS-SEM's distinctive methodological features make it an excellent alternative to the previously more popular CB-SEM approach. Specifically, PLS-SEM has several advantages over CB-SEM in many situations commonly encountered in social sciences research such as when sample sizes are small or when complex models with many indicators and model relationships are estimated. However, PLS-SEM should not be viewed simply as a less stringent alternative to CB-SEM but rather as a complementary modeling approach to SEM. If correctly applied, PLS-SEM indeed can be a silver bullet in many research situations.

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For the past 20 years, many researchers have increasingly been turning to second-generation techniques to overcome the weaknesses of first-generation methods (Table 14). These methods, referred to as structural equation modeling (SEM), enable researchers to incorporate unobservable variables measured indirectly by indicator variables. They also facilitate accounting for measurement error in observed variables (Chin, 1998). There are two types of SEM. Covariance-based SEM (CB-SEM) is primarily used to confirm (or reject) theories (i.e., a set of systematic relationships between multiple variables that can be tested empirically). It does this by determining how well a proposed theoretical model can estimate the covariance matrix for a sample data set. In contrast, PLS-SEM (also called PLS path modeling) is primarily used to develop theories in exploratory research. It does this by focusing on explaining the variance in the dependent variables when examining the model (Hair 2016).

	Primarily Exploratory	Primarily Confirmatory
First-generation techniques	• Cluster analysis • Exploratory factor analysis • Multidimensional scaling	• Analysis of variance • Logistic regression • Multiple regression • Confirmatory factor analysis
Second-generation techniques	• Partial least squares structural equation modeling (PLS-SEM)	• Covariance-based structural equation modeling (CB-SEM)

Table 14. PLS-SEM as the second-generation techniques

4.2.4. PLS-SEM vs CB-SEM and Regressions

A crucial conceptual difference between PLS-SEM and CB-SEM relates to the way each method treats the latent variables included in the model. CB-SEM considers the constructs as common factors that explain the covariation between its associated indicators. The scores of these common factors are neither known nor needed in the estimation of model parameters. PLS-SEM, on the other hand, uses proxies to represent the constructs of interest, which are weighted composites of indicator variables for a particular construct. For this reason, PLS-SEM constitutes a composite-based approach to SEM, which relaxes the strong assumptions of CB-SEM that all the covariation between sets of indicators is explained by a common factor (Henseler et al., 2014; Rigdon, 2012; Rigdon et al., 2014). At the same time, using weighted composites of indicator variables facilitates accounting for measurement error, thus making PLS-SEM superior compared with multiple regression using sum scores. In the latter case, the researcher assumes an equal weighting of indicators, which means that each indicator contributes equally to forming the composite (Henseler et al., 2014).

Regressions using sum scores equalize any differences in the individual item weights. Such differences are, however, common in research reality, and ignoring them entails substantial biases in the parameter estimates (e.g., Thiele, Sarstedt, & Ringle, 2015). Furthermore, learning about individual item weights offers important insights as the researcher learns about each item's importance for forming the composite in a certain context (i.e., its relationships with other composites in the structural model). It is important to note that the proxies produced by PLS-SEM are not assumed to be identical to the constructs, which they replace. They are explicitly recognized as approximations (Rigdon, 2012). As a consequence, some scholars view CB-SEM as a more direct and precise method to empirically measure theoretical concepts, while PLS-SEM provides approximations. Other scholars contend, however, that such a view is quite shortsighted as common factors derived in CB-SEM are also not necessarily equivalent to the theoretical concepts that are the focus of research. In fact, there is always a large validity gap between the concept a researcher intends to measure and the concrete construct used to measure a particular concept (e.g., Rigdon, 2012; Rossiter, 2011). In social sciences research, viewing measurement as an approximation seems more realistic (e.g., Rigdon, 2014b), making the distinction between PLS-SEM and CB-SEM in terms of their treatment of constructs questionable. This view is also supported by the way CB-SEM is applied in research practice. When using CB-SEM, initially hypothesized models almost always exhibit inadequate fit. In response, researchers should reject the model and reconsider the study (which usually requires gathering new data), particularly when many variables must be deleted to achieve fit (Hair et al., 2010). Alternatively, they frequently respecify the original theoretically developed model in an effort to improve fit indices beyond the suggested threshold levels. By doing so, researchers arrive at a model with acceptable fit, which they conclude theory supports. Unfortunately, the latter is a best-case scenario that almost never applies in reality. Rather, researchers engage in exploratory specification searches in which model subsets are modified with the aim of arriving at a satisfactory model fit. However, models that are the product of such modifications often do not correspond particularly well to the true models and tend to be overly simplistic (Sarstedt, Ringle, Henseler, & Hair, 2014).

Apart from differences in the philosophy of measurement, the differing treatment of latent variables and, more specifically, the availability of latent variable scores also has consequences for the methods' areas of application. Specifically, while it is possible to estimate latent variable scores within a CB-SEM framework, these estimated scores are not unique. That is, an infinite number of different sets of latent variable scores that will fit the model equally well are possible. A crucial consequence of this factor (score) indeterminacy is that the correlations between a common factor and any variable outside the factor model are themselves indeterminate. That is, they may be high or low, depending on which set of factor scores one chooses. As a result, this limitation makes CB-SEM extremely unsuitable for prediction (e.g., Dijkstra, 2014). In contrast, a major advantage of PLS-SEM is that it always produces a single specific (i.e., determinate) score for each composite for each observation, once the weights are established. These determinate scores are proxies of the concepts being measured, just as factors are proxies for the conceptual variables in CB-SEM (Becker, Rai, & Rigdon, 2013). Using these proxies as input, PLS-SEM applies ordinary least squares (OLS) regression with the objective of minimizing the error terms (i.e., the residual variance) of the endogenous constructs. In short, PLS-SEM estimates coefficients (i.e., path model relationships) that maximize the R^2 values of the (target) endogenous constructs. This feature achieves the prediction objective of PLS-SEM. PLS-SEM is therefore the preferred method when the research objective is theory development and explanation of variance (prediction of the constructs). For this reason, PLS-SEM is regarded as a variance-based approach to SEM.

Note that PLS-SEM is similar but not equivalent to PLS regression, another popular multivariate data analysis technique. PLS regression is a regression-based approach that explores the linear relationships between multiple independent variables and a single or multiple dependent variable(s).

PLS regression differs from regular regression, however, because in developing the regression model, it constructs composite factors from both the multiple independent variables and the dependent variable(s) by means of principal component analysis. PLS-SEM, on the other hand, relies on prespecified networks of relationships between constructs as well as between constructs and their measures (see Mateos-Aparicio, 2011, for a more detailed comparison between PLS-SEM and PLS regression). These considerations also have their roots in the method's characteristics. The statistical properties of the PLS-SEM algorithm have important features associated with the characteristics of the data and model used.

When applying PLS-SEM, researchers also benefit from high efficiency in parameter estimation, which is manifested in the method's greater statistical power than that of CB-SEM. Greater statistical power means that PLS-SEM is more likely to render a specific relationship significant when it is in fact significant in the population. The very same holds for regressions based on sum scores, which lag behind PLS-SEM in terms of statistical power (Thiele et al., 2015). There are, however, several limitations of PLS-SEM. In its basic form, the technique cannot be applied when structural models contain causal loops or circular relationships between the latent variables, which is not the case in this research.

Furthermore, since PLS-SEM does not have an established global goodness-of-fit measure, its use for theory testing and confirmation is generally limited. Recent research, however, has started developing goodness-of-fit measures within a PLS-SEM framework, therefore broadening the method’s applicability (e.g., Bentler & Huang, 2014). Other characteristics of PLS-SEM are that the parameter estimates are not optimal regarding consistency- a characteristic often incorrectly referred to as PLS-SEM bias.

Although CB-SEM advocates strongly emphasize this difference in the two methods, simulation studies show that the differences between PLS-SEM and CB-SEM estimates are very small when measurement models meet minimum recommended standards in terms of number of indicators and indicator loadings. Specifically, when the measurement models have four or more indicators and indicator loadings meet the common standards (≥ 0.70), there is practically no difference between the two methods in terms of parameter accuracy (e.g., Reinartz, Haenlein, & Henseler, 2009; Thiele et al., 2015). Thus, the extensively discussed PLS-SEM bias is of no practical relevance for the vast majority of applications (e.g., Binz Astrachan, Patel, & Wanzenried, 2014). More importantly, the divergence of parameter estimates of PLS-SEM should not be considered a bias but a difference resulting from the methods’ differing treatment of the construct measures (common factors vs. composites). Furthermore, recent research has developed modifications of the original PLS-SEM algorithm, which correct for the PLS-SEM differences. Most notably, Dijkstra and Henseler’s (2015) consistent PLS (PLSc) approach provides corrected model estimates while maintaining all of the PLS method's strengths, such as the ability to handle complex models when the sample size is limited, formatively measured constructs, and nonlinear relationships (for an alternative approach, see Bentler & Huang, 2014). In certain cases, particularly when there is little a priori knowledge of structural model relationships or the measurement characteristics of the constructs, or when the emphasis is more on exploration than confirmation, PLS-SEM is superior to CB-SEM. Furthermore, when CB-SEM assumptions are violated with regard to normality of distributions, minimum sample size, and maximum model complexity, or related methodological anomalies occur in the process of model estimation, PLS-SEM is a good methodological alternative for theory testing.

4.3. Design of research

In this point, we discuss the design of the research that we have followed for, on the one hand, strengthen the more possible our theoretical arguments and methodological and, on the other hand, ensure that our theoretical model is the closest possible to the reality of ERP customization. The design of research allows us to better articulate the different stages of our research (Saikouk & Spalanzani, 2013). Grunow (1995) specifies that the design of the research is an essential element for any scientific research. It represents a strategy, a plan or a program of research that includes four main steps: (1) the definition of issues which are the subject of the research, (2) the determination of relevant data, (3) the collection of data, and, (4) to collect and analyze the results obtained (Schwab, 1978). In this sense, Royer and Zarlowski (1999) indicate that the design of research is has three main issues namely, (1) the formulation of the question of research, (2) the achievement of a review of the literature, and (3) the analysis of the results. Similarly, Kothari (2009) has pointed out that the design of the research is essential for any research, because it facilitates the articulation of various stages of research. More recently, Bhattacherjee (2012) recalls that the researcher should go finances because this provides employment opportunities three sequential phases, next: during the first phase, the researcher must be able to observe a set of phenomena, events or relevant behaviors. The second phase is to give a meaning to what he has observed, in trying to conceptualize the links between the observed items to develop a theory or framework of general analysis. The third phase, and last phase, is to test the theory or the model developed in the second phase, by the use of scientific methods of data collection and analysis for research in the objective to understand and explain the phenomena, events or the behaviors observed.

From the foregoing, we distinguish between two main steps in the development of our search:

1. A first step of exploratory observation on the ground to exchange with the professionals, analyze the literature review of the ERP customization, and existing theories in the field of ERP acceptance.
2. A second step is to carry out an empirical study quantitative to test our assumptions and validate our model of theoretical research developed in the second step.

We have had to make these translations and adaptations of scales of measures, originally developed in the English language (Vallerand, 1989)

The research approach attempts to answer three research questions by describing associations between dependent and independent variables. The degree of association is used to accept, or not accept, the null hypothesis. The data items collected from the survey do not involve observations or treatment in an experiment. The survey simply collects quantitative responses submitted by participants. Thus, the research uses a descriptive, non-experimental quantitative survey approach.

The research approach, employ exploratory factor analysis (EFA). The exploratory phase applies Lewis, Templeton, and Byrd's (2005) methodology to assess construct validity. This study focuses on construct validity, rather than content validity, due the level of abstraction stemming from operationalization of the constructs (Lawshe, 1975). First, a literature review is performed to identify relevant models and frameworks. Next, a mapping process results in appropriate constructs and measures, yielding the survey instrument. Additional construct validity properties of the instrument are then evaluated (Lewis et al., 2005). Finally, a confirmatory factor analysis is performed to produce a confirmed model as well as a validated survey instrument (Excellent, 2013).

A general summary of the main aspects of the research approach follows:

1. Non-experimental approach
2. Approach uses a survey to elicit responses from a random selection of participants.
3. Approach does not observe or treat participants.
4. Research approach leverages quantitative methodology, based on statistical analysis, to describe and explain associations between independent and dependent variables.
5. Statistical analysis relies on a confirmatory approach, which depends on explicit hypotheses (Kositanurit et al., 2011).
6. Survey is descriptive-exploratory in nature (Roses, 2011).
7. Questionnaire is based on the self-report approach.

This first step is essential to the proper conduct of our research because it allows us to refine the research question and to mobilize the explanatory theories are most appropriate and adapted to our problem. Indeed, the qualitative analysis exploratory has much influence the choice of literature and theoretical framework which we helped to establish links between the different concepts involved in our research model. In the perspective of Bhattacherjee (2012) this exploratory phase is essential in the conduct of the research. As emphasized by Kothari (2009), in order to better reformulate the problem of research and define the question, it is essential to properly install the problem that the researcher has to face, which essentially depends on the preliminary definition and in general of the problematic, for the realization of a review of the literature appropriate to the nature of the problems posed and the realization of a review of the experience through discussions with the professionals.

In the framework of this step, we will include the following two points: the qualitative study preliminary and the literature review. These two steps are taking place one after the other.

4.3.1. A first review of experience

In any scientific research, the observation phase and the preliminary analysis are decisive, particularly in management science. It allows us to develop ideas, around a given problem, through discussions with professionals and interested businesses which allows us to draw relevant information Kothari (2009).

From this, and after the delimitation of the subject of research, we have carried out a first preliminary analysis, in the context of multiple ERP project implementation, through our regular participation in the project meeting and customization decision and realization. And exchange with consultants, business leaders, business and system analyst. This step has allowed us to understand the importance of the ERP customization and easy of customization, and its effect on the ERP acceptance.

4.3.2. Literature review

After we have refined our problem and research question, we have conducted a literature review in order to develop our model of theoretical research. First of all, we are engaged in the review of theories from information system acceptance, and which allow us to understand the effect of perceived usefulness, ease of use and social norm on the acceptance of information system in a mandated environment. This review has enabled us to select the complementary theories to know, the theory of UTAUT. Secondly, after the review of literature relating to ERP customization, the work which relate to, we have been able to highlight several syntheses of knowledge to construct solid arguments and therefore our final model.

4.3.3. Construction of the model and adoption of manifest variables

After having established our conceptual model, we engaged a second time in the literature in order to build our instruments of measures and develop the items (manifest variables) to measure our constructed (latent variable). In view of the foregoing, Saikouk & Spalanzani (2013) relied on the prospect of Hinkin (1995) and opted for the approach of deductive development of predetermined scales in the literature. The operationalization of concepts mobilized in our research is mainly based on pre-existing measures from the literature. To return to the methods of generation of items of Hinkin (1995) namely the deductive method or "the classification by the top", and the inductive method or "the classification by the bottom". For this author, the deductive approach of scale of measures is primarily based on the time, on the understanding of the phenomenon being studied from the exploratory study and but also on the existing literature. Two possibilities arise from this approach: (1) the use of a predetermined scale, and (2) development of new items from the literature, which requires, however, a phase of pre-test. It is as well, that we have chosen the deductive approach to adopt ladders of measures already validated in previous work having mobilized the same concepts that we have mobilized in our theoretical model. To do this, we will rely mainly on empirical work in order to focus on the key items or variables manifests which form the constructed (latent variables).

4.4. Development of scales of measures

As we mentioned in the previous chapters, the conceptualization and operationalization of ERP customization is an important issue, because it allow the company to fit in the gap between the system and the business process.
We recall that our model of research is organized around 3 major dimensions to knowledge: ERP customization, ERP acceptance and its influence factors.
We have developed ranges of measurements based on the psychometric standards for the design of scale of measurement (Anderson and Gerbing, 1988). We have developed measurement scales multi-items, on the basis of the existing measures we have identified from our literature review and our interviews with a few responsible business and IT persons. In effect, we have used directly of the existing scales or we have adapted when it becomes necessary.

A survey instrument to measure the nature of customization, was adopted. After these measures have been validated, a pilot survey will be performed. After a successful pilot, an assessment of the measure are accepted even part of the measure in pilot has been deleted because the deletion increase the VAE. For the final survey, more wide subjects' response were collected, in order to satisfy the model fit and moderator check using group technology.

4.4.1. Customization level

(Ng et al., 2013) defined the level (degree) of customization as the degree to which an ERP system was altered to meet the needs of a business unit. And it was used in the conceptual model of ERP success (adapted from DeLone & McLean, 2003) to predict the system benefit.

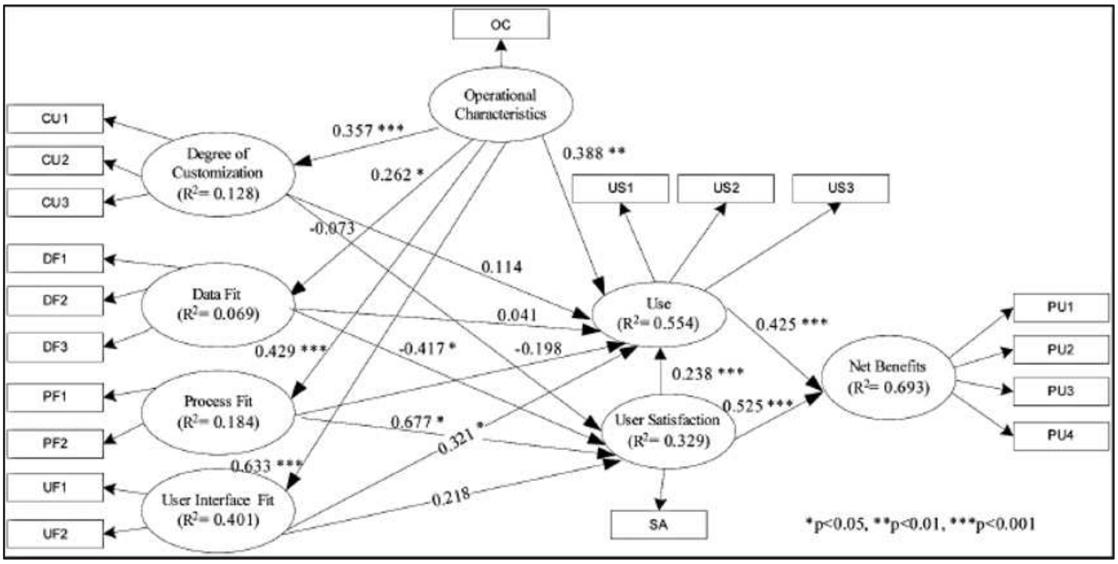


Figure 37. Conceptual model of ERP success

(DeLone and McLean, 2003)

And in (Hong and Kim, 2002), it was found that, the ERP package tailoring typology can be used to predict success ERP, and the ERP adaptation level speculate that ERP adaptation may have stronger explainability on ERP implementation success than process adaptation.

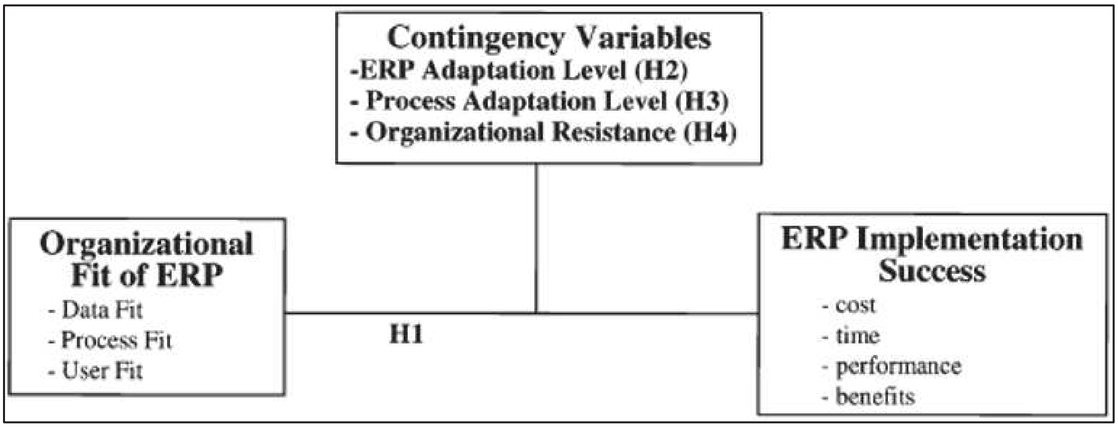


Figure 38. Conceptual model of ERP success

(Hong and Kim, 2002)

And customization as latent variable also used in (Gattiker and Goodhue, 2005) as has significant positive relation with task efficiency.

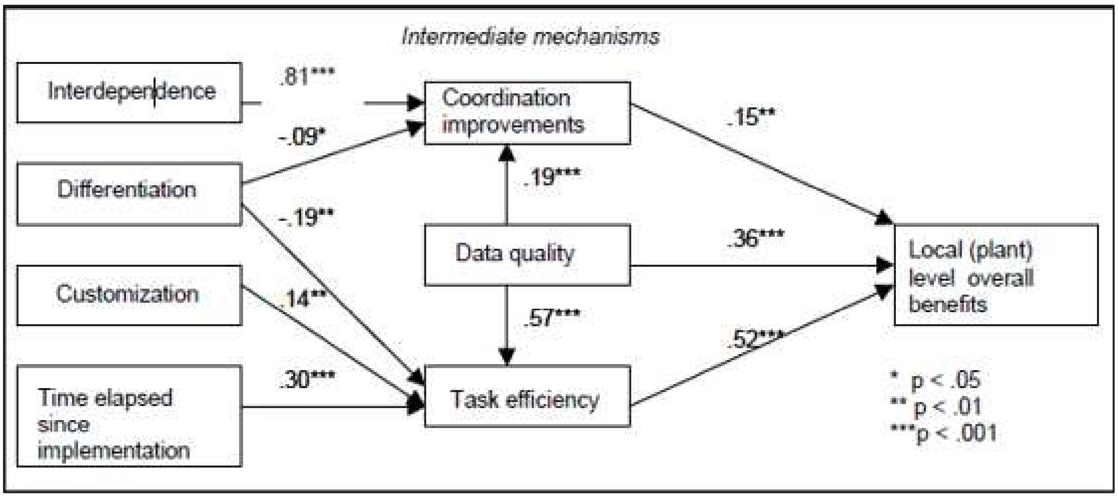


Figure 39. Conceptual model of ERP benefit

(Gattiker and Goodhue, 2005)

As in the model of Chou and Chang (2008), customization was defined as the capability of handling the lack of fit between the organization's business processes and those envisaged by the ERP package designers. We adopt the scale of measure of customization as it was the closest application similar to our model.

Variable	Item	Verify Item	Code	Questionnarie Items
Customization Level	1.1.1	CLEV1	V1.1.1_CLEV1	The ERP system was altered to improve its fit with the organization(If you have more than one ERP project or usage experience, please use the one you most familiar with or the one you have been involved most)
	1.1.2	CLEV2	V1.1.2_CLEV2	The ERP implementation (or modification) team was responsive to the needs of the organization
	1.1.3	CLEV3	V1.1.3_CLEV3	Individuals from this organization had a great deal of influence on how the ERP system was set up
	1.1.4	CLEV4	V1.1.4_CLEV4	A standard version of the ERP software was implemented (or modified) and used without changes being made to fit the particular requirements of this firm
	1.1.5	CLEV5	V1.1.5_CLEV5	When the ERP system was being implemented (or modified) in this firm, the package was changed to better meet the needs of this organization

Table 15. Scale for customization level

4.4.2. Ease of customization

Ease of Customization/Flexibility/Adaptability refers to the extent to which this package can be easily modified to meet your organization’s unique needs. ERP systems are complex and domain knowledge and business processes vary from industry to industry, thus, generally ERP system customization (or its generated system) is required. The implementation process is highly dependent on the consultants’ domain knowledge, vendors’ technical competence, and flexibility of the ERP system. Therefore, two items were added: domain knowledge of the ERP project team, and customization (Wu and

Wang, 2006) and these two indicators are used to measure the ERP system customization capability.

System flexibility defined as the ability of the ERP system to change, to adjust, or to adapt to new conditions, processes, organization structures, or circumstances. And system integrity, defined as the capacity of the ERP system to communicate data with other systems servicing different functional areas, located in different geographical zones, or working for other business partners.

Another source of scale of measure for the ease of customization come from (Longinidis and Gotzamani, 2009), the first one, ERP is easily adapted to changes occurred in your job and the second one, ERP is able to communicate with other IS of the organization. The results indicate that three main components affect the level of satisfaction of an ERP user: “interaction with the IT department,” “pre-implementation processes,” and “ERP product and adaptability.” (Longinidis and Gotzamani, 2009)

Variable	Item	Verify Item	Code	Questionnarie Items
Customization Ease	1.2.1	CDIF1	V1.2.1_CDIF1	To adapt to business requirement, our ERP system can be changed and enhanced, and the customization is easily to be done
	1.2.2	CDIF2	V1.2.2_CDIF2	Compare to other ERP system, the ERP we are using are relatively easier to change
	1.2.3	CDIF3	V1.2.3_CDIF3	ERP system has the ability to change, to adjust, or to adapt to new conditions, processes, organization structure, or circumstances
	1.2.4	CDIF4	V1.2.4_CDIF4	ERP is able to communicate with other IS of the organization
	1.2.5	CDIF5	V1.2.5_CDIF5	Compare to other ERP system, the ERP we are using is easier to communicate with other IS of the organization
	1.2.6	CDIF6	V1.2.6_CDIF6	ERP we are using is able to communicate or integrate with other IS of the organization
	1.2.7	CDIF7	V1.2.7_CDIF7	ERP system has the capacity to communicate data with other system servicing different functional areas, located in different geographical zones, or working for other business partners

Table 16. Scale for ease of customization

4.4.3. PE EE SI and BI from UTAUT

Performance expectancy, effort expectancy, social influence and behavioral intention to use the system are adopted directly from the UTAUT (Venkatesh et.al. 2003)

Variable	Item	Verify Item	Code	Questionnarie Items
Performance expectancy	2.1.1	PERF1	V2.1.1_PERF1	I found our ERP system is more helpful than the others
	2.1.2	PERF2	V2.1.2_PERF2	Using the system enables me to accomplish tasks more quickly.
	2.1.3	PERF3	V2.1.3_PERF3	Using the system increases my productivity.
	2.1.4	PERF4	V2.1.4_PERF4	If I use the system. I will increase my chances of getting a raise
Effort expectancy	2.2.1	EFFO1	V2.2.1_EFFO1	My interaction with the system would be clear and understandable
	2.2.2	EFFO2	V2.2.2_EFFO2	It would be easy for me to become skillful using the system
	2.2.3	EFFO3	V2.2.3_EFFO3	I would find the system easy to use.
	2.2.4	EFFO4	V2.2.4_EFFO4	Learning to operate the system is easy for me
Social influence	2.3.1	SEFF1	V2.3.1_SEFF1	People who influence my behavior think that I should use the system.
	2.3.2	SEFF2	V2.3.2_SEFF2	People who are important to me think that I should use the system.
	2.3.3	SEFF3	V2.3.3_SEFF3	The senior management of this business has been helpful in the use of the system.
	2.3.4	SEFF4	V2.3.4_SEFF4	In general, the organization has supported the use of the system
Behavioral intention to use the system	3.1.1	UINT1	V3.1.1_UINT1	I predict I would use the system in the next <n> months.
	3.1.2	UINT2	V3.1.1_UINT2	If I can decide, I will use the system in the next <n> months
	3.1.3	UINT3	V3.1.1_UINT3	I intend to use the system in the next <n> months
	3.1.4	UINT4	V3.1.1_UINT4	I plan to use the system in the next <n> months.
	3.1.5	UINT5	V3.1.1_UINT5	I would like to use the system if I can choose
	3.1.6	UINT6	V3.1.1_UINT6	I intend to use it if I can make more changes to the system

Table 17. Scale for part of UTAUT

4.4.4. General Summary of Items

Table 18. General Summary of Items
- constructed of first and second order retained

Table : General Summary of Items, constructed of first and second order retained				
Second Order	**First Order**	**Measurement Items**	**Code**	**Bibliography**
Customization	**Customization Level**	1.1.1 The ERP system was altered to improve its fit with the organization(If you have more than one ERP project or usage experience, please use the one you most familiar with or the one you have been involved most)	V1.1.1_CLEV1	Gattiker et al, (2005); Soh et al. (2000); Chou et al. (2008); Hong et al. (2008); Rajagopal et al. (2002); Gattiker et al. (1981); Gefen et al. (2002); Venkatesh et al (2003)
		1.1.2 The ERP implementation (or modification) team was responsive to the needs of the organization	V1.1.2_CLEV2	
		1.1.3 Individuals from this organization had a great deal of influence on how the ERP system was set up	V1.1.3_CLEV3	
		1.1.4 A standard version of the ERP software was implemented (or modified) and used without changes being made to fit the particular requirements of this firm	V1.1.4_CLEV4	
		1.1.5 When the ERP system was being implemented (or modified) in this firm, the package was changed to better meet the needs of this organization	V1.1.5_CLEV5	
	Ease/Flexibility of	1.2.1 To adapt to business requirement, our ERP system can be changed and enhanced, and the customization is easily to be done	V1.2.1_CDIF1	

	Customization	1.2.2 Compare to other ERP system, the ERP we are using are relatively easier to change	V1.2.2_CDIF2	Wu et al (2006) Bernroider & Koch (2001); Goldenberg, 1991); Keil et al, (2006); Gattiker and Goodhue (2002); Soh et al.2003); Jacobs and Bendoly (2003); Jacobs and Whybark (2000); Bryce & Bryce, (1987); Johannsen, (1980); Romanow et al.(1998)
		1.2.3 ERP system has the ability to change, to adjust, or to adapt to new conditions, processes, organization structure, or circumstances	V1.2.3_CDIF3	
		1.2.4 ERP is able to communicate with other IS of the organization	V1.2.4_CDIF4	
		1.2.5 Compare to other ERP system, the ERP we are using is easier to communicate with other IS of the organization	V1.2.5_CDIF5	
		1.2.6 ERP we are using is able to communicate or integrate with other IS of the organization	V1.2.6_CDIF6	
		1.2.7 ERP system has the capacity to communicate data with other system servicing different functional areas, located in different geographical zones, or working for other business partners	V1.2.7_CDIF7	
Expectancy	**Performance expectancy**	2.1.1 I found our ERP system is more helpful than the others	V2.1.1_PERF1	Compeau and Higgins (1995); Compeau et al. (1999); Moore and Benbasat (1991); Davis 1989; Davis et al. (1989); Thompson et al. (1991)
		2.1.2 Using the system enables me to accomplish tasks more quickly.	V2.1.2_PERF2	
		2.1.3 Using the system increases my productivity.	V2.1.3_PERF3	
		2.1.4 If I use the system. I will increase my chances of getting a raise	V2.1.4_PERF4	
	Effort	2.2.1 My interaction with the system would be clear and understandable	V2.2.1_EFFO1	Davis et al. (1989); Moore and Benbasat

	expectancy	2.2.2 It would be easy for me to become skillful using the system	V2.2.2_EFFO2	(1991); Thompson et al. (1991); Moore and Benbasat (1991)
		2.2.3 I would find the system easy to use.	V2.2.3_EFFO3	
		2.2.4 Learning to operate the system is easy for me	V2.2.4_EFFO4	
	Social influence	2.3.1 People who influence my behavior think that I should use the system.	V2.3.1_SEFF1	Ajzen (1991); Davis et al. (1989); Fishbein and Azjen(1975) ; Mathieson (1991); Taylor and Todd (1995a, 1995b); Thompson et al. (1991); Moore and Benbasat (1991)
		2.3.2 People who are important to me think that I should use the system.	V2.3.2_SEFF2	
		2.3.3 The senior management of this business has been helpful in the use of the system.	V2.3.3_SEFF3	
		2.3.4 In general, the organization has supported the use of the system	V2.3.4_SEFF4	
Behavioral Intention	**Behavioral intention to use the system**	3.1.1 I predict I would use the system in the next <n> months.	V3.1.1_UINT1	Warshaw, P.R (1985); Ajzen (1991); Davis et al. (1989); Thompson et al. (1991); Davis et al. (1989); Venkatesh et al (2003)
		3.1.2 If I can decide, I will use the system in the next <n> months	V3.1.1_UINT2	
		3.1.3 I intend to use the system in the next <n> months	V3.1.1_UINT3	
		3.1.4 I plan to use the system in the next <n> months.	V3.1.1_UINT4	
		3.1.5 I would like to use the system if I can choose	V3.1.1_UINT5	
		3.1.6 I intend to use it if I can make more changes to the system	V3.1.1_UINT6	
Control	**Experience**	4.1.1 How many years have you experienced in ERP	V4.1.1_EXPE	Moore and Benbasat (1991); Taylor and Todd (1995a); Thompson et al. (1994); Karahanna et al. (1999)
	Position	4.1.2 Which role are you in ERP implementation/use	V4.2.1_ROLE	Amoako-Gyampah's(2004); Lin et al (2009);

				Mingers (2001)

4.5 Test of assumption, model validation

To test the assumptions of our theoretical model and check the validity and the reliability of our scales of measurement, we will firstly submit the sampling method adopted as well as the characteristics of the population that we will be questioning. Secondly, we are going to present in detail, the questionnaire that we administered. Finally, we introduce the methods of analysis that we have mobilized to check the validity and reliability of our scales of measurement and test the assumptions of our theoretical model

4.5.1. Survey & PLS-SEM Strategy

The research methodology has been selected based on empirical research practices in the field, literature observations, and theoretical bases of reliability and validity (Shareef, Kumar, Kumar, & Dwivedi, 2011). As such, a survey-SEM approach has been adopted for this study (Urbach et al., 2010). The literature indicates extensive use of the survey approach, in the conduct of studies involving comprehensive multidimensional relationships (Urbach et al., 2010). A brief review of the 2011-2015 literature reveals that application of the survey-SEM approach encompasses a broad range of subjects. More specifically, the survey-SEM strategy has been used to study specialized IS as well as other areas of the field.

As this brief survey of the literature indicates, rather than investigating the impact of single intangible factors, it is preferable to apply a comprehensive SEM approach to the problem (DeLone & McLean, 2003, Urbach et al., 2010). The D & M model, as extended by Urbach et al.'s (2010) model, with further adaptation for this study, provides the theoretical grounds for this research.

SEM is used because it facilitates the simultaneous analyses of dependent and independent variables (Caniels & Bakens, 2012). However, the use of Likert-scale ordinal variables as interval variables reduces the variability of parametric statistical analysis, which depends on continuous, rather than discrete, variables (Kositanurit et al., 2011; Shareef et al., 2011). As such, it is preferable to use PLS SEM, rather than maximum likelihood SEM, when a non-parametric approach is adopted. PLS analysis helps mitigate issues encountered with multicollinearity, small sample size, model complexity, and normality violations (Caniels & Bakens, 2012), while allowing for the simultaneous analysis of measurement and structural models, as well as the comparison of different groups (Park et al., 2011).

The goal is predicting key target constructs or identifying key “driver” constructs. Formatively measured constructs are part of the structural model. Note that formative measures can also be used with CB-SEM, but doing so requires construct specification modifications (e.g., the construct must include both formative and reflective indicators to meet identification requirements) (Hair et al., 2013). The structural model is complex (many constructs and many indicators). The sample size is small and/ or the data are non-normally distributed. The plan is to use latent variable scores in subsequent analyses.

Use CB-SEM when the goal is theory testing, theory confirmation, or the comparison of alternative theories. Error terms require additional specification, such as the covariation. The structural model has non-recursive relationships. The research requires a global goodness-of-fit criterion.

The survey approach for this study relies on the distribution of online questionnaires to prospective study participants. The online survey approach offers convenience, low cost, practical response time, while facilitating data collection and analysis (Wang, et al., 2010). The questionnaire used in this study includes 40(35 plus 5 verification items), though 35 items are recommended (Caniels & Bakens, 2012) to minimize last-questions biases. Last survey questions present opportunities for biased responses when respondents trade speed for accuracy, due to increased loss of interest in the survey (Caniels & Bakens, 2012). Although a five-point Likert scale is preferred over a three-point Likert scale, which inadequately captures the strongest and mildest opinions, or a seven-point Likert scale, which overloads respondents with confusing choices (Pai & Huang, 2011), the seven-point Likert scale is used nonetheless for consistency with Urbach et al.'s (2010) methodology.

4.5.2. Pretest

The preliminary questionnaire was administered to those individuals who had ERP and customization experience. The purpose of this phase was to adjust the structured instrument and qualitative review approach to increase the validity and internal consistency of the study.

The pretest served to ensure that all participants understood and could respond to the overall data collection instruments as intended by the researcher. To ensure that the Likert scale items were appropriate for this research, the structured questionnaires were subjected to pretest. The sample for the pretest was done through SSRS service the same as formal survey and to the subjects who had an understanding of ERP or ERP-like initiatives.

It was ensured that "the participants are fully informed about the purpose of the research and how it is to be conducted" in an effort to enhance validity (Darke, Shanks, & Broadbent, 1998). Consistent with Jarvenpaa, Dickson, and DeSanctis (1985), we verified the data collection instruments translated into Chinese and used in prior research by Wixom and Watson (2001). These modifications necessitated the pretesting and pilot testing of the instruments to increase their validity and reliability.

4.5.3. The target population & sampling method

4.5.3.1. Random sampling

In the framework of research that are conducted in the field of the ERP customization, the main difficulty of quantitative studies, lies in the inability to query the whole target population due to its rarity. In effect, for collecting reliable data, it is necessary to target respondents aware of ERP implementation and the system customization, which requires a considerable effort, of this fact, it becomes more suitable to target the respondent using the web survey, and make use of the technology advantage of web survey to filter out the invalid respondents.

In addition, Saunders et al. (2011) consider that in the quantitative studies, the method of sampling represents a valid alternative when (1) the study of the mother population is impossible, (2) The necessary resources are not available, (3) the duration of the study is limited, and (4) the conclusions of the study are rapidly being solicited. However, to ensure the results are as representative as possible of the parent population, the choice of a sampling method appropriate and relevant becomes necessary. Saunders et al.(2011) indicate that the researchers can use two types of sampling methods, namely: (1) probabilistic methods when the selection of individuals from a sample, in the statistical population follows a law of probability random, but that each probability of selection is measurable, and (2) of the methods non-probabilistic when the probability of selection of individuals from a sample, in the mother population, is not measurable and therefore the statistical inference of the characteristics of the sample to those of the statistical population is not possible. For this reason, the generalization of the results of the analysis of the sample is possible, but it is not statistically based. In this method, assuming that the characteristics of the population statistics are symmetrical, the researcher selected a subjective manner of elements of this population, because it is he who guides the choice of individuals in the population.

The study relies on random sampling as an approach for the collection of responses from participants particularly involved in the ERP implementation. Random selection minimizes measurement error, enhance generalizability, while balancing time, cost, and rigor. Random sampling approaches (simple random sampling, stratified random sampling, cluster sampling, and systematic sampling), while easily administered through email, suffers from low survey response rates, compared to non-probability sampling methods (convenience sampling, quota sampling, and purposive sampling), which facilitate face-to-face interactions (Kelley, Clark, Brown, & Sitzia, 2003). In particular, random sampling requires contacting large number of subjects, while stratified, quota, or purposive sampling requires a priori knowledge of population characteristics (Hart, 2006). Thus, the disadvantages of random sampling include high costs, excessive time to collect the data, and a low response rate (Kelley et al., 2003).

The sample frame consists of a pool of respondents experienced in ERP implementation. A sample of 7052 participants was randomly selected from the population. Although a large random sample mitigates the risk of a low response rate, minimizes measurement error, and enhances generalizability (Kelley et al., 2003), the risk of a low response rate was a major consideration in this study. For example, a response rate of 5.6% has been reported elsewhere for a similar research approach (Chang and King, 2005). As such, to mitigate the risk of a low-response rate, the study relied on Sojump's survey response service (SSRS). Although the response rate was unavailable, due to the proprietary nature of SSRS. Responses were collected to test the hypotheses of the model.

The sampling process relied on SSRS's random sampling process, which includes the random selection of individuals from a pool of recruits matching the study's selection criteria. The steps taken to collect the random sample are delineated below.

1. A SSRS online request form was used to specify the criteria for recruiting and selecting the study's participants.
2. Audience with ERP implementation experience were specified, leaving all others choices with their default settings.
3. Based on the criteria provided Sojump survey performed the random sampling process.
4. Individuals were contacted through Sojump's electronic mail.
5. Qualified audience took the online survey, only after granting their consent. Consent was granted after reading a consent notice posted on the first page (landing page) of the survey (Parker, 2008; Walther, 2002).

6. Participants without ERP customization experience were filtered out by trap rules in the questionnaire

4.5.3.2. Web survey

For our research, we have opted for a probabilistic sampling, and use web survey instrument to collect response from population to enable the generality.

The subject of this research is the person with ERP customization experience. As the definition of customization vary in different research, we need to clarify the definition of customization in our research.

One critical mandated restriction for the research is that, the responded should have knowledge on the conception of ERP customization. Instead of teach or guide the respondents of what customization is in the interview or in the survey itself, the ERP customization should be accumulated in the project experience. In order to accurately target the right audience, we buy the Sojump's survey response service. Conception of customization is a bit blur and the respondents who had real ERP and customization experience can provide the right answer. Respondents are the users who had participated in the survey response, and accept the Sojump's recruitment terms and condition, voluntarily participate in the other related surveys. The respondent for this survey are subjects who had attended in ERP research survey with ERP experience, and has interest in ERP related surveys. Sojump provide high quality response by taking a disciplined approach to recruitment, incentives and engagement, to ensure no one member is over participating and reward members with non-cash incentives to discourage rushing through surveys just for the reward, and also run regular benchmarking surveys to ensure members are representative of Chinese population)

Ethical Considerations. While attempting to generalize findings to the overall population (Walther, 2002). Collecting data, while convenient, carries potential risks for online survey participants (Buchanan & Hvizdak, 2009), requiring adequate informed consent and privacy procedures. The urge for convenience may be exacerbated by the presumption that the study's benefits outweigh its risks, thereby minimizing the role of informed consent (Parker, 2008). The study relies on an informed consent statement delivered on the first page of the survey. It is presumed that the benefits of online informed consent outweighs the risks, since ethical guidance on the subject remains unclear (Buchanan & Hvizdak, 2009).

Online survey tools provide a cost effective approach to conduct research for the advancement of knowledge (Walther, 2002). However, the ease of data collection presents opportunities for breach of privacy and confidentiality (Parker, 2008). Online participants must be made aware of the risks accompanying the submission of online data, since such risks may be beyond the control of the researcher (Parker, 2008). These risks are further compounded by the fact that online surveys store confidential data (e.g., IP addresses) on remote servers (Buchanan & Hvizdak, 2009). Thus, it is imperative that researchers dealing with human subjects verify the existence of policies geared towards the protection of privacy and confidentiality (Buchanan & Hvizdak, 2009). In addition, it is important to be reminded that convenience and benefits do not relieve the researcher of the need to consider potential risks towards human research participants (Parker, 2008). As such, the ultimate responsibility for protecting human subjects rests with the researcher.

4.5.3.3. Sojump survey & response service

(Survey was conducted in Chinese, and has been translated to English in the model analysis) (Annex 4.1)
http://www.sojump.com/jq/4430850.aspx

www.sojump.com has 2.6million recruited response, and there are 5 hundred thousand response do the survey in Sojump website each day. Survey organizer can use Web pages, e-mail, SMS and other channels, or any of the combination, to collect a large number of high-quality answers in a short period of time (5-6 days)

Combining unique collaboration recommendation mode, resulting in a short time to collect a large number of high-quality answer.

The raw data of respondents containing the answers to each question and the source of IP address, know the province and city of the respondents, time submit the answers and time spent on fill in the survey. All data can be downloaded to Excel and import SPSS for further analysis. Statistical analysis charts contain data tables, pie charts, bar charts and other graphics options.

Most of these users have access to internet and could assuming no bias on the none response because of internet access issue.

To generalize the population, we didn't restrict the respondents attributes, e.g. gender, age, region, occupation, industry, property, etc., and try to use Sojump's resource of responder' nature distribution, demographic data from Sojump show that, the population is more generalized.

Figure 40. Sojump gender distribution

Figure 41. Sojump age distribution

Data collection through the online survey was completed within one week. The collection approach relied on SSRS's random sampling approach to select individuals involved in ERP implementation. Sojump provides incentives to recruit participants. For example, recruits have the opportunity to earn points and chance to be awarded. Participants were provided the web address of the survey. Reminders were sent to randomly selected participants to increase the response rate. During the data analysis phase, appropriate steps were taken to assess the impact of NRB. As such, the study relied on random sampling in an attempt to enhance generalizability.

4.5.3.4. Respondent screening

There are general screening function provide by Sojump.

1. **Anti-repeat:**

The same IP address, the same computer, the same user name can only be filled once, Or invalid responses were screened cannot fill to fill again.

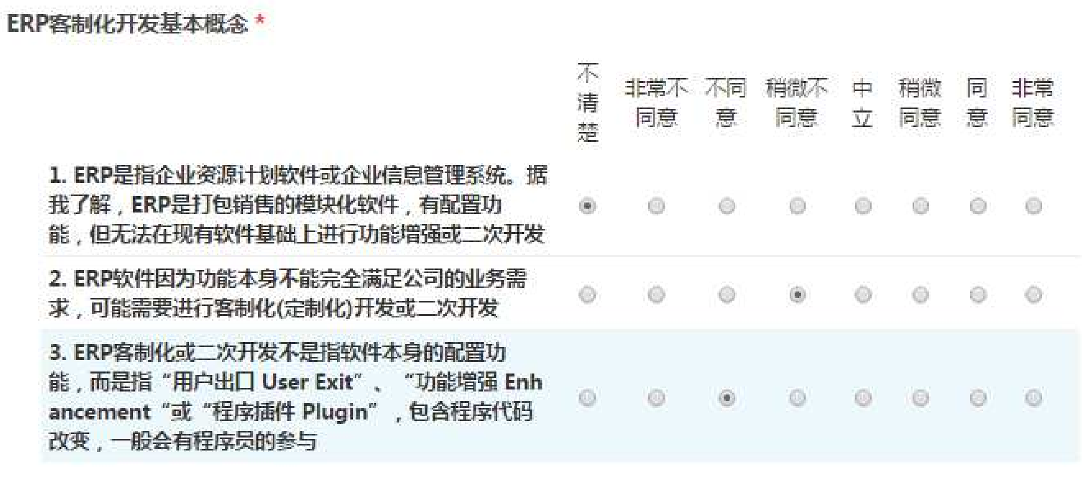
2. Skip logic & trap rules

Skip logic is a feature that changes what question or page a respondent sees next based on how they answer the current question. Also known as “conditional branching” or “branch logic,” skip logic creates a custom path through the survey that varies based on a respondent’s answers. This skip pattern will vary based on rules that you define for the respondent.

We setup two trap rules and using skip logic to automatically filter out the respondent:

Skep logic:

1. Who don’t have any ERP customization experience or don't understand the customization definition in this research


ERP客制化开发基本概念 *

	不清楚	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
1. ERP是指企业资源计划软件或企业信息管理系统。据我了解，ERP是打包销售的模块化软件，有配置功能，但无法在现有软件基础上进行功能增强或二次开发	◉	○	○	○	○	○	○	○
2. ERP软件因为功能本身不能完全满足公司的业务需求，可能需要进行客制化(定制化)开发或二次开发	○	○	○	◉	○	○	○	○
3. ERP客制化或二次开发不是指软件本身的配置功能，而是指“用户出口 User Exit”、“功能增强 Enhancement“或“程序插件 Plugin”，包含程序代码改变，一般会有程序员的参与	○	○	◉	○	○	○	○	○

Figure 42. ERP customization concept validation question Chinese on web survey

Variable	Item	Verify Item	Code	Questionnarie Items
ERP & Customization Definition	0.1.1	X	V0.1.1_CDEF1	ERP is refering to enterprise resourcing planning software or enterprise information management system. As I know, ERP is modulized and packaged software, has Configuration function, but can't do enhancment, customized development or code change
	0.1.2	X	V0.1.2_CDEF2	ERP software possiblly required Customized development or code change
	0.1.3	X	V0.1.3_CDEF3	ERP customization or code change is not software configuration, it is refer to User exit, Enhancement or plugin, including program code change, normally need participation of programmer

Table 19. ERP customization concept validation question English

For question V0.1.1_CDEF1, if the answer is: Don't know, Neutral, Slightly Agree, Agree, Strongly Agree, the skip logic will triggered, and the respondent will be judged as unqualified.

For question V0.1.1_CDEF2, if the answer is: Don't know, Strongly Disagree, Disagree, Slightly Disagree, or Neutral, the skip logic will triggered, and the respondent will be judged as unqualified.

For question V0.1.1_CDEF3, if the answer is: Don't know, Strongly Disagree, Disagree, Slightly Disagree, or Neutral, the skip logic will triggered, and the respondent will be judged as unqualified.

Sample of failed answers:
For question item 1(V0.1.1_CDEF1), the respondent (from IP 123.177.19.42, Liaoning-Dalian city, 2016/6/22 17:00:04) select strongly Agree that, it is impossible to do customization in ERP system. Apparent, he is not qualified as the right respondent, and his response was identified as invalid.

Figure 43. Failed answer for customization

2. Who don’t have ERP experience

Table 20. Validation question for ERP experience

Variable	Item	Verify Item	Code	Questionnarie Items
Validation Question	0.2.1	X	V0.2.1_VALD1	I hope I have chance to use ERP system, as I don't have ERP system usage and project implementation experice

For question V0.2.1_VALD1, if the answer is: Neutral, Slightly Agree, Agree, Strongly Agree, the skip logic will triggered, the respondent will be judged as unqualified

Sample of failed answers:

For question item 20(V0.2.1_VALD1), the respondent (from IP 125.78.148.83, Fujian-Quanzhou, 2016/6/22 15:19:39）select strongly Agree that, he don’t have ERP system usage and project implementation experience. Apparent, he is not qualified as the right respondent. The response was identified as invalid.

Figure 44. Failed answer for ERP experience

Variable	Item	Verify Item	Code	Questionnarie Items
Demographic	0.3.1	ERP Name	V0.3.1_DEMO1	ERP Software Name
Demographic	0.4.1	INDUSTRY	V0.4.1_DEMO1	Industry of my company(if select others, please provide the name)
Demographic	0.5.1	REVENUE	V0.5.1_DEMO1	Company Size(revenue)

Table 21. Questions of demographic information

And for question V0.3.1_DEMO1, if the answer is Win7 or Win8, the respondent will be judged as unqualified.

For question item 20, the respondent (from IP 123.177.19.42, Liaoning-Dalian city, 2016/6/22 17:00:04) select strongly Agree that, it is impossible to do customization in ERP system. Apparent, he is not qualified as the right respondent.

As Sojump don’t provide download and analysis functionality, we don’t check for each of the response the reason why it was judged as invalid.

4.5.3.5. Sample size

PLS-SEM like any statistical technique requires researchers to consider the sample size against the background of the model and data characteristics (Hair, Ringle, & Sarstedt, 2011). Specifically, the required sample size should be determined by means of power analyses based on the part of the model with the largest number of predictors.

Often-cited 10 times rule (Barclay, Higgins, & Thompson, 1995), which indicates the sample size should be equal to 10 times the largest number of structural paths directed at a particular construct in the structural model. This rule of thumb is equivalent to saying that the minimum sample size should be 10 times the maximum number of arrowheads pointing at a latent variable anywhere in the PLS path model. While the 10 times rule offers a rough guideline for minimum sample size requirements researchers can use programs such as G* Power (which is available free of charge at http:// www.psycho.uni-duesseldorf.de/aap/projects/gpower/) to carry out power analyses specific to model setups(Hair et al 2014).

A power analysis was used to assess an adequate sample size for this study. Two approaches were reviewed for the power analysis: (a) MacCallum, Browne, & Sugawara's (1996) power analysis method, which focuses on an optimum structural model, rather than the relationships between independent and dependent variables and (b) G*Power 3 used to perform a priori power computations (Kelley et al., 2003).

Table 22 shows the minimum sample size requirements necessary to detect minimum R^2 values of 0.10, 0.25, 0.50 and 0.75 in any of the endogenous constructs in the strucG*ptural model for significance levels of 1%, 5%, and 10%, assuming the commonly used level of statistical power of 80% and a specific level of complexity of the PLS path model (i.e., the maximum number of arrows pointing at a construct in the PLS path model). In our model, the maximum number of independent variables in the measurement and structural models is three, would need 124 observations to achieve a statistical power of 80% for detecting R^2 values of at least 0.1 (with a 5% probability of error).

Maximum Number of Arrows Pointing at a Construct	Significance level											
	1%				5%				10%			
	Minimum R^2				Minimum R^2				Minimum R^2			
	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75
2	158	75	47	38	110	52	33	26	88	41	26	21
3	176	84	53	42	124	59	38	30	100	48	30	25
4	191	91	58	46	137	65	42	33	111	53	34	27
5	205	98	62	50	147	70	45	36	120	58	37	30
6	217	103	66	53	157	75	48	39	128	62	40	32
7	228	109	69	56	166	80	51	41	136	66	42	35
8	238	114	73	59	174	84	54	44	143	69	45	37
9	247	119	76	62	181	88	57	46	150	73	47	39
10	256	123	79	64	189	91	59	48	156	76	49	41

Table 22. Sample size recommendation
with statistical power 80% (Hair 2013)

computations, where f is the pseudo F test defined in Cohen (1988). Urbach et al. (2010) relied on a value of 0.05 to determine the significance of the results. Gefen et al. (2000) suggest that lies either somewhere below 0.15 (small), between 0.15 and 0.35 (medium), or greater than 0.35 (large).

In case that the R^2 could be less than 0.1, I downloaded the G*Power 3.1.9.2 software from http://www.gpower.hhu.de/, and calculate sample size as required.

The a priori power analyses suggest sample sizes of 311, 33, and 20, for small, medium, and large effect size, respectively. Urbach et al. (2010) report small effect sizes among significant relationships between constructs (e.g., effect of process quality on portal use). Thus, the study collected is targeted to collect 311 random responses in anticipation of similar effect sizes.

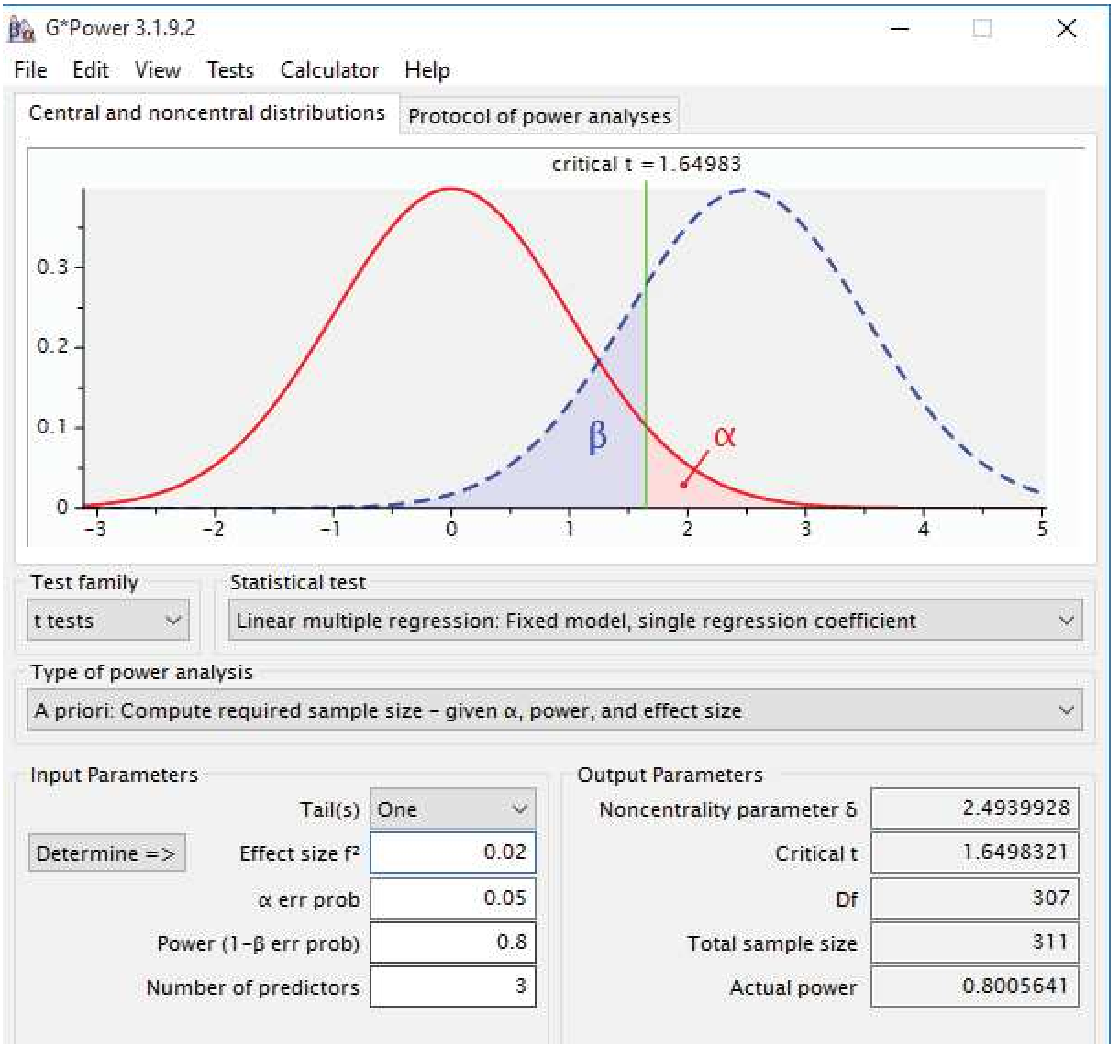


Figure 45. Sample size calculate G*Power

According to our questionnaire, maximum 7 item in the scale of measure, to achieve the 1% significance of R^2 equal to 0.1, at least 228 items. And to check the effect of moderator variable, role and experience, multiple group analysis will be employed, 2 groups will be used in our research, in order to achieve 5% significance, each group should be R^2 0.1 166 samples, R^2 0.5 80 samples separately. So we targeted to collect maximum 335 samples.

4.5.4. Presentation of the questionnaire and mechanism for administration

The questionnaire is a research instrument which allows the researcher to enter in contact with potential respondents, chosen for its study with the aim to collect data in a standardized manner (Bhattacherjee, 2012). In addition, our questionnaire consists of three main parts:

(1) An introduction whose role is to present the context and objective of our research, the structure of the questionnaire

(2) The set of questions relating to the different concepts mobilized in our research model. Each question requires two answers on a Likert scale (1932) of 7 levels.

(3) In order to collect data regarding the profile of the company and its two partners, we have integrated a third party in the questionnaire the questions relating to the name of the firm, the sector of activity, the scale of its activity, the size and the date of creation. Also, we have integrated questions on the nature the relationship with each partner.

4.5.4.1. Administration of the questionnaire Phase of pre-test:

Once the questionnaire valid, we chose the mode of administration of the questionnaire. There are several possible procedures for the administration of the questionnaires. Saunders et al. (2012) distinguish the procedures of synchronous asynchronous procedures. In the synchronous procedure, the questionnaires are administered by using a means of synchronous communication that requires an Interaction between the researcher and the respondent, as the phone or the service. In contrast, in the procedure a synchronous, the questionnaires are self-administered by using the means of asynchronous communication such as email, web sites or mailing. Well choose the mechanism of appropriate administration is essential in the data collection phase, because it facilitates access to respondents (Saunders et al., 2012). In this sense, these authors indicate that the choice of the mechanism for administration of the questionnaire depends on the size of the sample, the type and number of questions, of the importance of reaching the individual respondents and the response rate desired.

After the design of our questionnaire, we have opted for a procedure of pre-test: It should be noted that in the phase of preparation of our questionnaire, we have taken several precautions, despite the special attention that we have to select the items, to guarantee the neutrality of our questionnaire and ensure the relevance and the exploitability of our data. In effect, to ensure the validity and reliability of our scales of measure chosen in the framework of our research, they have been the subject of several pre-tests to ensure their understanding and make a first purification of our measurement instrument. This step of pre-test, also called the pilot stage (Churchill, 1979), which is to interview a small number of individuals, in our case of the experts of ERP implementation and customization, in order to ensure the proper understanding of the questionnaire (Jolibert and Jourdan, 2006). By relying on Thietart et al. (2007), which indicate that the step of pre-test is essential in any research to avoid any bias related to the formulation and order of the questions. We have been able to change, move, or delete a few questions following the recommendation of our sample for the pre-test. We have also carried out several proofreads of our questionnaire, to ensure that our questions are easy to understand that the order of questions is justified. In effect, to avoid any bias of collection, we have insisted on a few points, that any researcher must comply with, namely: (1) provide a comprehensive vision on the interest of our study and its objectives, (2) explain that our study is non-profit and exclusively academic, (3) the confidentiality of the data provided, and (4) insist on the sincerity in the answer to all the questions. For the administration of our questionnaire, we used Sojump website's (www.sojump.com, one of the largest web survey site), which is one of the Sample service. The site provide of our questionnaire to our contacts on the social network professional Viadeo©. We have thus sent more than 1800 messages for the most part, custom to respondents (Annex 4.1).

4.5.4.2. Data processing

After the reception of the data needed to test our assumptions, we will process it using multiple methods of analysis, namely: (1) the preparation of the data; (2) A preliminary analysis univariate analysis of all the variables of the first and second order, by descriptive statistics and an exploratory factor analysis (Principal Component Analysis); (3) an exploratory analysis by least squares partial structural equation;

A first analysis of the responses has enabled us to calculate the rate of responses and to highlight, using a descriptive statistical analysis of variables of profile of businesses, the main characteristics of our sample. Then, we have had recourse to a descriptive statistical analysis univariate analysis of responses by the extent of the statistical parameters elementary as the average standard deviation, the median and the overall trend of responses.

It is at present to check the reliability of our scales of measurement as well as the validity of our constructed. The reliability of the scales of measurement is different from the validity of the constructed: the validity has as objective to respond to the following question: do we measure what we are trying to measure (Evrard et al., 2003). Generally, the reliability of a scale of measurement allows us to say that the latter is consistent and does not change as a function of the researcher or in function of the situations (Bhattacherjee, 2012).

In addition, reliability refers to the level of appreciation of the quality of an instrument. In this sense, the reliability helps to ensure that the various items used actually measure the same concept. A measuring instrument is said reliable if it allows different investigators to establish similar measures of a same subject in situations and different times (Drucker-Godard , Ehlinger and Grenier, 1999). The reliability of a Built reflects its level of internal coherence and consistency of the measurement instrument (Jolibert and Jourdan, 2006).

In addition, Bhattacherjee (2012) indicates that several methods exist to measure the reliability of a scale of measurement, namely:

(1) The method inter-observers is used to measure the consistency of a measuring instrument by two or more independent observers. This method is often mobilized in the pilot studies.

(2) The method of test-pretesting is used to measure the consistency of a measuring instrument for the same built administered, repeatedly, to the same sample.

(3) The method of parallel forms is used to measure the consistency between the two halves of a measuring instrument of built, by the calculation of the correlation between the score of the two halves separately administered to a sample of respondents.

(4) The method of the internal consistency reliability is used to measure the consistency between different items by the calculation of the coefficients of the Cronbach's Alpha or Spearman- Brown.

To test the reliability of our measurement scales, we will calculate the Cronbach's Alpha (Cronbach's, 1951) which is still acceptable from 0.70.

4.5.4.3. Validity of instrument for measuring

An instrument is valid if it measures correctly the concept studied (Drucker-Godard , Ehlinger and Grenier 1999). In effect, there are various types of validity (Thietart et al., 2007 Evrard et al., 2009). The internal validity of a measure refers to the ability of an instrument to enter so pure and complete a built. While the external validity is relative to the capacity of an instrument to generalize the characteristics of a built. The validity of the constructed or so-called "stroke " is clean in the field of the social sciences or the object often focuses on abstract concepts that are not always observable" (Zaltman, Pinson and Angelmar, 1973, cited by Thietart et al. , 2007). The validity of the constructed allows you to ensure that the proposed measure allows you to measure only the built in question, and no other constructed (Bhattacherjee, 2012). To measure the validity of the constructed, we can use the confirmatory factor analysis (Campbell and Fiske, 1959; Evrard et al., 2000). The validity of the constructed integrated at the time the validity convergent and discriminant validity: (1) the convergent validity is close to reliability, it refers to the proximity between a measure and the constructed that it is supposed to measure (Bhattacherjee, 2012). The verification process is to ensure that the correlations between items which measure a same stroke are higher than the correlations between items do not measure the phenomenon (Evrard et al., 2009), (2) the discriminant validity refers to the degree to which a measure does not allow to measure other constructed that it is not supposed to measure (Bhattacherjee, 2012). This author also indicates that there is another validity of representation which refers to the operationalization of the extent of the built. This validity integrates two types of validity, namely the facial validity and the validity of Content. The facial validity of a built is relative to the relevance of the measure from the point of view of specialists and experts in the field. The validity of content means that the items are well representative of the measurement concept. Otherwise, this validity indicates that the set of items corresponds to the scientific content or theoretical constructs that it is supposed to measure. In addition, the criterion validity of studied the influence of the instrument on an external variable that it is sense predict (Jolibert and Jourdan, 2006). This validity integrates two other type of validity, namely: (1) the predictive validity if the measurement is used to predict a future outcome, and (2) the concurrent validity if the measure refers to concrete criteria and staffing.

4.5.5. EFA (PCA): Validation of the measurement model

After studying the validity and the reliability of our instruments of measurement, we will achieve a factor analysis (Jolibert and Jourdan, 2006) which can be a principal component analysis (PCA). According to these authors, the main difference between these two analyzes based on the nature of the factors. Whereas in a PCA the researcher takes into account the total variance of the data, the researcher takes into account the variance of common data. Generally, the researcher mobilized the PCA for both predict scores of variables on the factors, calculate the indices in order to purify the scales of measures, with a view to their use for other analyzes (Jolibert and Jourdan, 2006).   For this, we have used the software for statistical analyzes IBM SPSS v. 20 which allows you to determine the correlations inter-items and ensure that the data are factorisables by the calculation of the index of Kaiser-Meyer -Olkin (KMO index) and the use of the test of sphericity of Bartlett. The KMO index allows you to inform on the quality of correlations inter-items. This index shows in what proportion the items constitute a coherent whole and measure adequately a concept, as well as by the partial correlations that show the contribution of each item to the variable in question. To judge from the index of KMO, we support on (Jolibert and Jourdan, 2006) to consider that the index is acceptable from 0.50 and excellent at 0.80. In addition, the test of sphericity of Bartlett allows us to check if the matrix of correlations is different to an identity matrix. This test is significant when it is less than 0.05 to say that the factors or variables are not completely independent. As we mentioned previously, we have mobilized a PCA, in order to purify our scales of measurement by the analysis of communities or communalities, as well as the total variance explained In order to highlight the factors and the items that are to be withheld. With the aim of identifying the weight of each item in relation to the factor extracted, we will analyze the Table of components without rotation and, if necessary, apply a varimax rotation (orthogonal rotation) or Promax (oblique rotation).

4.5.6. PLS-SEM Analysis

This section provides the assessment of the structural research model. According to Hair et al. (2014), assessing the structural model in PLS-SEM requires the following four steps: (1) assessing the significance of the path coefficients, (2) assessing the level of the R^2 value, (3) assessing the f^2 effect size, and (4) assessing the prediction relevance (q^2).

Path estimation was performed to examine the significance of the path relations in the structural model (Chin, 1998). The significance of each path was based on the t value resulting from the PLS bootstrap procedure. The result of the path analysis indicated that four out of the seven latent variables were significant.

This implies that the model is within the acceptable fit for the path coefficient (fi). The R^2 measures how much variability is explained by the exogenous variables (Hair et al., 2014).

The strength of the effect size was also investigated. According to Chine (1998), the strength of the effect is classified as follows, a value of 0.02 indicates a weak effect, 0.15 indicates a medium effect, and 0.35 indicates a strong effect.

Following evaluation of the R^2 value, the researcher examined the model's predictive relevance. Hair et al. (2014) noted that when PLS-SEM exhibits predictive relevance, it accurately predicts the data points of indicators in endogenous models. The Q^2 value was estimated using the blindfolding procedure. Blindfolding is used to obtain cross-validated redundancy measures for each endogenous construct. If the result for the Q^2 value is greater than 0, it indicates that the exogenous constructs have predictive relevance for the endogenous construct.

SmartPLS provides the t statistics for significance testing of the model. It uses a procedure called bootstrapping by providing the approximate t value for significance testing of the structural path. The bootstrapping result approximates the normality of data and permits testing the research hypotheses.

To examine the two moderating effects of Position, and Experience, each will require to split the sample into two different groups. The moderation effects of position, and experience will be examined individually. According to Henseler et al. (2009), a PLS-MGA result is statistically significant if the *p* value is less than .05 or greater than .95. Before conducting the PLS-MGA analysis, the researcher should assessed the reliability and validity for all items in each group.

4.6 Conclusion

This chapter has helped us positioning on the ontological, epistemological and methodological, and to present our mechanism of inquiry and its conduct. We have begun by the presentation, in general, of different paradigms of scientific research, and subsequently, we have presented the paradigms mobilized in our research. In effect, we are putting our research in a perspective post-positivist. To build our questionnaire, we have adopted an approach essentially quantitative containing a first preliminary phase exploratory qualitative in nature with a pre-test. Our questionnaire contains three main blocks, namely: (1) the customization level and ease of customization, (2) the dimensions of the performance expectancy, effort expectancy and social influence, and (3) the behavioral intention. After having described our scales of measurement, we have presented the EFA (PCA) techniques and quantitative methods which will enable us to ensure the validity and reliability of our scales of measurement, after that, we presented the validity of the measurement model using CFA, the structural model and to test our assumptions using PLS-SEM. In the next chapter, we will introduce the steps for the exploitation of data collected following the approach that we have described in this chapter.

CHAPTER 5. RESULTS AND ANALYSIS

5.0. Introduction

This study applies quantitative techniques to enhance the generalizability of research results (Urbach et al., 2010). A survey instrument offers an efficient means of collecting data to test hypothetical relationships, based on empirical observations. Operationalization of the constructs relies on items adapted from literatures. As such, adaptation of items may affect internal validity, since the items were originally used for different purpose. Thus, the items' discriminant validity, content validity, and CMB depend, in part, on the extent of the adaptation of the items to the instrument used in this study. In addition, the generalizability of research findings depends, in part, on the effectiveness of the sampling approach.

Once the data was gathered, prior to beginning any analysis, it must be validated for completeness and accuracy.
Hair et al. (2014a) contends that to address these issues:

- If reviewing the dataset and 15% or more of the observation is missing, it should be removed, but if only 5% or less is missing from the dataset, then it should be retained and mean replacement should be used.
- If straight lining [one answer for all] or inconsistent answer patterns are present, the dataset should be removed
- If outliers with extreme responses are present, typical this would be removed, but the researcher should determine if a distinct group exists in the dataset for it to be retained.
- Datasets that exhibit distribution deviation substantial from normal should be reviewed by the researcher to determine if the dataset would potentially distort the results

After all the data had been collected and validated for completeness, several analysis techniques will be used to analyze the data for the research study. All survey items will be validated using factor analysis through exploratory factor analysis (EFA) to determine whether items in the survey represent a specific construct. And then Confirmatory Factor Analysis (CFA) and Partial Leased

Squares-Structural Equation Modeling (PLS-SEM) were used for this research and the details explaining this justification are listed in the next section.

Since the authors have already assessed the content validity of their instrument through pilot and field tests, additional pilot and field tests seem inefficient (Boudreau, Gefen, & Straub, 2001; Lewis et al. 2005). As such, this study assesses the construct validity, rather than the content validity, due to the level of abstraction in operationalizing the constructs (Lawshe, 1975). The selection of the construct validity approach rests on arguments presented elsewhere that: (a) pilot and field tests have no scientific basis (Presser et al., 2004), (b) pilot and field tests assist with the identification of instrument problems, but fail to provide solution for such problems (Presser et al., 2004), and (c) pilot and field tests are expensive and inefficient (Boudreau et al., 2001; Presser et al., 2004). As such, the study relies on authors existing pilot and field tests' results, rather than on additional pilot and field tests, which would merely identify additional instrument problems, if any, rather than provide solutions to problems. Finally, this study does not significantly alter the generic nature of the original instrument as to warrant additional pilot and field tests (Boudreau et al., 2001; Pitt, Watson, & Kavan, 1997).

The analysis relied on structural equation modeling to evaluate hypothetical relationships between latent variables. SPSS was used to assess the unidimensionality of the measurement model. Using SPSS, an assessment of the measurement model was performed through principal component analysis (PCA). This study then relied on SmartPLS (Ringle et al., 2005) to assess the quality of the structural model, followed by an evaluation of structural paths to test hypothetical relationships. The data types of the constructs used in the study were ordinal in nature.

For the CFA analysis of the measurement model, factor loading, internal consistency, indicator reliability, and convergent and discriminant validity were analyzed. The level of acceptance for each category is .50 and higher for factor loading, .70 and higher for internal consistency, .70 and higher for indicator reliability, .50 and higher for convergent validity based on the average variance extracted (AVE). For discriminant validity, the outer loadings on a construct should be higher than all cross loadings with other constructs and the square root of the AVE of each construct should be higher than its highest correlation with any other construct (Hair et al, 2014a).

For the structural model, the following assessment procedure were considered: assess the model for collinearity issues, access the significance and relevance of the relationships, assess the level of R^2 value, assess the *f* effect size, and assess the predictive relevance of Q^2 and the q^2 effect sizes. Provided now is the level of acceptance for each category. Collinearity is measured based on tolerance levels and the variance inflation factor (VIF). If the tolerance levels are below 0.20 and (VIF) is above 5.00 for the predictor constructs, then collinearity issues exist and would need to be addressed. For the significance of the hypothesized relationships, path coefficients range from -1 to +1 and closer to +1 indicate strong positive relationships. Also, the empirical *t* values (which determines the standard error) should be higher than the critical value which are 1.65 for a significance level at 10%, 1.96 for a significant level at 5%, and 2.57 for a significance level at 1%. The R^2 value ranges from 0 to 1 for endogenous latent variables with the scale of 0.75 for significant, 0.50 for moderate, and 0.25 for weak. *f* effect sizes for the exogenous latent variables are 0.02 for small effect, 0.15 for medium effect, and 0.35 for a large effect. Q^2 values larger than 0 indicate that the exogenous constructs have some level of predictive significance for the endogenous construct. q^2 values for the exogenous constructs are 0.02 for small predictive relevance, 0.15 for medium predictive relevance, and 0.35 for large predictive relevance for a certain endogenous construct.

Stage 5: Evaluation of the Measurement Models	
Stage 5a: Reflective Measurement Models	**Stage 5b: Formative Measurement Models**
• Internal consistency (Cronbach's alpha, composite reliability) • Convergent validity (indicator reliability, average variance extracted) • Discriminant validity	• Convergent validity • Collinearity between indicators • Significance and relevance of outer weights
Stage 6: Evaluation of the Structural Model	
• Coefficients of determination (R^2) • Predictive relevance (Q^2) • Size and significance of path coefficients • f^2 effect sizes • q^2 effect sizes	

Table 23. Systematic Evaluation of PLS-SEM Results

5.1. Overall analysis response

The primary issues that need to be examined include missing data, suspicious response patterns (straight lining or inconsistent answers), outliers, and data distribution. We will address each of these on the following pages.

Data Considerations When Applying PLS-SEM (Hair 2011)

1. As a rough guideline, the minimum sample size in a PLS-SEM analysis should be equal to the larger of the following (10 times rule): (1) 10 times the largest number of formative indicators used to measure one construct or (2) 10 times the largest number of structural paths directed at a particular construct in the structural model. Researchers should, however, follow more elaborate recommendations such as those provided by Cohen (1992) that also take statistical power and effect

sizes into account. Alternatively, researchers should run individual power analyses, using programs such as G* Power.

2. With larger data sets (N = 250 +), CB-SEM and PLS-SEM results are very similar when an appropriate number of indicator variables (4 +) are used to measure each of the constructs (consistency at large).
3. PLS-SEM can handle extremely non-normal data (e.g., high levels of skewness).
4. Most missing value treatment procedures (e.g., mean replacement, pairwise deletion, EM, and nearest neighbor) can be used for reasonable levels of missing data (less than 5% missing per indicator) with limited effect on the analysis results.
5. PLS-SEM works with metric, quasi-metric, and categorical (i.e., dummy-coded) scaled data, albeit with certain limitations.

As we adopted Sojump's survey response service (SSRS), we didn't get the email list of the audiences. Totally 7052 email sent by the website with a link to the Survey website. And totally 772 samples collected, 310 valid and 462 invalid. The samples in the invalid list are filtered automatically by the verification questions in the questionnaire. Response rate 10.94% (and 4.4% valid response).The survey approach suffers from low response rates, which are not necessarily indicative of large non-response errors (Tannery et al., 2011).

5.1.1. Univariate preliminary analysis

Data Characteristics

Straight lining is when a respondent marks the same response for a high proportion of the questions. Inconsistency in answers may also need to be addressed before analyzing your data. Many surveys start with one or more screening questions. The purpose of a screening question is to ensure that only individuals who meet the prescribed criteria complete the survey. This respondent would therefore need to be removed from the data set. Surveys often ask the same question with slight variations, especially when reflective measures are used. If a respondent gives a very different answer to the same question asked in a slightly different way, this too raises a red flag and suggests the respondent was not reading the questions closely or simply was marking answers to complete and exit the survey as quickly as possible.

As discussed before, we had evaluation question to filter out these response, and there are timer for each page of the question, to block the respondent from complete and exit the question too quickly.

For example, question V0.1.1_CDEF1 (ERP is referring to enterprise resourcing planning software or enterprise information management system. As I know, ERP is modularized and packaged software, has Configuration function, but can't do enhancement, customized development or code change) , if the answer is: Don’t know, Strongly Disagree, Disagree, Slightly Disagree, or Neutral, the skip logic will triggered, and the sample will be identified as invalid.

Sample of failed answer for question item 1(V0.1.1_CDEF1):

The respondent (from IP 123.177.19.42, Liaoning-Dalian city, 2016/6/22 17：00：04） select strongly Agree that, it is impossible to do customization in ERP system. Apparent, he is not qualified as the right respondent, and his response was identified as invalid. Or he is not carefully answer the question, instead, he may select the same option, which is a pattern of straight line.

Figure 46. Sample straight line answer

For question V0.2.1_VALD1(I hope I have chance to use ERP system, as I don't have ERP system usage and project implementation experience), if the answer is: Neutral, Slightly Agree, Agree, Strongly Agree, the skip logic will triggered, the respondent will be judged as unqualified

Sample of failed answers for question item 20(V0.2.1_VALD1): the respondent (from IP 125.78.148.83, Fujian-Quanzhou, 2016/6/22 15:19:39）select strongly Agree that, he don't have ERP system usage and project implementation experience. Apparent, he is not qualified as the right respondent. The response was identified as invalid.

公司ERP软件性能和对我工作起到的作用 [矩阵量表题] *

16. 我发现公司的这个ERP系统对我的工作更有帮助	同意 （得分：6）
17. 公司这个ERP系统使我的工作完成得更快	同意 （得分：6）
18. 使用公司的这个系统提高了我的工作效率	非常同意 （得分：7）
19. 使用公司的这个ERP系统，我能够获得更多的提升机会	同意 （得分：6）
20. 公司的ERP系统项目实施和后续使用与我没有任何关系	非常同意 （得分：7）

Figure 47. Sample failed in trap answer

Missing Data

One of the benefit to use Web survey is the ability to make the question mandatory. We employed this technics and no data missing in the questionnaire.

Outlier

An outlier is an extreme response to a particular question, or extreme responses to all questions. Outliers must be interpreted in the context of the study, and this interpretation should be based on the type of information they provide. Outliers can result from data collection of entry errors. However, exceptionally high or low values can also be part of reality. Finally, outliers can occur when combinations of variable values are particularly rare. The first step in dealing with outliers is to identify them.

There has been much debate in the literature regarding what to do with extreme or influential data points. (Osborne et al., 2004) The presence of outliers can lead to inflated error rates and substantial distortions of parameter and statistic estimates when using either parametric or nonparametric tests (e.g., Zimmerman, 1994, 1995, 1998). Casual observation of the literature suggests that researchers rarely report checking for outliers of any sort. This inference is supported empirically by Osborne, Christiansen, and Gunter (2001), who found that authors reported testing assumptions of the statistical procedure(s) used in their studies--including checking for the presence of outliers--only 8% of the time.

There is as much controversy over what constitutes an outlier as whether to remove them or not. Simple rules of thumb (e.g., data points three or more standard deviations from the mean) are good starting points. Some researchers prefer visual inspection of the data. Others (e.g., Lornez, 1987) argue that outlier detection is merely a special case of the examination of data for influential data points.

Simple rules such as z = 3 (3 times standard deviations) are simple and relatively effective, although Miller (1991) and Van Selst and Jolicoeur (1994) demonstrated that this procedure (nonrecursive elimination of extreme scores) can produce problems with certain distributions (e.g., highly skewed distributions characteristic of response latency variables) particularly when the sample is relatively small. To help researchers deal with this issue, Van Selst and Jolicoeur (1994) present a table of suggested cutoff scores for researchers to use with varying sample sizes that will minimize these issues with extremely non-normal distributions. We tend to use a z = 3 guideline as an initial screening tool, and depending on the results of that screening, examine the data more closely and modify the outlier detection strategy accordingly.

In our research, the skewness is less than 1, and assume it is not the highly skewed, and we can apply the rule, z = 3, samples greater or less than 3 time deviation were deleted. Based on the analysis, 7 outliers were removed from the data, thus, this study included 303 valid cases.

Data Distribution

PLS-SEM is a nonparametric statistical method. Different from maximum likelihood (ML)-based CB-SEM, it does not require the data to be normally distributed. PLS-SEM’s statistical properties provide very robust model estimations with data that have normal as well as extremely non-normal (i.e., skewness and/ or kurtosis) distributional properties (Reinartz et al., 2009; Ringle et al., 2009).

Nevertheless, it is important to verify that the data are not too far from normal as extremely non-normal data prove problematic in the assessment of the parameters' significances. Specifically, extremely non-normal data inflate standard errors obtained from bootstrapping and thus decrease the likelihood some relationships will be assessed as significant (Hair, Ringle, & Sarstedt, 2011; Henseler et al., 2009). The Kolmogorov-Smirnov test and Shapiro-Wilks test are designed to test normality by comparing the data to a normal distribution with the same mean and standard deviation as in the sample (Mooi & Sarstedt, 2011). However, both tests only indicate whether the null hypothesis of normally distributed data should be rejected or not. As the bootstrapping procedure performs fairly robustly when data are non-normal, these tests provide only limited guidance when deciding whether the data are too far from being normally distributed.

Instead, researchers should examine two measures of distributions—skewness and kurtosis. Skewness assesses the extent to which a variable's distribution is symmetrical. If the distribution of responses for a variable stretches toward the right or left tail of the distribution, then the distribution is characterized as skewed. Kurtosis is a measure of whether the distribution is too peaked (a very narrow distribution with most of the responses in the center). When both skewness and kurtosis are close to zero (a situation that researchers are very unlikely to ever encounter), the pattern of responses is considered a normal distribution. Following Kline's (2005) suggestion that the skew and kurtosis indices should be below 3.0 and 8.0(Teo, 2009), respectively, there were no severe problems in the data and the data were considered fairly normal.

A general guideline for skewness is that if the number is greater than + 1 or lower than –1, this is an indication of a substantially skewed distribution (Hair, 2013). For kurtosis, the general guideline is that if the number is greater than +

1, the distribution is too peaked. Likewise, a kurtosis of less than –1 indicates a distribution that is too flat. Distributions exhibiting skewness and/ or kurtosis that exceed these guidelines are considered non-normal.

Table 24. Sample Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CLEV1	303	2	7	4.21	0.954	0.41	0.14	0.051	0.279
CLEV2	303	2	7	4.26	1.011	-0.007	0.14	-0.286	0.279
CLEV3	303	2	7	4.25	0.964	0.358	0.14	0.039	0.279
CLEV4	303	2	7	4.18	1.036	-0.111	0.14	-0.54	0.279
CLEV5	303	2	7	4.27	1.032	-0.143	0.14	-0.317	0.279
CDIF1	303	2	6	4.16	0.868	0.03	0.14	0.073	0.279
CDIF2	303	2	6	4.17	0.875	-0.192	0.14	0.001	0.279
CDIF3	303	1	7	4.21	1.073	-0.018	0.14	-0.282	0.279
CDIF4	303	2	7	4.17	0.976	0.094	0.14	-0.204	0.279
CDIF5	303	2	7	4.18	0.943	0.138	0.14	0.04	0.279
CDIF6	303	2	7	4.17	1.017	0.151	0.14	-0.317	0.279
CDIF7	303	1	6	3.39	1.003	0.148	0.14	-0.723	0.279
PERF1	303	2	7	4.32	1.006	0.059	0.14	-0.199	0.279
PERF2	303	1	7	4.35	1.132	0.108	0.14	0.076	0.279
PERF3	303	2	7	4.35	1.034	-0.045	0.14	-0.121	0.279
PERF4	303	2	7	4.32	1.088	0.167	0.14	-0.303	0.279
PERF5	303	2	7	4.37	1.011	0.311	0.14	-0.207	0.279
EFFO1	303	1	7	4.31	1.153	-0.178	0.14	-0.148	0.279
EFFO2	303	1	7	4.21	1.151	0.137	0.14	-0.317	0.279
EFFO3	303	1	7	4.28	1.228	-0.009	0.14	-0.527	0.279
EFFO4	303	2	7	4.3	1.17	0.029	0.14	-0.5	0.279
SEFF1	303	2	7	4.19	0.967	0.124	0.14	0.045	0.279
SEFF2	303	2	6	4.26	0.967	-0.123	0.14	-0.275	0.279
SEFF3	303	2	6	4.17	0.945	-0.119	0.14	-0.344	0.279
SEFF4	303	2	7	4.22	0.97	-0.149	0.14	-0.059	0.279
UINT1	303	1	7	4.5	1.218	0.137	0.14	-0.612	0.279
UINT2	303	1	7	4.43	1.315	0.006	0.14	-0.54	0.279
UINT3	303	1	7	4.38	1.319	-0.116	0.14	-0.389	0.279
UINT4	303	1	7	4.51	1.385	-0.19	0.14	-0.554	0.279
UINT5	303	1	6	3.69	1.309	-0.002	0.14	-0.78	0.279
UINT6	303	1	7	4.38	1.249	-0.106	0.14	-0.386	0.279

NRB & CMB

To mitigate the risks of a low response rate or a small sample size, this study relied on SSRS. The study faces limitations, due, in part, to the possibility of non-response bias (NRB) and common method bias (CMB). NRB results from the nonparticipation of subjects in the survey. Nonparticipation results in response misrepresentation, which limits external validity (Urbach et al., 2010). Mitigation approaches to NRB include the application of careful survey design to research objectives, captivating messages to potential respondents, and persuasive approaches to gatekeepers (Urbach et al., 2010). In contrast, with CMB, the same data collection method tends to inflate or deflate correlations, due to correlations among item specific errors (Ylitalo, 2009). Mitigation approaches include procedural tactics (e.g., enhanced anonymity and minimal ambiguity) as well as statistical options (e.g., Harman's single-factor test and marker variable test) (Urbach et al., 2010). The marker variable test was not performed in this study, due to the exploratory nature of the research. Thus, this study suffers from NRB and CMB limitations, since adoption of Sojump's survey response service (SSRS) online proprietary survey service limits control of a priori mitigation procedures. As such, there are limitations as to the external validity of the research.

Since the data collection was performed with a single self-reported survey, there is the possibility of common measure bias, which may distort SEM results (Straub, Boudreau, & Gefen, 2004). To evaluate CMB, Harman's single-factor test was applied (Lee, & Podsakoff, 2003). And the single-factor test revealed that CMB was not an issue. SPSS (IBM Corp., 2012) was used to extract factors for early and late respondents. The factors explained 77.3% of the total variance. The first and second of these factors explained 42.9% and 12.7% of the total variance, respectively. Thus, since the majority of the total variance was due to several extracted factors, CMB was not an issue.

As the scale of was originally in English, the scales were translated into Chinese by the translation and back-translation method (Brislin 1970, 1976). To check if the original factor structure of the scale in English has been replicated in Chinese, PCA will be conducted to check the convergence of the scales, and their validity and reliability as well.

5.1.2. Demographics information

Respondents were asked which ERP system was implemented. 27.1% of the participants worked in Kingdee, 22.8% of the participants worked in UFSoft, and 8.3% in Eabax. The above 3 are also the most popular middle to small size ERP system in China. 5.9% of the participant worked in SAP, and 4.6% in Oracle, which are the most popular two ERP system used in larger companies.

Table 25. Respondent ratio by ERP system name

ERP Name	Count	Percentage Ratio
Kingdee 金蝶	82	27.1%
UFsoft 用友	69	22.8%
Eabax 金算盘	25	8.3%
SAP	18	5.9%
Oracle	14	4.6%
北极星	10	3.3%
浪潮	10	3.3%
科思	8	2.6%
Microsoft Dynamic	6	2.0%
博科	6	2.0%
Others	6	2.0%
Adonix	5	1.7%
Infor	4	1.3%
启明	4	1.3%
Epicor	3	1.0%
Lawson	3	1.0%
QAD	3	1.0%
安易	3	1.0%
金思维	3	1.0%
天思	3	1.0%
Consona Corp	2	0.7%
并捷	2	0.7%
鼎新	2	0.7%

金航联	2	0.7%
经纬	2	0.7%
万达宝	2	0.7%
易飞	2	0.7%
Activant	1	0.3%
BAAN	1	0.3%
利玛	1	0.3%
速达	1	0.3%
Total	303	100.0%

Respondents were then asked how many years' experience in ERP system. 17.8% of the participants have ERP experience for 5 years, 17.5% of the respondents have ERP experience for 6 years. And the respondents have average of 6.21 years of experience. Totally 183 of the respondents have experience equal and less than 6 years, and 120 of the respondents have experience equal or longer than 7 years.

Table 26. Respondent ratio by experience

Experience Year	Count	Percentage Ratio
2	4	1.3%
3	31	10.2%
4	41	13.5%
5	54	17.8%
6	53	17.5%
7	50	16.5%
8	28	9.2%
9	20	6.6%
10	6	2.0%
11	5	1.7%
12	3	1.0%
13	2	0.7%
14	1	0.3%
16	3	1.0%
17	1	0.3%
18	1	0.3%
Total	303	100.0%

Respondents were then asked the role in ERP implementation. 65.3% of the respondents are normal users, and only 4% are pure decision makers, and 30.7% both users and decision makers.

Table 27. Respondent ratio by role

Role	Count	Percentage Ratio
Normal User	198	65.3%
Decision Maker	12	4.0%
Normal User & Decision Maker	93	30.7%
Total	303	100.0%

Respondents were then asked the industry of the company. Equally 14.5% of the participants from information industry and mechanical and electrical. 10.6% from electronics electrical. 96% of the respondent select the industry (which is adopted from the China industry classification) from the list we provided, and 4 percent select the others.

Table 28. Respondent ratio by industry

Industry	Count	Percentage Ratio
Information industry	44	14.5%
Mechanical & electrical	44	14.5%
Electronics & electric	32	10.6%
Petroleum and chemical	27	8.9%
Apparel and textile	26	8.6%
Light industry food	24	7.9%
Medicine and health	20	6.6%
Building materials	18	5.9%
Traffic and transport	12	4.0%
Professional services	8	2.6%
Safety protection	8	2.6%
Toys and gifts	6	2.0%
Metallurgy mineral	5	1.7%
Office supplies	5	1.7%
Agency Organization	4	1.3%

Water Conservancy and hydropower	4	1.3%
Other	4	1.3%
Environmental greening	3	1.0%
Household items	3	1.0%
Office	3	1.0%
Agriculture, forestry, Animal husbandry, Fisheries	2	0.7%
Packaging	1	0.3%
Total	302	100%

Respondents were then asked the revenue of the company. Around half of the respondents (49.5%) from the company of revenue range from 100 million Chinese Yuan, to 1 billion Chinese Yuan, we assume the company of the size are the major companies implement ERP systems. 28.4% from companies with revenue range from 10 million to 100 million, and 11.6% from 1 billion to 10 billion.

Table 29. Respondent ratio by revenue

Revenue	Count	Percentage Ratio
< 1Million	2	0.7%
1M - 10Million	22	7.3%
10M - 100Million	86	28.4%
100M - 1Billion	150	49.5%
1B - 10Billion	35	11.6%
> 10Billion	8	2.6%
Total	303	100%

5.2. Unidimensionality and principle component analysis

This study applies quantitative techniques to enhance the generalizability of research results (Urbach et al., 2010). A survey instrument offers an efficient means of collecting data to test hypothetical relationships, based on empirical observations. Operationalization of the constructs relies on items adapted from literatures. As such, adaptation may affect internal validity. The items' discriminant validity, content validity, depends, in part, on the extent of the adaptation of items to the instrument used in this study. In addition, the generalizability of research findings depends, in part, on the effectiveness of the sampling approach. Because the items adopted from different resource, especially the ease of customization, even the research have assessed the validity and reliability of the instrument, we will check and verify in our research.

Support for unidimensionality requires the satisfaction of two conditions. First, all items associated with a given construct must load on a common component. Second, these items must not load on other components associated with other constructs (Lumsden, 1962). In practice, however, it is sufficient that all items of a given construct show a higher degree of correlation with its construct than with other constructs (Gefen & Straub, 2005).

To determine unidimensionality, this study used SPSS (IBM Corp., 2012) to perform factor rotations, based on PCA with Varimax rotation and Kaiser normalization. The factor rotations, based on an eigenvalue on 1 or scree plots, were satisfactory. 5 factors identified in the initial PCA extraction, and the last component with eigenvalue 0.991, it is close to 1, so instead of relying on the eigenvalue or scree plots approach, six factors were specified a priori for the factor rotations, in line with the six reflectively measured constructs of the study's theoretical framework.

Our model includes constructs at three levels: ease of customization and customization level for the first level; performance expectancy, effort expectancy and social influence for the second level, and behavior intention for the third level. We conducted an exploratory factor analysis for each level.

In the PCA analysis, our criteria for screening items were (1) that the item load on the expected factor (i.e., load with the other items intended to measure the intended construct) and (2) that the loading on the primary factor must be substantially greater (a difference of .50 or more) than the loading on any other factor. Furthermore, we omitted any question that decreased the reliability of the scale of which it is intended to be a part. As discussed below, the survey items generally performed as intended.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.173	32.817	32.817	10.173	32.817	32.817	5.683	18.334	18.334
2	3.376	10.891	43.708	3.376	10.891	43.708	4.145	13.371	31.705
3	2.832	9.137	52.845	2.832	9.137	52.845	4.071	13.131	44.836
4	2.15	6.936	59.781	2.15	6.936	59.781	3.207	10.346	55.182
5	1.638	5.283	65.064	1.638	5.283	65.064	3.064	9.883	65.064
6	0.991	3.197	68.261						
7	0.916	2.954	71.215						
8	0.79	2.549	73.765						
9	0.639	2.061	75.826						
10	0.576	1.857	77.682						
11	0.567	1.828	79.51						
12	0.549	1.77	81.28						
13	0.516	1.665	82.945						
14	0.503	1.621	84.566						
15	0.457	1.474	86.04						
16	0.418	1.35	87.39						
17	0.408	1.315	88.705						
18	0.372	1.2	89.905						
19	0.339	1.095	91						
20	0.334	1.077	92.077						
21	0.307	0.99	93.067						
22	0.295	0.952	94.018						
23	0.269	0.868	94.886						
24	0.245	0.792	95.678						
25	0.234	0.754	96.432						
26	0.226	0.73	97.162						
27	0.212	0.684	97.846						
28	0.182	0.586	98.432						
29	0.169	0.544	98.976						
30	0.163	0.526	99.502						
31	0.154	0.498	100						

Extraction Method: Principal Component Analysis.

Table 30. Initial variance explained

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
CLEV1	0.32			0.69		
CLEV2				0.775		
CLEV3				0.695	0.346	
CLEV4		0.331		0.689		
CLEV5				0.731		
CDIF1	0.749					
CDIF2	0.774					
CDIF3	0.777					
CDIF4	0.705					
CDIF5	0.789					
CDIF6	0.754					
CDIF7	0.444					
PERF1		0.779				
PERF2		0.836				
PERF3		0.804				
PERF4		0.807				
PERF5		0.822				
EFFO1			0.36		0.762	
EFFO2					0.806	
EFFO3			0.329		0.751	
EFFO4					0.803	
SEFF1						0.784
SEFF2						0.839
SEFF3						0.729
SEFF4						0.857
UINT1			0.74			
UINT2			0.715			
UINT3			0.719			
UINT4			0.777			
UINT5			0.585			
UINT6		0.3	0.727			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Table 31. Rotated components before deletion

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.916
Bartlett's Test of Sphericity	Approx. Chi-Square	5964.987
	df	465
	Sig.	0

Table 32. KMO & Bartlett Test

The resulting rotation implied the presence of six factors. Four latent constructs, three of them, ease of customization, performance expectancy and social influence, loaded exclusively on their separate component. Two scales, ease of customization item 7 (CDIF7) and behavioral intention to use item 5 (UINT5) has load lower than 7, we suppose if they can be delete. We will check if deletion of them will increase the AVE. Although a few item loaded on two components, the loading on the main construct are higher than 7 and in the meantime, they are all significantly heavier than loading on the other scales, and the unidimensionality was acceptable. Kaiser-Meyer-Olkin measure of sampling adequacy is 0.916, and Bartlett's test of sphericity has high significance.

We deleted the two items CDIF7 and UNIT5, and performed factor rotations again with 6 scales. And it shows that after deletion, the cumulative loading is 71.5% which is higher than original 65%. And we checked later in confirmatory factor analysis using SmartPLS, the AVE is increased for these two scales from 0.548 to 0.613 for ease of customization and from 0.707 to 0.803 for behavioral intention respectively. Overall, the unidimensionality was satisfactory after the deletion of the two items.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
CLEV1		0.325			0.689	
CLEV2					0.778	
CLEV3				0.339	0.702	
CLEV4	0.344				0.676	
CLEV5					0.733	
CDIF1		0.759				
CDIF2		0.781				
CDIF3		0.781				
CDIF4		0.707				
CDIF5		0.784				
CDIF6		0.766				
PERF1	0.782					
PERF2	0.836					
PERF3	0.805					
PERF4	0.798					
PERF5	0.827					
EFFO1			0.338	0.778		
EFFO2				0.819		
EFFO3				0.764		
EFFO4				0.82		
SEFF1						0.777
SEFF2						0.844
SEFF3						0.733
SEFF4						0.864
UINT1			0.76			
UINT2			0.709	0.319		
UINT3			0.725	0.315		
UINT4			0.774	0.316		
UINT6			0.744			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Table 33. Rotated components after deletion of items

5.3. Model analysis of measuring and testing of assumptions

Remaining analyses were conducted in a two-stage sequence, as recommended by Kline (2011). In the first stage the measurement model was evaluated, and then the full structural equation model was analyzed in the second stage. The primary purpose of dividing the analyses into two steps is to isolate and address any issues in each model separately. For the CFA analysis of the measurement model, factor loading, internal consistency, indicator reliability, and convergent and discriminant validity were analyzed. The level of acceptance for each category is .50 and higher for factor loading, .70 and higher for internal consistency, .70 and higher for indicator reliability, .50 and higher for convergent validity based on the average variance extracted (AVE). For discriminant validity, the outer loadings on a construct should be higher than all cross loadings with other constructs and the square root of the AVE of each construct should be higher than its highest correlation with any other construct (Hair et al, 2014a). And the heterotrait-monotrait ratio (HTMT) of the correlations was also assessed to enhance the discriminant validity check.

5.3.1. Analysis of the measurement model CFA

5.3.1.1. Identification of Reflective indicators

As noted by Cook and Campbell (1979), Nunnally and Bernstein (1994), Schwab (1980), and others, researchers use multiple measures of their constructs because (a) most constructs cannot be measured without error, (b) it is difficult for a single indicator to adequately capture the breadth of a construct's domain, and (c) it is necessary to unconfound the method of measurement from the construct of interest. Thus, the use of multiple measures with maximally different methods is the best way to ensure that the measures validly and reliably represent the construct of interest. However, once a researcher has developed multiple measures, he or she faces the problem of how to accurately model the relationships between the measures and the construct of interest. Generally speaking, two different measurement models have been mentioned in the structural equation modelling literature: the common latent construct model with reflective indicators and the composite latent construct model with formative indicators.

When developing constructs, researchers must consider two broad types of measurement specification: reflective and formative measurement models. As checked in the source of the measurement scale, all of them handled as reflective indicators, we are going to check in our research if they are reflective in nature.

The reflective measurement model (also referred to as Mode A measurement in PLS-SEM) has a long tradition in the social sciences and is directly based on classical test theory. According to this theory, measures represent the effects (or manifestations) of an underlying construct. Therefore, causality is from the construct to its measures. Reflective indicators can be viewed as a representative sample of all the possible items available within the conceptual domain of the construct. Therefore, since a reflective measure dictates that all indicator items are caused by the same construct (i.e., they stem from the same domain), indicators associated with a particular construct should be highly correlated with each other. In addition, individual items should be interchangeable, and any single item can generally be left out without changing the meaning of the construct, as long as the construct has sufficient reliability. The fact that the relationship goes from the construct to its measures implies that if the evaluation of the latent trait changes (e.g., because of a change in the standard of comparison), all indicators will change simultaneously. A set of reflective measures is commonly called a scale.

In contrast, formative measurement models (also referred to as Mode B measurement in PLS-SEM) are based on the assumption that the indicators cause the construct. Therefore, researchers typically refer to this type of measurement model as being a formative index. An important characteristic of formative indicators is that they are not interchangeable, as is true with reflective indicators. Thus, each indicator for a formative construct captures a specific aspect of the construct's domain. Taken jointly, the items ultimately determine the meaning of the construct, which implies that omitting an indicator potentially alters the nature of the construct. As a consequence, breadth of coverage of the construct domain is extremely important to ensure that the domain of content of the focal construct is adequately captured (Diamantopoulos & Winklhofer, 2001).

But when do we measure a construct reflectively or formatively? There is not a definite answer to this question since constructs are not inherently reflective or formative. Instead, the specification depends on the construct conceptualization and the objective of the study. In table 34, present a set of guidelines that researchers can use to guide their decision of whether to measure a construct reflectively or formatively. Note that there are also empirical means to determine the measurement perspective. Gudergan, Ringle, Wende, and Will (2008) propose the so-called confirmatory tetrad analysis for PLS-SEM (CTA-PLS), which allows testing the null hypothesis that the construct measures are reflective in nature. Rejecting the null hypothesis in a tetrad test implies, therefore, that formative measures should be used for construct operationalization. Clearly, a purely data-driven perspective needs to be supplemented with theoretical considerations based on the guidelines summarized in the table be supplemented with theoretical considerations based on the guidelines summarized in table

Criterion	Decision	Reference
Causal priority between the indicator and the construct	• From the construct to the indicators: reflective • From the indicators to the construct: formative	Diamantopoulos and Winklhofer (2001)
Is the construct a trait explaining the indicators or rather a combination of the indicators?	• If trait: reflective • If combination: formative	Fornell and Bookstein (1982)
Do the indicators represent consequences or causes of the construct?	• If consequences: reflective • If causes: formative	Rossiter (2002)
Is it necessarily true that if the assessment of the trait changes, all items will change in a similar manner (assuming they are equally coded)?	• If yes: reflective • If no: formative	Chin (1998)
Are the items mutually interchangeable?	• If yes: reflective • If no: formative	Jarvis, MacKenzie, and Podsakoff (2003)

Table 34. Guidance for choosing measurement model

The distinction between formative and reflective indicators is also important because failure to properly specify measurement relations can threaten the statistical conclusion validity of a study's findings. For example, Law and Wong (1999) have noted that measurement model misspecification can sometimes bias estimates of the structural relationships between constructs and potentially undermine statistical conclusion validity (although it did not do so in their study). If this were found to be generally true, it would suggest that measurement model misspecification may cause Type I and/or Type II errors of inference in hypothesis testing.

However, as yet it is not known just how much impact such misspecification might have or under what conditions it is likely to have biasing effects. In addition, little guidance exists for researchers about how to distinguish formative from reflective indicators or about how to develop, model, and evaluate constructs with formative indicators.

Models of this type posit that covariation among measures is explained by variation in an underlying common latent factor. It is for this reason that the indicators are referred to as effects indicators (Bollen, 1989; Bollen & Lennox, 1991; MacCallum & Browne, 1993) that are reflective of the underlying construct they represent. This is illustrated in Figure 48 by an ellipse with several arrows emanating from it to a set of indicators. We refer to the factors in this model as common latent constructs for two reasons. First, this is the most common type of measurement model found in the behavioral and organizational literature. Second, the latent construct is empirically defined in terms of the common (shared) variance among the items.

As noted by Bollen and Lennox (1991), there are several key features of this type of measurement model that should be recognized. First, the direction of causality flows from the construct to the measures in the sense that the construct explains the variation in the measures. Second, the indicators in this type of measurement model should be highly correlated due to the fact they all reflect the same underlying construct. As a result, they should exhibit high levels of internal consistency reliability. Third, "for all practical purposes, equally reliable effect indicators of a unidimensional construct are interchangeable" (Bollen & Lennox, 1991). This is true because each of the measures is supposed to be sampled from the same conceptual domain and to represent all aspects of it. This implies that dropping one of two equally reliable indicators from the measurement model should not alter the meaning of the construct. Fourth, in this type of measurement model, error is associated with the individual measures rather than with the construct as a whole (though an overall calculation of the reliability of a set of measures can be made on the basis of the individual measure reliabilities). One advantage of this is that it

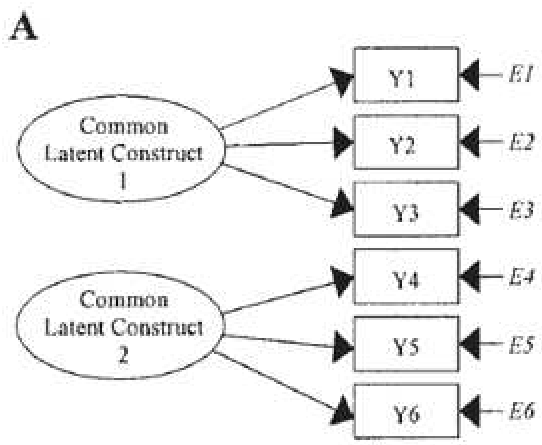


Figure 48. Model with reflective indicators
Factor specification for the common latent construct model

permits researchers to evaluate the differential reliability of the individual items in their scales. This is helpful when designing scales because it provides a basis for identifying weaker items and suggests areas where the scale could be improved. Finally, because the measures are all imperfect reflections of the underlying construct, a summed scale score will not adequately represent a construct with reflective indicators, and using a scale score in place of the latent construct will result in inconsistent structural estimates of the relationships between the construct and other latent constructs.

5.3.1.2. Internal consistency

Cronbach's Alpha

The traditional criterion for internal consistency is Cronbach’s alpha, which provides an estimate of the reliability based on the intercorrelations of the observed indicator variables. Cronbach’s alpha assumes that all indicators are equally reliable (i.e., all the indicators have equal outer loadings on the construct). But PLS-SEM prioritizes the indicators according to their individual reliability. Moreover, Cronbach’s alpha is sensitive to the number of items in the scale and generally tends to underestimate the internal consistency reliability.

As such, it may be used as a conservative measure of internal consistency reliability.

	Composite Reliability	Cronbach's Alpha
Behavior Intention UNIT	0.953	0.939
Customization Ease DFIF	0.905	0.874
Customization Level CLEV	0.895	0.854
Effort Expectancy EFFO	0.939	0.913
Performance Expectancy PERF	0.932	0.908
Social Influence SEFF	0.891	0.839

Table 35. Internal consistency

Composite Reliability

Due to Cronbach alpha's limitations in the population, it is more appropriate to apply a different measure of internal consistency reliability, which is referred to as composite reliability. It is generally interpreted in the same way as Cronbach's alpha. Specifically, composite reliability values of 0.60 to 0.70 are acceptable in exploratory research, while in more advanced stages of research, values between 0.70 and 0.90 can be regarded as satisfactory (Nunally & Bernstein, 1994). Values above 0.95 are not desirable because they indicate that all the indicator variables are measuring the same phenomenon and are therefore unlikely to be a valid measure of the construct (Hair et al., 2011).
Table 35 show the internal consistency is right above 0.8, and even the composite reliability of behavioral intention is 9.51, a little bit higher than 9.5, we take it as acceptable. Thus, it shows the scales are satisfactory for measure their respective constructs.

Specifically for our research, customization level and ease of customization, Cronbach's alpha and composite reliability values ranged from 0.895 to 0.905 and 0.854 to 0.874, respectively. Which shows satisfactory composite reliability values.

5.3.1.3. Convergent validity

Convergent validity is the extent to which a measure correlates positively with alternative measures of the same construct. Using the domain sampling model, indicators of a reflective construct are treated as different approaches to measure the same construct. Therefore, the items that are indicators (measures) of a specific construct should converge or share a high proportion of variance. To establish convergent validity, researchers consider the outer loadings of the indicators, as well as the average variance extracted (AVE). High outer loadings on a construct indicate that the associated indicators have much in common, which is captured by the construct. This characteristic is also commonly called indicator reliability. At a minimum, all indicators' outer loadings should be statistically significant. Because a significant outer loading could still be fairly weak, a common rule of thumb is that the (standardized) outer loadings should be 0.708 or higher. The rationale behind this rule can be understood in the context of the square of a standardized indicator's outer loading, referred to as the communality of an item. The square of a standardized indicator's outer loading represents how much of the variation in an item is explained by the construct and is described as the variance extracted from the item.

5.3.1.3.1. Indicator reliability

Indicator reliability assesses the extent to which each indicator measuring the same domain loads highly on its respective latent constructs (Urbach et al., 2010). Indicator loadings above 0.70 are recommended for satisfactory indicator reliability (Hair et al., 2011). High outer loadings on a construct indicate the associated indicators have much in common, which is captured by the construct. The size of the outer loading is also commonly called indicator reliability. At a minimum, the outer loadings of all indicators should be statistically significant. Because a significant outer loading could still be fairly weak, a common rule of thumb is that the standardized outer loadings should be 0.708 or higher. The rationale behind this rule can be understood in the context of the square of a standardized indicator's outer loading, referred to as the communality of an item. The square of a standardized indicator's outer loading represents how much of the variation in an item is explained by the construct and is described as the variance extracted from the item. An established rule of thumb is that a latent variable should explain a substantial part of each indicator's variance, usually at least 50%. This also implies that the variance shared between the construct and its indicator is larger than the measurement error variance. This means that an indicator's outer loading should be above 0.708 since that number squared (0.7082) equals 0.50. Note that in most instances, 0.70 is considered close enough to 0.708 to be acceptable (Hair et al., 2013)

Researchers frequently observe weaker outer loadings in social science studies, especially when newly developed scales are used (Hulland, 1999). Rather than automatically eliminating indicators when their outer loading is below 0.70, researchers should carefully examine the effects of item removal on the composite reliability, as well as on the construct's content validity. Generally, indicators with outer loadings between 0.40 and 0.70 should be considered for removal from the scale only when deleting the indicator leads to an increase in the composite reliability (or the average variance extracted; see next section) above the suggested threshold value. Another consideration in the decision of whether to delete an indicator is the extent to which its removal affects content validity. Indicators with weaker outer loadings are sometimes retained on the basis of their contribution to content validity. Indicators with very low outer loadings (below 0.40) should, however, always be eliminated from the scale (Hair, Ringle, & Sarstedt, 2011).

	Customization Ease	Customization Level	Effort Expectancy	Performance Expectancy	Social Influence	Behavior Intention
CDIF1	0.742					
CDIF2	0.800					
CDIF3	0.824					
CDIF4	0.722					
CDIF5	0.827					
CDIF6	0.778					
CLEV1		0.785				

CLEV2		0.752				
CLEV3		0.843				
CLEV4		0.799				
CLEV5		0.789				
EFFO1			0.871			
EFFO2			0.898			
EFFO3			0.892			
EFFO4			0.902			
PERF1				0.793		
PERF2				0.896		
PERF3				0.861		
PERF4				0.850		
PERF5				0.875		
SEFF1					0.856	
SEFF2					0.847	
SEFF3					0.780	
SEFF4					0.793	
UINT1						0.908
UINT2						0.896
UINT3						0.884
UINT4						0.905
UINT6						0.888

Table 36. Outer loadings

As depicted in table 36, all the outer loadings are higher than 0.708, which show higher indicator reliability.

	Loadings	***t***
CDIF1 <- Customization Ease DFIF	0.742	22.534
CDIF2 <- Customization Ease DFIF	0.800	38.726
CDIF3 <- Customization Ease DFIF	0.824	43.565
CDIF4 <- Customization Ease DFIF	0.722	22.010
CDIF5 <- Customization Ease DFIF	0.827	50.780
CDIF6 <- Customization Ease DFIF	0.778	29.221
CLEV1 <- Customization Level CLEV	0.785	32.893
CLEV2 <- Customization Level CLEV	0.752	22.066
CLEV3 <- Customization Level CLEV	0.843	49.971
CLEV4 <- Customization Level CLEV	0.799	36.076
CLEV5 <- Customization Level CLEV	0.789	36.229
EFFO1 <- Effort Expectancy EFFO	0.871	54.773
EFFO2 <- Effort Expectancy EFFO	0.898	87.046

EFFO3 <- Effort Expectancy EFFO	0.892	79.551
EFFO4 <- Effort Expectancy EFFO	0.902	78.108
PERF1 <- Performance Expectancy PERF	0.793	32.677
PERF2 <- Performance Expectancy PERF	0.896	71.574
PERF3 <- Performance Expectancy PERF	0.861	52.126
PERF4 <- Performance Expectancy PERF	0.850	46.321
PERF5 <- Performance Expectancy PERF	0.875	61.414
SEFF1 <- Social Influence SEFF	0.856	43.719
SEFF2 <- Social Influence SEFF	0.847	39.601
SEFF3 <- Social Influence SEFF	0.780	23.975
SEFF4 <- Social Influence SEFF	0.793	23.763
UINT1 <- Behavior Intention UNIT	0.908	87.095
UINT2 <- Behavior Intention UNIT	0.896	85.921
UINT3 <- Behavior Intention UNIT	0.884	74.636
UINT4 <- Behavior Intention UNIT	0.905	101.809
UINT6 <- Behavior Intention UNIT	0.888	72.567

Table 37. Significance of loadings

5.3.1.3.2. AVE

The AVE was used to assess convergent validity. AVE measures the extent that a given construct's variance with its group of associated measures stems more from valid measurements than from measurement errors (Fornell & Larcker, 1981). An AVE above 0.50 indicates acceptable convergent validity (Hair et al., 2011).

Based on the indicator reliability results, additional analysis was performed to determine if any indicators would need to be removed. As discussed in EFA, two items were deleted, and we also checked in measuring indicator reliability, the indicator CDIF6 <- Customization Ease had an outer loading value of 0.452 and UINT5 <- Behavior Intention of value 0.514, did not met the preferred threshold of .70. Typically, to determine if the indicator should be removed, an outer loading relevance test should be conducted (Hair et al., 2014a) along with an evaluation of the items contribution to content validity (Hair et al., 2011). The relevance test involves deleting the indicator if its value is less than 0.40, or check to see that the AVE and composite reliability values do not meet the minimum thresholds and by deleting the indicator, AVE and composite reliability would increase above the minimum thresholds of .50 and .70 respectively. The researcher determined that because the AVE value of Customization Ease and Behavior Intention increased from 0.548 to 0.613 and 0.707 to 0.803 respectively.

	AVE After Deletion	AVE Before
Behavior Intention UNIT	0.803	0.707
Customization Ease DFIF	0.613	0.548
Customization Level CLEV	0.631	0.631
Effort Expectancy EFFO	0.793	0.793
Performance Expectancy PERF	0.732	0.732
Social Influence SEFF	0.672	0.672

Table 38. AVE before and after deletion

The square root of the variance extracted (AVE) for all constructs is higher than 0.5, (0.613 to 0.803). For ease of customization and customization level, AVE values ranged from 0.613 to 0.631 (Table 38). As such, the two latent constructs explained approximately 61% to 63% of their indicators' variance. Each indicators associated measuring the same domain converged more with their respective constructs than with other constructs measuring different domains. Thus, all reflective measures showed satisfactory convergent validity.

5.3.1.4. Discriminant validity

Cross loading

Discriminant validity assesses the amount of dissimilarities present between items of distinct constructs. As such, items of different constructs should measure separate domains. Two measures of discriminant validity have been proposed. One method for assessing discriminant validity is by examining the cross loadings of the indicators. Specifically, an indicator's outer loading on the associated construct should be greater than all of its loadings on other constructs (i.e., the cross loadings). The presence of cross loadings that exceed the indicators' outer loadings represents a discriminant validity problem. This criterion is generally considered rather liberal in terms of establishing discriminant validity (Hair, Ringle, & Sarstedt, 2011). That is, it is very likely to indicate that two or more constructs exhibit discriminant validity.

	Customization Ease	Customization Level	Effort Expectancy	Performance Expectancy	Social Influence	Behavior Intention
CDIF1	0.742	0.243	0.224	0.077	0.041	0.199
CDIF2	0.800	0.325	0.280	0.184	0.067	0.212
CDIF3	0.824	0.355	0.268	0.209	-0.055	0.263
CDIF4	0.722	0.251	0.266	0.128	0.085	0.266
CDIF5	0.827	0.380	0.279	0.188	0.011	0.236
CDIF6	0.778	0.318	0.199	0.248	0.057	0.249
CLEV1	0.439	0.785	0.407	0.307	0.093	0.440
CLEV2	0.173	0.752	0.328	0.361	0.059	0.335
CLEV3	0.339	0.843	0.533	0.407	0.146	0.463
CLEV4	0.332	0.799	0.379	0.473	0.087	0.401
CLEV5	0.289	0.789	0.420	0.329	0.088	0.384
EFFO1	0.291	0.404	0.871	0.307	0.104	0.594
EFFO2	0.263	0.483	0.898	0.307	0.170	0.584
EFFO3	0.324	0.497	0.892	0.347	0.136	0.612
EFFO4	0.276	0.493	0.902	0.327	0.102	0.566
PERF1	0.179	0.359	0.257	0.793	0.054	0.374
PERF2	0.195	0.421	0.349	0.896	0.100	0.512
PERF3	0.213	0.439	0.344	0.861	0.068	0.459
PERF4	0.161	0.398	0.226	0.850	0.078	0.440
PERF5	0.209	0.410	0.361	0.875	0.085	0.479
SEFF1	0.032	0.144	0.187	0.128	0.856	0.387
SEFF2	-0.018	0.113	0.129	0.067	0.847	0.319
SEFF3	0.078	0.061	0.075	0.072	0.780	0.329
SEFF4	0.042	0.067	0.046	-0.002	0.793	0.229
UINT1	0.282	0.481	0.596	0.490	0.367	0.908
UINT2	0.243	0.487	0.600	0.490	0.360	0.896
UINT3	0.274	0.467	0.600	0.462	0.359	0.884
UINT4	0.282	0.419	0.609	0.448	0.355	0.905
UINT6	0.277	0.449	0.560	0.495	0.335	0.888

Table 39. Cross loadings

Fornell-Larcker Criterion

The Fornell-Larcker criterion is a second and more conservative approach to assessing discriminant validity. It compares the square root of the AVE values with the latent variable correlations. Specifically, the square root of each construct's AVE should be greater than its highest correlation with any other construct. (Note: This criterion can also be stated as the AVE should exceed the squared correlation with any other construct.) The logic of this method is based on the idea that a construct shares more variance with its associated indicators than with any other construct.

	Behavior Intention	Customization Ease	Customization Level	Effort Expectancy	Performance Expectancy	Social Influence
Behavior Intention	0.896					
Customization Ease	0.303	0.783				
Customization Level	0.514	0.404	0.794			
Effort Expectancy	0.662	0.325	0.528	0.891		
Performance Expectancy	0.532	0.224	0.475	0.362	0.856	
Social Influence	0.397	0.040	0.123	0.144	0.091	0.820

Table 40. Fornell-Larcker Criterion

As shown in the table 40, all the scales load heavier on their respective constructs than load on the other items, and all AVEs exceed the squared correlation with any other construct. It shows the discriminant validity of the scales.

Heterotrait-monotrait ratio (HTMT)

However, recent research that critically examined the performance of cross-loadings and the Fornell-Larcker criterion for discriminant validity assessment has found that neither approach reliably detects discriminant validity issues (Henseler et al., 2015). Specifically, cross-loadings fail to indicate a lack of discriminant validity when two constructs are perfectly correlated, which renders this criterion ineffective for empirical research.

Similarly, the Fornell-Larcker criterion performs very poorly, especially when indicator loadings of the constructs under consideration differ only slightly (e.g., all indicator loadings vary between 0.60 and 0.80). When indicator loadings vary more strongly, the Fornell-Larcker criterion's performance in detecting discriminant validity issues improves but is still rather poor overall. (also see Voorhees, Brady, Calantone & Ramirez, 2016).

As a remedy, Henseler et al. (2015) propose assessing the heterotrait-monotrait ratio (HTMT) of the correlations. In short, HTMT is the ratio of the between-trait correlations to the within-trait correlations. HTMT is the mean of all correlations of indicators across constructs measuring different constructs (i.e., the heterotrait-heteromethod correlations) relative to the (geometric) mean of the average correlations of indicators measuring the same construct (i.e., the monotrait-heteromethod correlations; for a formal definition of the HTMT statistic, see Henseler et al., 2015). Technically, the HTMT approach is an estimate of what the true correlation between two constructs would be, if they were perfectly measured (i.e., if they were perfectly reliable). This true correlation is also referred to as disattenuated correlation. A disattenuated correlation between two constructs close to 1 indicates a lack of discriminant validity.

Henseler et al. (2015) suggest a threshold value of 0.90 if the path model includes constructs that are conceptually very similar. In other words, an HTMT value above 0.90 suggests a lack of discriminant validity. When the constructs in the path model are conceptually more distinct, a lower and thus more conservative threshold value of 0.85 seems warranted (Henseler et al., 2015). Furthermore, it is possible to derive a bootstrap confidence interval. The confidence interval is the range into which the true HTMT population value will fall, assuming a certain level of confidence (e.g., 95%). A confidence interval containing the value 1 indicates a lack of discriminant validity. Conversely, if the value 1 falls outside the interval's range, this suggests that the two constructs are empirically distinct. Since the HTMT based assessment using a confidence interval relies on inferential statistics, one should primarily rely on this criterion, especially in light of the limitations of cross-loadings and the Fornell-Larcker criterion. However, the latter two measures still constitute standard means for discriminant validity assessment. To decrease the HTMT by increasing a construct's average monotrait-heteromethod correlations, one can eliminate items that have low correlations with other items measuring the same construct.

In addition to examining the HTMT ratios, you should test whether the HTMT values are significantly different from 1. This requires computing bootstrap confidence intervals obtained by running the bootstrapping option.

As expected, since the conservative HTMT threshold of 0.85 already supports discriminant validity (Table 41), the bootstrap confidence interval (Table 42) results of the HTMT criterion shows *p* value < 0.05 also clearly speak in favor of the discriminant validity of the constructs. And it approved the discriminant validity of the scales.

	Behavior Intention	Customization Ease	Customization Level	Effort Expectancy	Performance Expectancy	Social Influence
Behavior Intention						
Customization Ease	0.335					
Customization Level	0.568	0.452				
Effort Expectancy	0.715	0.361	0.589			
Performance Expectancy	0.573	0.247	0.536	0.394		
Social Influence	0.433	0.091	0.133	0.151	0.096	

Table 41. Heterotrait-Monotrait Ratio (HTMT)

	HTMT	t	p	2.5%	97.5%
Customization Ease DFIF -> Behavior Intention UNIT	0.335	6.033	0.000	0.220	0.448
Customization Level CLEV -> Behavior Intention UNIT	0.568	12.424	0.000	0.480	0.653
Customization Level CLEV -> Customization Ease DFIF	0.452	8.228	0.000	0.341	0.553
Effort Expectancy EFFO -> Behavior Intention UNIT	0.715	21.877	0.000	0.648	0.772
Effort Expectancy EFFO -> Customization Ease DFIF	0.361	6.905	0.000	0.258	0.455
Effort Expectancy EFFO -> Customization Level CLEV	0.589	11.698	0.000	0.471	0.668
Performance Expectancy PERF -> Behavior Intention UNIT	0.573	14.157	0.000	0.493	0.652
Performance Expectancy PERF -> Customization Ease DFIF	0.247	4.031	0.000	0.136	0.365
Performance Expectancy PERF -> Customization Level CLEV	0.536	10.968	0.000	0.428	0.617
Performance Expectancy PERF -> Effort Expectancy EFFO	0.394	7.108	0.000	0.284	0.494
Social Influence SEFF -> Behavior Intention UNIT	0.433	8.141	0.000	0.325	0.534
Social Influence SEFF -> Customization Ease DFIF	0.091	3.339	0.001	0.084	0.185
Social Influence SEFF -> Customization Level CLEV	0.133	2.914	0.004	0.091	0.260
Social Influence SEFF -> Effort Expectancy EFFO	0.151	3.051	0.002	0.081	0.263
Social Influence SEFF -> Performance Expectancy PERF	0.096	2.340	0.020	0.065	0.215

Table 42. Significance & confidence interval for HTMT

Summary

With the findings identified for the measurement model, the CFA analysis revealed that the initial instrument showed favorable results when subjected to factor loading, internal consistency reliability, convergent validity, indicator reliability and discriminant validity. The analysis of the structural model will be discussed next.

Latent Variable	Indicators	Convergent Validity			Internal Consistency Reliability		Discriminant Validity
		Loadings	Indicator Reliability	AVE	Composite Reliability	Cronbach's Alpha	
		>0.70	>0,50	>0.50	0.60-0.90	0,60-0,90	HTMT confidence interval does not include 1
Customization Ease	CDIF1	0.742	0.551	0.613	0.905	0.874	Yes
	CDIF2	0.800	0.639				
	CDIF3	0.824	0.678				
	CDIF4	0.722	0.521				
	CDIF5	0.827	0.684				
	CDIF6	0.778	0.606				
Customization Level	CLEV1	0.785	0.616	0.631	0.895	0.854	Yes
	CLEV2	0.752	0.565				
	CLEV3	0.843	0.710				
	CLEV4	0.799	0.639				
	CLEV5	0.789	0.622				
Effort Expectancy	EFFO1	0.871	0.758	0.793	0.939	0.913	Yes
	EFFO2	0.898	0.806				
	EFFO3	0.892	0.796				
	EFFO4	0.902	0.813				
Performance Expectancy	PERF1	0.793	0.629	0.732	0.932	0.908	Yes
	PERF2	0.896	0.803				
	PERF3	0.861	0.742				
	PERF4	0.850	0.722				
	PERF5	0.875	0.766				
Social Influence	SEFF1	0.856	0.732	0.672	0.891	0.839	Yes
	SEFF2	0.847	0.718				
	SEFF3	0.780	0.608				
	SEFF4	0.793	0.628				
Behavior Intention	UINT1	0.908	0.825	0.803	0.953	0.939	Yes
	UINT2	0.896	0.803				
	UINT3	0.884	0.782				
	UINT4	0.905	0.819				
	UINT6	0.888	0.788				

Table 43. Summary for measurement model

5.3.2. Analysis of the structural model:

In the previous chapter, Confirmatory Factor Analysis (CFA) techniques were used to validate the reflective measurement model. Based on the findings, the validated instruments will be used for the next step in the research study, which is structural equation modeling. This chapter provides a detail of the findings for the structural model. Partial Lease Squares-Structural Equation Modeling (PLS-SEM) was used for the second stage of the analysis and the selected software was SmartPLS (Ringle et al, 2015). The findings along with the SEM data will be presented and discussed.

The structural model in PLS-SEM is assessed on the basis of heuristic criteria that are determined by the model's predictive capabilities. These criteria, by definition, do not allow for testing the overall goodness of the model fit in a CB-SEM sense. Rather, the model is assumed to be specified correctly and is assessed in terms of how well it predicts the endogenous variables/ constructs (see Rigdon, 2012, for a discussion of model fit in CB-SEM vis-à-vis PLS-SEM's prediction orientation).

The structural model contains the constructs as well as the relationship between each one (Hair et al, 2014a). For the structural model, the following assessment procedure were considered: assess the model for collinearity issues, access the significance and relevance of the relationships, assess the level of R^2 value, assess the f^2 effect size, and assess the predictive relevance of Q^2 and the q^2 effect sizes. Provided now is the level of acceptance for each category. Collinearity is measured based on tolerance levels and the variance inflation factor (VIF). If the tolerance levels are below 0.20 and (VIF) is above 5.00 for the predictor constructs, then collinearity issues exist and would need to be addressed. For the significance of the hypothesized relationships, path coefficients range from -1 to +1 and closer to +1 indicate strong positive relationships. Also, the empirical t values (which determines the standard error) should be higher than the critical value which are 1.65 for a significance level at 10%, 1.96 for a significant level at 5%, and 2.57 for a significance level at 1. The R^2 value ranges from 0 to 1 for endogenous latent variables with the scale of 0.75 for significant, 0.50 for moderate, and 0.25 for weak. f effect sizes for the exogenous latent variables are 0.02 for small effect, 0.15 for medium effect, and 0.35 for a large effect. Q^2 values larger than 0 indicate that the exogenous constructs have some level of predictive significance for the endogenous construct. q^2 values for the exogenous constructs are 0.02 for small predictive relevance, 0.15 for medium predictive relevance, and 0.35 for large predictive relevance for a certain endogenous construct.

Figure 49 Shows a systematic approach to the assessment of structural model results (Haire 2013).

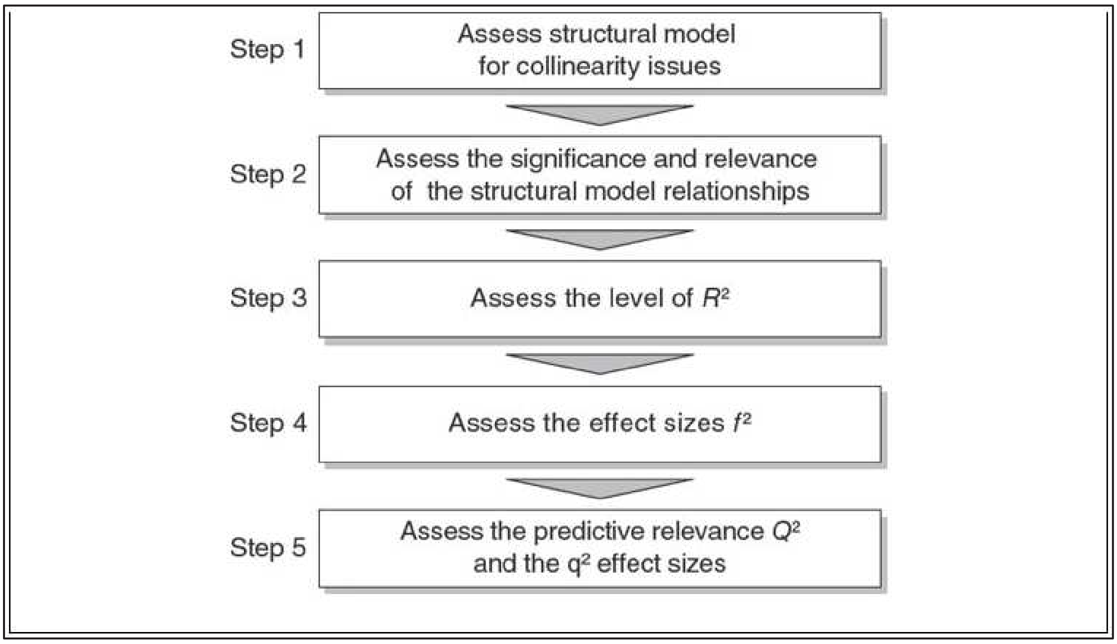


Figure 49. Structural model assessment procedure

5.3.2.1. Collinearity Diagnostics

Before we describe these analyses, however, we need to examine the structural model for collinearity (Step 1). The reason is that the estimation of path coefficients in the structural models is based on OLS regressions of each endogenous latent variable on its corresponding predecessor constructs. Just as in a regular multiple regression, the path coefficients might be biased if the estimation involves significant levels of collinearity among the predictor constructs (Hair 2011).

The first criterion evaluated was collinearity. If VIF is > 5.00, then collinearity problems exists. None of the constructs exceeded the 5.00 value which indicated that no collinearity issues existed. Table 44 shows the results of collinearity assessment.

	Behavior Intention	Customization Ease	Customization Level	Effort Expectancy	Performance Expectancy	Social Influence
Behavior Intention UNIT						
Customization Ease DFIF			1.000	1.195		
Customization Level CLEV				1.195	1.000	1.000
Effort Expectancy EFFO	1.168					
Performance Expectancy PER	1.153					
Social Influence SEFF	1.023					

Table 44. VIF collinearity of structural model

As shown in the table 44, the collinearity is not an issue in our structural model.

5.3.2.2. Path Coefficients

After running the PLS-SEM algorithm, estimates are obtained for the structural model relationships (i.e., the path coefficients), which represent the hypothesized relationships among the constructs. The path coefficients have standardized values between − 1 and + 1. Estimated path coefficients close to + 1 represent strong positive relationships (and vice versa for negative values) that are almost always statistically significant (i.e., different from zero in the population). The closer the estimated coefficients are to 0, the weaker the relationships. Very low values close to 0 are usually nonsignificant (i.e., not significantly different from zero).

Whether a coefficient is significant ultimately depends on its standard error that is obtained by means of bootstrapping.

Commonly used critical values for two-tailed tests are 1.65 (significance level = 10%), 1.96 (significance level = 5%), and 2.57 (significance level = 1%). In social science, researchers usually assume a significance level of 5%. This does not always apply, however, since consumer research studies sometimes assume a significance level of 1%, especially when experiments are involved.

On the other hand, when a study is exploratory in nature, researchers often assume a significance level of 10%. Ultimately, the choice of the significance level depends on the field of study and the study's objective.

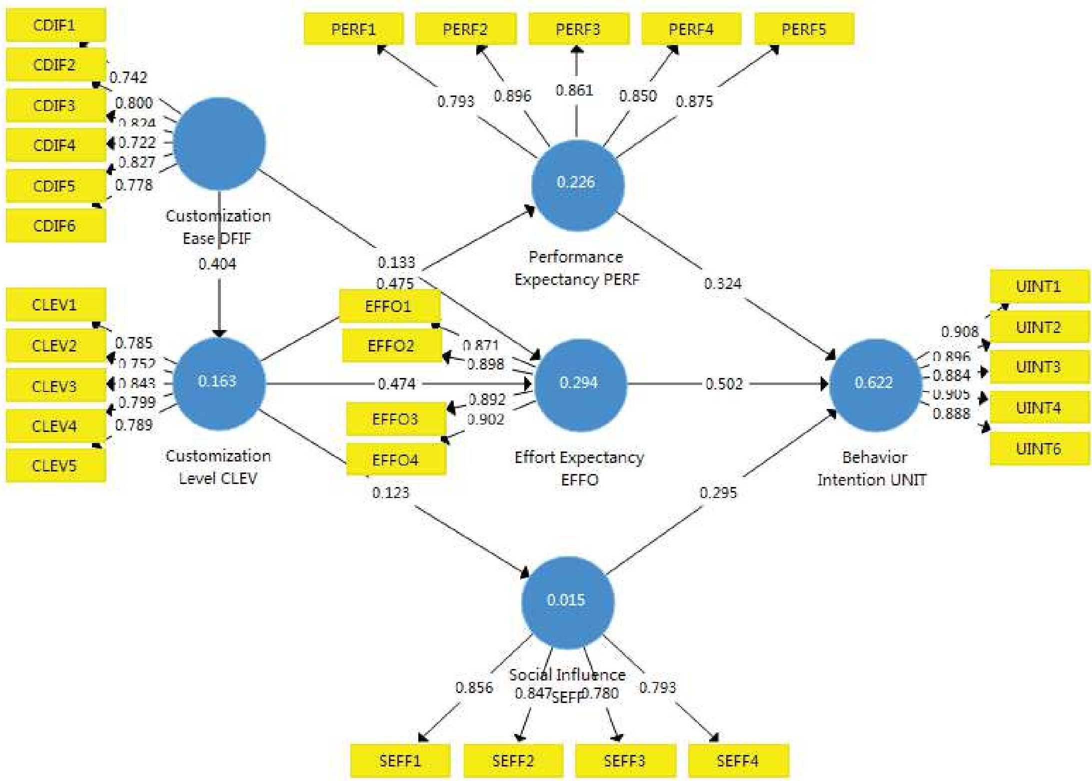


Figure 50.SmartPLS SEM Result

	Behavior Intention	Customization Ease	Customization Level	Effort Expectancy	Performance Expectancy	Social Influence
Behavior Intention						
Customization Ease			0.404	0.133		
Customization Level				0.474	0.475	0.123
Effort Expectancy	0.502					
Performance Expectancy	0.324					
Social Influence	0.295					

Table 45. Path Coefficients

When interpreting the results of a path model, we need to test the significance of all structural model relationships. When reporting results, however, we examine the empirical t value, the p value, or the bootstrapping confidence interval. There is no need to report all three types of significance testing results since they all lead to the same conclusion.

	Path Coefficiency	*t*	*p*
Customization Ease DFIF -> Customization Level CLEV	0.404	8.526	0.000
Customization Ease DFIF -> Effort Expectancy EFFO	0.133	2.784	0.006
Customization Level CLEV -> Effort Expectancy EFFO	0.474	9.455	0.000
Customization Level CLEV -> Performance Expectancy PERF	0.475	10.459	0.000
Customization Level CLEV -> Social Influence SEFF	0.123	2.148	0.032
Effort Expectancy EFFO -> Behavior Intention UNIT	0.502	14.522	0.000
Performance Expectancy PERF -> Behavior Intention UNIT	0.324	8.992	0.000
Social Influence SEFF -> Behavior Intention UNIT	0.295	8.114	0.000

Table 46. Significance of Path Coefficients

As shown in Table 46, all the path are significance. Except for coefficient between ease of customization and effort expectancy (0.133, and p<0.005), and coefficient between customization level social influence (0.123, and p <0.05), all the coefficient with p <0.001.

After examining the significance of relationships, it is important to assess the relevance of significant relationships. The path coefficients in the structural model may be significant, but their size may be so small that they do not warrant managerial attention.

The structural model path coefficients can be interpreted relative to one another. If one path coefficient is larger than another, its effect on the endogenous latent variable is greater. More specifically, the individual path coefficients of the path model can be interpreted just as the standardized beta coefficients in an OLS regression: A one-unit change of the exogenous construct changes the endogenous construct by the size of the path coefficient when everything else (i.e., all other constructs and their path coefficients) remains constant (ceteris paribus; Hair et al., 2010). If the path coefficient is statistically significant (i.e., the coefficient is significantly different from zero in the population), its value indicates the extent to which the exogenous construct is associated with the endogenous construct. Researchers have also proposed formal tests for assessing whether two path coefficients differ significantly in one model (Chin, Kim, & Lee, 2013). Such a test should be used when hypotheses relate to differences in path coefficients in the model, which, however, is rather rarely the case.

And comparatively, for the effect of customization, the Customization Ease DFIF -> Customization Level CLEV is 0.404, Customization Level CLEV -> Effort Expectancy EFFO is 0.474, and Customization Level CLEV -> Performance Expectancy PERF is 0.475. We also noticed that, the direct effect between Customization Ease DFIF -> Effort Expectancy EFFO is very low 0.133, and Customization Level CLEV -> Social Influence SEFF is even lower to 0.123.

Researchers are often interested in evaluating not only one construct's direct effect on another but also its indirect effects via one or more mediating constructs. The sum of direct and indirect effects is referred to as the total effect. Although the direct effect of ease of Customization Ease DFIF -> Effort Expectancy EFFO is very low 0.133, but the total effect (both direct and indirect combined) is quite pronounced (i.e., 0.325) (Table 47). And total effects between Customization Ease DFIF -> Behavior Intention UNIT and Customization Level CLEV -> Behavior Intention UNIT is 0.240 and 0.428 respectively.

	Direct	Indirect effect	Total effect
Customization Ease DFIF -> Behavior Intention UNIT		0.240	0.240
Customization Ease DFIF -> Customization Level CLEV	0.404		0.404
Customization Ease DFIF -> Effort Expectancy EFFO	0.133	0.192	0.325
Customization Ease DFIF -> Performance Expectancy PERF		0.192	0.192
Customization Ease DFIF -> Social Influence SEFF		0.050	0.050
Customization Level CLEV -> Behavior Intention UNIT		0.428	0.428
Customization Level CLEV -> Effort Expectancy EFFO	0.474		0.474
Customization Level CLEV -> Performance Expectancy PERF	0.475		0.475
Customization Level CLEV -> Social Influence SEFF	0.123		0.123
Effort Expectancy EFFO -> Behavior Intention UNIT	0.502		0.502
Performance Expectancy PERF -> Behavior Intention UNIT	0.324		0.324
Social Influence SEFF -> Behavior Intention UNIT	0.295		0.295

Table 47. Direct, indirect and total effects

5.3.2.3. Coefficient of Determination R^2

The most commonly used measure to evaluate the structural model is the coefficient of determination (R^2 value). This coefficient is a measure of the model's predictive accuracy and is the squared correlation of actual and predicted values, it also represents the amount of variance in the endogenous constructs explained by all of the exogenous constructs linked to it. The R^2 value ranges from 0 to 1 with higher levels indicating higher levels of predictive accuracy. It is difficult to provide rules of thumb for acceptable R^2 values as this depends on the model complexity and the research discipline. In scholarly research that focuses on marketing issues, R^2 values of 0.75, 0.50, or 0.25 for endogenous latent variables can, as a rough rule of thumb, be respectively described as substantial, moderate, or weak (Hair, Ringle, & Sarstedt, 2011; Henseler et al., 2009). We will discuss it for our research.

More constructs to explain an endogenous latent variable in the structural model always increases its R^2 value. The more paths pointing toward a target construct, the higher its R^2 value. However, researchers want models that are good at explaining the data (thus, with high R^2 values) but also have fewer exogenous constructs. Such models are called parsimonious.

The adjusted R^2 value can be used as the criterion to avoid bias toward complex models. The value reduces the R^2 value by the number of explaining constructs and the sample size and thus systematically compensates for adding nonsignificant exogenous constructs merely to increase the explained variance R^2.

	R Quare	2.5%	97.5%	*p*
Behavior Intention UNIT	0.622	0.569	0.678	0.000
Customization Level CLEV	0.163	0.095	0.243	0.000
Effort Expectancy EFFO	0.294	0.198	0.384	0.000
Performance Expectancy PERF	0.226	0.142	0.309	0.000
Social Influence SEFF	0.015	0.000	0.053	0.308

Table 48. R Square

Ease of customization to customization level

R^2 for customization level was 0.163, the model indicate a weak levels of explanations for the variances of customization level by ease of customization.

Customization to Performance, Effort expectance & Social influence

R^2 for performance expectancy and effort expectancy is 0.226 and 0.294 respectively, and not significant for social influence. Thus, we assuming customization level and ease of customization can explanation 22.6% and 29.4% of the variance for performance expectancy and effort expectancy. We will discuss it in the next chapter.

PE EE & CL to Behavior intention

R^2 for intention to use is moderate 0.622, and it supports the theory of UTAUT.

5.3.2.4. Effects size f^2

The next criterion measured was the f^2 effect size, the change in the R^2 value when a specified exogenous construct is omitted from the model can be used to evaluate whether the omitted construct has a substantive impact on the endogenous constructs. This measure is referred to as the f^2 effect size. Guidelines for assessing f^2 are that values of 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects (Cohen, 1988) of the exogenous latent variable.

	f Square	P Values	Level of effect
Customization Ease DFIF -> Customization Level CLEV	0.195	0.001	Medium
Customization Ease DFIF -> Effort Expectancy EFFO	0.021	0.195	No
Customization Level CLEV -> Effort Expectancy EFFO	0.266	0.000	Medium
Customization Level CLEV -> Performance Expectancy PERF	0.291	0.000	Medium
Customization Level CLEV -> Social Influence SEFF	0.015	0.328	No
Effort Expectancy EFFO -> Behavior Intention UNIT	0.571	0.000	Large
Performance Expectancy PERF -> Behavior Intention UNIT	0.240	0.000	Medium
Social Influence SEFF -> Behavior Intention UNIT	0.224	0.000	Medium

Table 49. *f* Square

For customization, the effects of ease of customization on customization level is medium, but small on effort expectancy. And customization level have medium effects on performance and effort expectancy with value 0.291 and 0.266 respectively, but very small on social influence.

For the part of model UTAUT, Performance Expectancy PERF -> Behavior Intention UNIT and Social Influence SEFF -> Behavior Intention UNIT are 0.240 and 0.224 respectively at medium level and Effort Expectancy EFFO -> Behavior Intention UNIT has large effect.

So, we conclude that, for ease of customization and customization level,

H1 Customization level has significant influence on performance expectance, the higher customization done, the higher performance expected.

H2 Customization level has significant influence on effort expectance, the higher customization done, the lower effort (easier) expected.

H3 Customization level **does not have** significant influence on social influence.

H4a Ease of customization has significant influence on customization, the easier customization can be done, the higher customization level expected.

H4b Ease of customization **does not have** significant influence on effort expectancy, the easier customization can be done, the lower the effort expected.

For UTAUT model

H6 Performance Expectancy has significant influence on behavior intention

H7 Effort Expectancy has significant influence on behavior intention and intention to use

H8 Social Influence has significant influence on behavior intention and intention to use

5.3.2.6. Blindfolding & Predictive relevance Q^2

In addition to evaluating the magnitude of the R^2 values as a criterion of predictive accuracy, researchers should also examine Stone-Geisser's Q^2 value (Geisser, 1974; Stone, 1974). This measure is an indicator of the model's predictive relevance. It accurately predicts the data points of indicators in reflective measurement models of endogenous constructs and endogenous single-item constructs (the procedure does not apply for formative endogenous constructs). In the structural model, Q^2 values larger than zero for a certain reflective endogenous latent variable indicate the path model's predictive relevance for this particular construct.

The Q^2 value is obtained by using the blindfolding procedure for a ceratin omission distance D. The difference between the true (i.e., omitted) data points and the predicted ones is then used as input for the Q^2 measure.

If the prediction is close to the original value (i.e., there is a small prediction error), the path model has a high predictive accuracy. The prediction errors (calculated as the difference between the true values [i.e., the omitted values] and the predicted values), along with a trivial prediction error (defined as the mean of the remaining data), are then used to estimate the Q^2 value (Chin, 1998). Q^2 values larger than 0 suggest that the model has predictive relevance for a certain endogenous construct. In contrast, values of 0 and below indicate a lack of predictive relevance.

It is important to note that the Q^2 value can be calculated by using two different approaches. The cross-validated redundancy approach, as described in this section, builds on the path model estimates of both the structural model (scores of the antecedent constructs) and the measurement model (target endogenous construct) of data prediction. Therefore, prediction by means of cross-validated redundancy fits the PLS-SEM approach perfectly.

The model's predictive relevance was assessed by inspecting the cross-validated redundancy measure, a blindfolding procedure performed with SmartPLS using the default omission distance of 7 in SmartPLS (Ringle et al., 2005). Evidence of the model's predictive relevance is supported when Q^2 is above zero (Hair et al., 2011). For the respondents, Q^2 was greater than zero. Thus, the results seems to support the predictive relevance of the model.

Step 5: Blindfolding and Predictive Relevance Q2

As checked in Table 50, all Q square are large than 0.

	SSO	SSE	Q² (=1-SSE/SSO)
Behavior Intention UNIT	1,515.000	763.638	0.496
Customization Ease DFIF	1,818.000	1,818.000	
Customization Level CLEV	1,515.000	1,366.653	0.098
Effort Expectancy EFFO	1,212.000	933.256	0.230
Performance Expectancy PERF	1,515.000	1,268.404	0.163
Social Influence SEFF	1,212.000	1,203.292	0.007

Table 50. Q square

5.3.2.7. Effect size of q^2

Similar to the $f2$ effect size approach for assessing R^2 values, the relative impact of predictive relevance can be compared by means of the measure to the q2 effect size, As a relative measure of predictive relevance, values of 0.02, 0.15, and 0.35 indicate that an exogenous construct has a small, medium, or large predictive relevance for a certain endogenous construct.

The final criterion measured was the q^2 effect size of endogenous latent variables. Value range for q^2 effect size is 0.02 (small effect), 0.15 (medium effect), and 0.35 (large effect). The findings revealed that ease of customization and customization level have small to medium effect on predictive relevancy. CLEV-EFFO 0.192, PERF-UNIT 0.145, EFFO-UNIT 3.43, SEFF-UNIT 0.135.

5.3.2.9. Position moderate on CL to PE EE SI

Another important aspect of structural model evaluation is the heterogeneity of observations, which can be a threat to the validity of PLS-SEM results (e.g., Rigdon, Ringle, Sarstedt, & Gudergan, 2011; Ringle, Sarstedt, & Mooi, 2010; Sarstedt, Schwaiger, & Ringle, 2009) because it can distort the results. Researchers often encounter a situation in which different parameters occur for different subpopulations. Because heterogeneity is often present in empirical research, researchers should always consider potential sources of heterogeneity (Hair, Ringle, & Sarstedt, 2011; Hair et al., 2012a), for example, by forming groups of data based on a priori information (e.g., role or experience in our research) and testing separate models for each group.

Moderation describes a situation in which the relationship between two constructs is not constant but depends on the values of a third variable, referred to as a moderator variable. The moderator variable (or construct) changes the strength or even the direction of a relationship between two constructs in the model. Moderation can (and should) be seen as a means to account for heterogeneity in the data (Hair et al., 2013)

When assessing reflective measurement models, the moderator variable must meet all relevant criteria in terms of internal consistency reliability, convergent validity, and discriminant validity.

We examined the moderating effects of Position, and Experience. Each test required splitting the sample into two different groups. The moderation effects of position, and experience were examined individually. Before conducting the PLS-MGA analysis, the researcher assessed the reliability and validity for all items in each group. The composite reliability values exceeded the 0.7 level (Hair et al., 2011; Wong, 2013). The discriminant validity test showed that discriminant validity existed because the square root of the AVE for each latent variable was larger than the correlations among the latent variables (Hair et al., 2011; Wong, 2013).

According to the demographic data, it shows that, 65.3% of the respondents are normal users, and only 4% are both user and decision maker, and 30.7% are decision maker. To check the moderating effect of position, the respondents are categorized into two groups. One group from general user, the remaining respondents are put into the second group. The result in the table below shows that there are significant difference between the two groups, 198 normal users, and 104 decision makers or mangers.

	Path Coefficients (GROUP_ROLE(1.0))	p-Values (GROUP_ROLE(1.0))
Customization Ease DFIF -> Customization Level CLEV	0.424	0.000
Customization Ease DFIF -> Effort Expectancy EFFO	0.100	0.090
Customization Level CLEV -> Effort Expectancy EFFO	0.563	0.000
Customization Level CLEV -> Performance Expectancy PERI	0.541	0.000
Customization Level CLEV -> Social Influence SEFF	0.126	0.056
Effort Expectancy EFFO -> Behavior Intention UNIT	0.449	0.000
Performance Expectancy PERF -> Behavior Intention UNIT	0.367	0.000
Social Influence SEFF -> Behavior Intention UNIT	0.324	0.000
	Path Coefficients Original (GROUP_ROLE(2.0))	**p-Values (GROUP_ROLE(2.0))**
Customization Ease DFIF -> Customization Level CLEV	0.370	0.000
Customization Ease DFIF -> Effort Expectancy EFFO	0.191	0.039
Customization Level CLEV -> Effort Expectancy EFFO	0.290	0.004
Customization Level CLEV -> Performance Expectancy PERI	0.341	0.000
Customization Level CLEV -> Social Influence SEFF	0.127	0.249
Effort Expectancy EFFO -> Behavior Intention UNIT	0.599	0.000
Performance Expectancy PERF -> Behavior Intention UNIT	0.258	0.000
Social Influence SEFF -> Behavior Intention UNIT	0.222	0.001

Table 51. Path coefficients group by roles
and p value (position)

As in Table 52, each group have shown significance in their path coefficients in the two path we are going to measure the moderator effects. Customization Level CLEV -> Effort Expectancy EFFO and Customization Level CLEV -> Performance Expectancy PERF. And as illustrated, there are significant difference between these two groups in path coefficients. In the meantime, there are no other items have significant different with $p < 0.05$.

	Path Coefficients-diff (| GROUP_ROLE(1.0) - GROUP_ROLE(2.0) |)	p-Value (GROUP_ROLE(1.0) vs GROUP_ROLE(2.0))
Customization Ease DFIF -> Customization Level CLEV	0.054	0.304
Customization Ease DFIF -> Effort Expectancy EFFO	0.091	0.804
Customization Level CLEV -> Effort Expectancy EFFO	0.273	0.005
Customization Level CLEV -> Performance Expectancy PERF	0.200	0.018
Customization Level CLEV -> Social Influence SEFF	0.001	0.530
Effort Expectancy EFFO -> Behavior Intention UNIT	0.150	0.975
Performance Expectancy PERF -> Behavior Intention UNIT	0.109	0.076
Social Influence SEFF -> Behavior Intention UNIT	0.102	0.105

Table 52. MGA for groups by role

Thus, we can conclude that,

H5a The influence of Customization level on Performance Expectancy will be moderated by role, such that, the effect will be stronger for Normal User (NU) than Decision Maker (DM)

H5b The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker

H5c The influence of Customization level on Effort Expectancy **will not be** moderated by role.

5.3.2.9. Experience moderate on CL to PE EE SI

To check the moderating effect of experience, we categorized the respondents to two groups for comparison purpose. The demographic information show that, And the respondents have average of 6.21 years of experience. So we broke the data into two groups, one group with 183 of the respondents have experience equal and less than 6 years, and another group with 120 of the respondents have experience equal or longer than 7 years.

The moderating effect of experience was examined using the SmartPLS-MGA method. The results showed that there are not significant difference between the two groups. The result of the MGA analysis is listed in Table 53 below.

	Path Coefficients-diff (| GROUP_ROLE(1.0) - GROUP_ROLE(2.0) |)	p-Value (GROUP_ROLE(1.0) vs GROUP_ROLE(2.0))
Customization Ease DFIF -> Customization Level CLEV	0.026	0.611
Customization Ease DFIF -> Effort Expectancy EFFO	0.166	0.053
Customization Level CLEV -> Effort Expectancy EFFO	0.033	0.379
Customization Level CLEV -> Performance Expectancy PERF	0.076	0.219
Customization Level CLEV -> Social Influence SEFF	0.152	0.119
Effort Expectancy EFFO -> Behavior Intention UNIT	0.061	0.802
Performance Expectancy PERF -> Behavior Intention UNIT	0.032	0.343
Social Influence SEFF -> Behavior Intention UNIT	0.016	0.583

Table 53. MGA for groups by experience

We can see that, the path coefficients do not differ greatly from each other, and the p value is not significant for the two groups.

Thus, we can conclude that,

H6a Experience does not moderate the influence of Customization level on Performance Expectancy

H6b Experience does not moderate the influence of Customization level on Effort Expectancy

H6c Experience does not moderate the influence of Customization level on Social Science

5.3.2.11. Summary of hypothesis

With the findings identified for the structural model, the PLS-SEM analysis revealed that there is no collinearity issues, and showed favorable results for the research model. Based on the outcome, 12 out of the 15 hypotheses were supported. Chapter 6 provides a discussion and the overall findings of the study.

Hypotheses			Validation
H0	Customization level has significant influence on behavioral intention, the higher customization done, the higher behavioral intention to use.	CL has significant positive influence on BI	Yes
H1	Customization level has significant influence on performance expectance, the higher customization done, the higher performance expected.	CL has significant positive influence on PE	Yes
H2	Customization level has significant influence on effort expectance, the higher customization done, the lower effort (easier) expected.	CL has significant positive influence on EE	Yes
H3	Customization level has significant influence on social influence, the higher customization done, the higher social influence expected.	CL has significant positive influence on SI	No
H4a	Ease of customization has significant influence on customization, the easier customization can be done, the higher customization level expected.	CE have significant positive influence on CL	Yes
H4b	Ease of customization has significant influence on effort expectancy, the easier customization can be done, the lower the effort expected.	CE has significant positive influence on EE	No
H5a	The influence of Customization level on Performance Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker	Influence of CL on PE will be stronger for NU than DM	Yes
H5b	The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker	Influence of CL on EE will be stronger for NU than DM	Yes
H5c	The influence of Customization level on Social Influence will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker	Influence of CL on SI will be stronger for NU than DM	No
H6a	Experience does not moderate the influence of Customization level on Performance Expectancy	Experience does not moderate the influence of CL on PE	Yes
H6b	Experience does not moderate the influence of Customization level on Effort Expectancy	Experience does not moderate the influence of CL on EE	Yes
H6c	Experience does not moderate the influence of Customization level on Social Science	Experience does not moderate the influence of CL on SI	Yes

H6	Performance Expectancy has significant influence on behavior intention	PE has significant positive influence on BI	Yes
H7	Effort Expectancy has significant influence on behavior intention and intention to use	EE has significant positive influence on BI	Yes
H8	Social Influence has significant influence on behavior intention and intention to use	SI has significant positive influence on BI	Yes

5.4. CONCLUSION

Prior to beginning any analysis, we validated the data for completeness and accuracy. There is no data missing and very few straight lining issue, because we employed policy via design in the web survey items. We filtered other a few outliers using 3 times standard deviation as suggested. And checked the skewness and kurtosis and found it is within the acceptable level.

After all the data had been collected and validated for completeness, several analysis techniques were used to analyze the data for the research study. All survey items had been validated using factor analysis through exploratory factor analysis (EFA) to determine whether items in the survey represent a specific construct. And then Confirmatory Factor Analysis (CFA) and Partial Leased Squares-Structural Equation Modeling (PLS-SEM) were used for this research and the details explaining this justification are listed in the next section.

After data has been screened, we assessed the unidimensionality of the measurement model. Using SPSS, an assessment of the measurement model was performed through principal component analysis (PCA). The factor rotations, based on an eigenvalue on 1 or scree plots, were satisfactory. 5 factors identified in the initial PCA extraction, and the last component with eigenvalue 0.991, it is close to 1, so instead of relying on the eigenvalue or scree plots approach, six factors were specified a priori for the factor rotations, in line with the six reflectively measured constructs of the study's theoretical framework. And then we identified all the scales have loading higher than 7 on their main structure, except two scales. We deleted the items and confirmed that after they had been deleted, both the VAE and the content validity.

After that, relied on SmartPLS (Ringle et al., 2005), we used CFA to check the factor loading, internal consistency, indicator reliability, and convergent and discriminant validity were analyzed, and we found they are all satisfactory.

For the structural model, the following assessment were processed: assess the model for collinearity issues, access the significance and relevance of the relationships, assess the level of R^2 value, assess the *f* effect size, and assess the predictive relevance of Q^2 and the q^2 effect sizes. And then, we split the samples into two groups separately by position and ERP experience, and employed the SmartPLS MGA to do the group analysis. Totally, there were 14 proposed hypothesis, and it concludes that, 12 hypothesis were supported, and 3 of the 15 hypothesis, 2 related to effect of customization level on social influence and another one for effect of ease of customization on the effort expectancy are not supported. The results and it is significance will be discussed in the next chapter.

CHAPTER 6. DISCUSSION OF RESEARCH

6.0. Introduction

This chapter has for object the discussion of the results of our analysis that we have presented in the previous chapter. The first item will be the subject of the discussion of the analysis of the response rate and of the constitution of our sample. This will allow us in a second point to discuss the results of our univariate analysis. In the third point we are going to discuss the results of the CPA of prime order, as well as the model of measures of constructed of our research model. The first point will be the subject of the discussion of the overall results of the analysis PLS-SEM, in order to put into perspective the validation of our assumptions of research. This chapter will be the opportunity to compare our results to those existing in the literature in order to enhance or extend.

6.1. Response rate & Sample size

Before discussing results of our analysis, we would like to re-emphasize the constraints facing to collect the data needed for the purification of our measurement scales developed and to test the validation of our model of theoretical research. Indeed, the main difficulty lies in the inability to query the whole target population due to its rarity. In effect, for collecting reliable data, it is necessary to target responsible aware of ERP system, specifically should be aware of the ERP customization and can understand the concept of customization in our research domain, which requires a considerable effort.

The study relies on random sampling as an approach for the collection of responses from participants particularly involved in the ERP implementation. Random selection minimizes measurement error, enhance generalizability, while balancing time, cost, and rigor. Random sampling approaches (simple random sampling, stratified random sampling, cluster sampling, and systematic sampling), while easily administered through email, suffers from low survey response rates, compared to non-probability sampling methods (convenience sampling, quota sampling, and purposive sampling), which facilitate face-to-face interactions (Kelley, Clark, Brown, & Sitzia, 2003). In particular, random sampling requires contacting large number of subjects, while stratified, quota, or purposive sampling requires a priori knowledge of population characteristics

As we adopted Sojump's survey response service (SSRS), we didn't get the email list of the audiences. Totally 7052 email sent by the website with a link to the Survey website. And totally 772 samples collected, 310 valid and 462 invalid. The samples in the invalid list are filtered automatically by the verification questions in the questionnaire. Response rate 10.94% (and only 4.4% valid response). The survey approach suffers from low response rates, which are not necessarily indicative of large non-response errors (Tannery et al., 2011).

To improve the validity of the response, firstly, we employed skip logic also known as "conditional branching" into the first 3 questions to validate if the audience has ERP experience, and can understand the conception of ERP customization in our research domain. If they don't, the skip logic will be triggered, the respondent will be judged as unqualified, and he is rejected from answering the questions. And in order to avoid the straight lining issues, we setup two traps questions in the middle of the survey, if the respondent don't read the questions carefully or they are don't know thing about ERP system, their answers are judged as invalid. All these validation questions took effect and 462 samples was judged as invalid, even as the audience declared that they have ERP experience in their personal profile.

To avoid data missing, we make all questions mandatory, and in case of fatigue issues, we limited our survey within 40 questions, and 35 questions for measurement scale. And then, we employed timer on each page, and make sure they are not too quick to tick the answer without carefully read the question.

Before we started the analysis, we employed the rule, z = 3 (3 times standard deviation), samples greater or less than 3 time deviation were deleted. Based on the analysis, 7 outliers were removed from the data, thus, this study included 303 valid cases.

We had employed G*Power 3 (2012) to perform a priori power computations (Kelley et al., 2003), and planned to collect 335 samples based on estimated least R^2 equal to 1, and f^2 0.02. After we run the PLS-SEM analysis, the smallest R^2 is for customization level because it has only one latent variable – ease of customization point to him, and the related effect size f^2 was 0.195, sample size 34 is enough. And effort expectancy, which has two LV point to it, got R^2 0.294, sample size 25 is enough. So after we split the samples, the sample size is large enough. Even we consider about the insignificant path Customization Ease DFIF -> Effort Expectancy EFFO, which f^2 is only 0.021, the power still can reach 81%. Thus we concluded that, the valid sample size is large enough for our research.

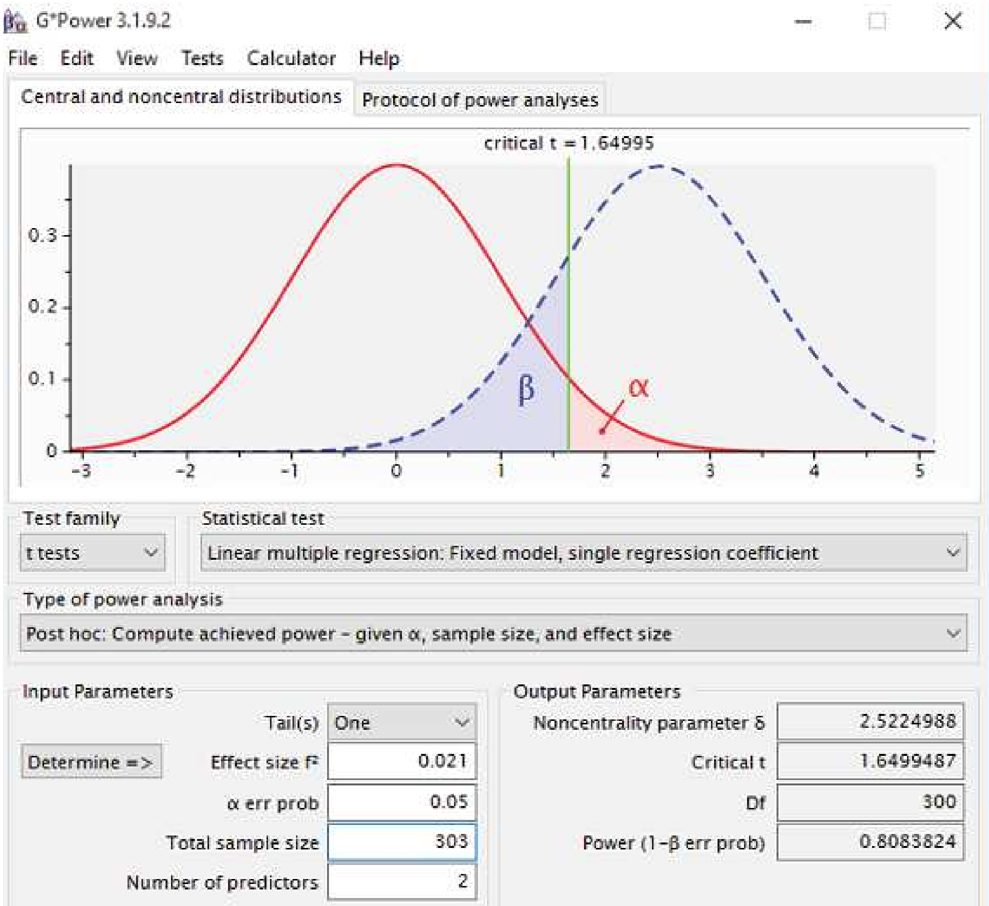


Table 54. Power for sample size

As for the two moderators, position and experience, we divided the samples into two groups for each of them, for positon, we have 198 normal users, and 105 decision makers. And for the groups of experience, 183 respondents with ERP experience less than 6 years, and 120 greater than 7 years. Thus we concluded that, the valid sample size is large enough for our research.

6.2. Univariate analysis descriptive

After all the data had been collected and validated for completeness, several analysis techniques were used to analyze the data for the research study.

Firstly we assessed the unidimensionality of the measurement model. A survey instrument offers an efficient means of collecting data to test hypothetical relationships, based on empirical observations, and operationalization of the constructs relies on items adapted from literatures. As such, adaptation may affect internal validity. The items' discriminant validity, content validity, depends, in part, on the extent of the adaptation of items to the instrument used in this study. In addition, the generalizability of research findings depends, in part, on the effectiveness of the sampling approach. Because the items adopted from different resource, especially for the construct the ease of customization, as we combined the items from two resources, even the research have assessed the validity and reliability of the instrument, we had checked and verified in our research.

Using SPSS, an assessment of the measurement model was performed through principal component analysis (PCA). All survey items had been validated using factor analysis through exploratory factor analysis (EFA) to determine whether items in the survey represent a specific construct. The factor rotations, based on an eigenvalue on 1 or scree plots, were satisfactory. 5 factors identified in the initial PCA extraction, and the last component with eigenvalue 0.991, it is close to 1. So instead of relying on the eigenvalue or scree plots approach, six factors were specified a priori for the factor rotations, in line with the six reflectively measured constructs of the study's theoretical framework. And then we identified all the scales have loading higher than 7 on their main structure, except two scales. We deleted the items and confirmed that after they had been deleted, both the AVE and the content validity increased.

6.3. Multivariate analysis PCA & measurement model PLS-SEM

6.3.1. Validity and reliability of the measurement model

SmartPLS was used to generate the results of Confirmation Factor Analysis, as it provides a valid and reliable means to carry on a CFA analysis (Asyraf & Afthanorhan, 2013). Based on the factor loadings and verified by the AVE, we confirmed two items should be deleted, and all other items are retained. After that, Cronbach's alpha and composite reliability were used to evaluate the internal consistency reliability. All values fell within the acceptable range for both internal consistency reliability methods and establishes reliability for each latent variable. AVE also used to evaluate the convergent validity, and it shows that each group of associated indicators measuring the same domain converged more with their respective constructs than with other constructs measuring different domains. Finally, we checked the discriminant validity via different approaches, the Fornell-Larcker criterion and the cross loadings, and as discussed, we also included the analysis for HTMT because both cross loading and Fornell-Larcker have flaws. The data showed that the discriminant validity was sufficient.

Before we started analyze the structural model, we checked theoretically against the measures to see if they are reflective measurement models as claimed by the authors. We compared the reflective and formative model, and found that the measurement model for both ease of customization and customization level are reflective in nature. We could see the causality is from the construct to its measures. And all the indicators can be viewed as a representative sample of the possible items available within the conceptual domain of the construct. And as checked, all the indicators associated with a particular construct are highly correlated with each other.

6.3.2. The effect of the customization on behavioral intention

As discussed in chapter 2, we found that customization is a must in ERP implementation, acceptance and success, and strategic customization is of critical importance to the company. ERP adoption is an innovation and a complexity excise. Many obstacles faced in ERP implementation, among them, user's acceptance of the new system is a major problem. Two approaches (variance theory and process theory) are commonly used in the literature for study of organizational behavior. Process theory, which are employed to identify ERP stages or phases with considering the events and behaviors, seems helpful to understand when the issues e.g. users' acceptance could happened and how importance the resistance from the users could damper the

ERP adoption. We also used the “ERP Systems Experience Cycle" framework to demo the different levels of business transformation, its related potential performance improvement which is a link between the acceptance of ERP system and the potential performance expectancy.

However, as ERP is a complex system, to avoid the risk and the perception of the companies’ potential long term cost, companies may not interested in customization, especially in project phase. So we assumed that there are more possibly lack of sufficient customization than over customization. To make our research more effective, we are going to build our model based on the UTAUT framework, because of its comprehensiveness and the experiences from the scholars who have employed and extended the UTAUT models. And we also went deep dive on the mandatory of ERP acceptance which is different from the volunteer technology acceptance. Based on these discussion, we proposed to check if and how ease of customization and customization level are going to influence the ERP acceptance behavioral intention. The 3 predictive latent variables (performance expectancy, effort expectancy and social influence) were used as intermediates to measure the effects of customization on behavioral intention in UTAUT model. After that, we presented our hypothesis, and data analysis revealed that, 12 of the 15 hypothesis were supported, two hypothesis related to effect of customization level on social influence is not supported. And direct effect of ease of customization is not significant on effort expectancy. The results and it is significance will be discussed next.

6.3.3. The influence of Customization Level on the Behavioral Intention

One estimate was that 20% of the processes in an organization cannot be modelled in an ERP system without customization (Scott and Kaindl, 20007). It will impact the performance expectancy, effort expectancy and finally impact intention to use the system.

Such misalignments are a serious problem (Berry and Hill 1992). Sia and Soh (2002) categorize ERP misfits as surface (having to do with user interface and the like) or deep structure (fundamental misfit between the model/package and reality) and as pervasive (exogenous, stemming from external sources) or non-pervasive (such as different part numbers in different plants). Misfits that are both deep-structure and pervasive are the most problematic. Clearly many misfits between an ERP configuration and a manufacturing facility are deep structure misfits.

Using customization to solve function misalignment has been suggested by prior work (Rajagopal et al. 2002, Soh et al. 2002)) misalignment was addressed by using two different approaches—non-core and core customization. While the former includes the modification to the interface of an add-on module or a query/reporter writer facility, implementing the latter entails the revision of the base code. (Chou and Chang, 2008)

Since ERP system involves a standardized view on how a business operates and at the same time each business performs its operations uniquely, it is inevitable to involve customization in ERP implementation. From strategic perspective, a competitive advantage cannot be derived solely from a noncustomized, "out-of-the-box" packaged ERP solution, and customization is a must.

However, there are various risks in information system projects, financial, technical, functionality, project and political. Vendors and consultants are keener on helping the project manager to meet the budget and time target than to reap more benefit for business performance. Thus, customization usually had been avoided, and insufficient customization are more common than over customization, even there are propaganda by ERP vendors that, over customization is an issue in ERP implementation.

To approve the theories and the effects of customization on behavioral intention, the first 3 essential hypothesis were:

H1 Customization level has significant influence on performance expectance, the higher customization done, the higher performance expected.
H2 Customization level has significant influence on effort expectance, the higher customization done, the lower effort (easier) expected.
H3 Customization level has significant influence on social influence, the higher customization done, the higher social influence expected.

Based on the analysis in chapter 5, measurement results showed that, the path coefficients which present the direct effect between two variables:

Customization Level CLEV -> Effort Expectancy EFFO is 0.474, and
Customization Level CLEV -> Performance Expectancy PERF is 0.475, and
Customization Level CLEV -> Social Influence SEFF is 0.123

And confirmed by f^2 effect size, which is the change in the R^2 value when a specified exogenous construct is omitted from the model.
Customization Level CLEV -> Effort Expectancy EFFO is 0.266, and
Customization Level CLEV -> Performance Expectancy PERF is 0.291, and
Customization Level CLEV -> Social Influence SEFF 0.015

Both of the two measurement indicators show that, the Customization Level have significant positive influence on Effort Expectancy and Performance Expectancy, at $p < 0.001$ significant level, which is aligned with our discuss in the former chapter that, customization is a must, and apply of customization is of strategic importance to performance and ERP efforts. And it also revealed that, because of risk avoidance, companies are reluctant to implement customization, and the respondents are expecting more customizations, and which may help to improve their ERP use intention.

The hypothesis, Customization level has significant influence on social influence is not supported. The path coefficients is low and the f^2 effect is not significant. As discussed, ERP system is of mandatory nature, and social influence has significant positive influence on behavioral intention. But customization is more technical topic, and normally the decision not to implement customization were made by manager, the respondents may not perceive the direct influence between customization with their social responsibility, or thought the customization itself will not directly impact on how the person around will look at him or expect from him in the ERP acceptance or use.

Ultimately, we need to check the effect of customization on the behavioral intention. It is through the indirect effects value.
Customization Level CLEV -> Behavior Intention UNIT is 0.428. Which is moderate, and support our general hypothesis:

H0 Customization level has significant influence on behavioral intention, the higher customization done, the higher behavioral intention to use. CL has significant positive influence on BI

6.3.4. The influence of Customization Ease on the Behavioral Intention

Brehm et al. (2001) and Ng et al. (2002) discuss complexity as a factor affecting adjustment. When the system or the type of adjustment is too complex, changing of system is generally avoided and vice versa. Complexity highly affects their way of adjustment. It makes the adjustments a lot more difficult to realize, and it is hard to understand and foresee the future consequences of the adjustments in that situation. So, they avoid making changes of the core of the ERP. Nastek also describe complexity about the process of going through all adjustments during maintenance due to this factor.

Adjustment depends on customization possibility, which refers to whether or not the consultant has access to the ERP package code, or development tools provided by vendor (Brehm et al., 2001; Luo & Strong, 2004). Some ERP system have rich tools available for customization, but some others don’t. We took SAP customization as an example, present the ease of customization impact on the vendor and consultants' willing to help the customer to leverage customization to mitigate the misfit issues.

Thus, we proposed two hypothesis and to check if ease of customization have direct influence on customization level and how it will influence the behavioral intention through the other latent variables.

H4a Ease of customization has significant influence on customization, the easier customization can be done, the higher customization level expected. CE have significant positive influence on CL

H4b Ease of customization has significant influence on effort expectancy, the easier customization can be done, the lower the effort expected. CE has significant positive influence on EE

As checked in the analysis, the path coefficients which present the direct effect between two variables:

Customization Ease DFIF -> Customization Level CLEV is at moderate level 0.404 at significant level $p < 0.001$,
Customization Ease DFIF -> Effort Expectancy EFFO at low level 0.133, although significant level $p < 0.01$.

And we check the f^2 effect size, and found that
Customization Ease DFIF -> Customization Level CLEV is 0.195, which is medium effect, and at significant level $p < 0.001$
Customization Ease DFIF -> Effort Expectancy EFFO is very low at 0.021, and $p = 0.195$, and presented there is no significant influence if ease of customize deleted from the model.

And we checked indirect influence of customization ease on the behavioral intention,
Customization Ease DFIF -> Behavior Intention UNIT is 0.241, which is small but significant at $p < 0.001$.

Thus, we concluded that, indirectly, through customization level, ease of customization has small but significant influence on behavioral intention.

6.3.5. The influence of Position as Moderator between CL & PE EE SI

Former study Amoako-Gyampah's(2004) demonstrated that there are significant different perception between Managers and End-users (Position) regarding the critical success factors of the implementation of ERP systems, and Lin et al (2009) approved that.

There are various risks in information system projects, financial, technical, functionality, project and political. Implementation of Enterprise Resource Planning (ERP) systems has been a source of pain for organizations since the inception of ERP software. One of the sources of pain is customization. The decision to or not to customize the system is of complexity. Beyond being a source of pain in implementation, customization affects the organization in an on-going fashion through increased maintenance costs, increased complexity, and less flexibility of the system. For these reasons, many have argued that a "vanilla" implementation, i.e. without customization, is the "best" way to implement ERP systems. However, when business processes in an organization cannot be modeled in an ERP system without customization, the impact of a decision to not customize becomes relevant. All customizations are not created equal, and a certain type of customization is beneficial. Specifically, strategic customizations will enhance the IT infrastructure strategic alignment with the business strategy. Non-strategic customization, such as consistency customization, will impact the system agility of the corporation.

Decision makers in the organizations may make a decision not to customize, only to be forced to customize after implementation when a serious strategic threat to the organization manifests (Gattiker and Goodhue, 2002). Following from this, one can conclude that regular employees or normal users are more concerned with the importance, availability, relevance, format, and timeliness when evaluating ERP success, while management employees are concerned with the project budget and timeline, as normally these are the evaluation criteria for ERP project itself.

There were 3 hypothesis came from these analysis,

H5a The influence of Customization level on Performance Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker Influence of CL on PE will be stronger for NU than DM

H5b The influence of Customization level on Effort Expectancy will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker Influence of CL on EE will be stronger for NU than DM

H5c The influence of Customization level on Social Influence will be moderated by role, such that, the effect will be stronger for Normal User than Decision Maker Influence of CL on SI will be stronger for NU than DM

We split the samples into two group, normal users and decision makers, and compared the path coefficients and measured the significance of the difference:

Customization Level CLEV -> Effort Expectancy EFFO has difference of 0.273 with $p = 0.005$
Customization Level CLEV -> Performance Expectancy PERF has difference of 0.200 with $p < 0.05$
Customization Level CLEV -> Social Influence SEFF has difference 0.001 and don't have significant difference at $p = 0.53$.

Thus, we concluded that, position do have influence on the perception of intention to use, although overall the respondents expect to have more customization, but the normal user have stronger expectancy that, the more customization, the stronger they have behavioral intention. And the company decision makers, who need to balance the benefit of the system and the budget and timeline of the project itself, are more cautious, and have relatively lower perception on this conception.

6.3.6. The influence of Experience as Moderator between CL & PE EE SI

In UTAUT model, (Venkatesh et.al. 2003) identifies four key moderating variables (experience, voluntariness, gender, and age). For the time limitation, we don't want to check and verify if these four variables behavior the same in our model. However, experience is of interest in our model.

In the former literatures, the effects normally stronger for none or less experienced users. The role of experience was empirically examined using a cross-sectional analysis by Davis et al. (1989). In contrast, Karahanna et al. (1999) found that attitude was more important with increasing experience, while subjective norm became less important with increasing experience. Within TAM2, subjective norm was salient only in mandatory settings and even then only in cases of limited experience with the system (i.e., a three-way interaction). The effect of subjective norm was more salient for women in the early stages of experience (i.e., a three-way interaction). And it was found that he determinants of intention varied over time, with some determinants going from significant to nonsignificant with increasing experience.

On the contrary, several process models (Markus and Tanis 1999; McAfee 2002; Ross and Vitale 2000) suggest that ERP impacts on the organization may improve with time. A survey by CIO Magazine (Cosgrove Ware 2003) suggests that most companies do not achieve the anticipated benefits after one year, but the majority do reap them beginning in the second year. In general, it appears that companies (and the subunits that make up those companies) may experience a performance dip initially after implementation (Ross and Vitale 2000). However, often performance improves thereafter. Therefore, in a plant within an ERP implementation, greater time elapsed since ERP implementation is associated with greater coordination improvements of ERP accrued to that plant, and in a plant within an ERP implementation, greater time elapsed since

ERP implementation is associated with greater task efficiency improvements of ERP accrued to that plant. (Gattiker 2005).

In our research, we assuming that, the more experienced users have stronger perception that, the customization will increase their performance and effort expectance. And in the meantime, as approved by former authors, some determinants going from significant to nonsignificant with increasing experience.

Thus, we found that, they are mixing factors in the effects of experience on the behavioral intentions, some of them increase the influence and some decrease the influence in the opposite site, we assumed that:

H6a Experience does not moderate the influence of Customization level on Performance Expectancy Experience does not moderate the influence of CL on PE
H6b Experience does not moderate the influence of Customization level on Effort Expectancy Experience does not moderate the influence of CL on EE
H6c Experience does not moderate the influence of Customization level on Social Science Experience does not moderate the influence of CL on SI

We do the similar analysis using SmartPLS MGA by splitting the samples into two groups, and check the significance of the path coefficients difference, and the results revealed that, difference between:
Customization Level CLEV -> Effort Expectancy EFFO is small at 0.033 and no significance at p=0.379
Customization Level CLEV -> Performance Expectancy PERF is small at 0.076 and no significance at p= 0.219
Customization Level CLEV -> Social Influence SEFF is low at 0.152 and no significance at p=0.119

It concluded and verified our hypothesis that, experience is not significantly moderate the effect between customization and performance expectancy, effort expectancy and social influence.

6.5. CONCLUSION

In this chapter, first we re-emphasize the constraints facing to collect the data, and all the measures taken for the purification of our measurement scales. And how we leverage the benefit of survey tool to improve the quality of response, and the data collected. After the valid samples being confirmed, we checked the required sample size, and assure that, we have collected sufficient response to guarantee our research.

Secondly, we assessed the unidimensionality of the measurement model, and checked if the adopted survey instrument offers an efficient means of collecting data to test hypothetical relationships. We found that, the scales for 4 latent variables adopted from UTAUT, and the items adopted for measuring ease of customization and customization level are all valid and reliable.

Then based on the data analysis using SmartPLS PLS-SEM, we discussed the result of hypothesis and the theoretical relevance. And found that, the general hypothesis is supported by our research and we had a try to explain the variance in the results of the 3 hypothesis which were not supported by the data.

GENERAL CONCLUSION

7.0. Introduction

This chapter provides an overall summation of the findings, contribution to research, limitations, future research and finally a conclusion to the research study. The purpose of this research study was to identify if customization is one of the key determinants of ERP acceptance, and tried to answer the questions raised in the beginning of the research.

7.1 Reminder of the framework of the search

While most studies analyze implementation at an organization or industry level, there is a dearth in research in ERP system adoption at the individual or user level. (Bagchi et al. 2003) Practitioners generally evaluate systems not only to predict acceptability but also to diagnose the reasons underlying lack of acceptance and to formulate interventions to improve user acceptance.

Since ERP system involves a standardized view on how a business operates and at the same time each business performs its operations uniquely, it is inevitable to involve customization in ERP implementation. From strategic perspective, a competitive advantage cannot be derived solely from a noncustomized, "out-of-the-box" packaged ERP solution, and customization is a must.

However, there are various risks in information system projects, financial, technical, functionality, project and political. Vendors and consultants are keener on helping the project manager to meet the budget and time target than to reap more benefit for business performance. Thus, customization usually had been avoided, and insufficient customization are more common than over customization, even there are propaganda by ERP vendors that, over customization is an issue in ERP implementation.

Nowadays, the researcher wants to be able to measure the nature and extent of package tailoring as an independent variable that predicts or explains success. Practitioners want to know how much and what kinds of tailoring pose a threat to project success. At present, however, the literature makes only the most basic distinction between ERP packages that have merely been "configured" and ERP packages that have been "modified" is an exception.

We are going to fill the gap, try to identify if the characters of customization impact the ERP acceptance or behavioral intention to use the system.

7.2 Synthesis of research work

This research is at an exploratory level as customization and ERP adoption is a relatively new concept and only a little empirically supported research is available. Using web survey and quantitative research method, it is a trial to produce generalizable results, and it is a valuable insight into the ERP adoption research.

In this sense, research on how customization level and the ease of customization can influence the ERP acceptance or behavioral intention. Based on literature review, and theoretical analysis, and check if the Customization Level (CL) and Ease of Customization (CE) directly influence Performance Expectancy (PE), Effort Expectancy (EE), and/or Social Influence (SI) in extended UTAUT model. We proposed 15 hypothesis, with objective to answer the research questions.

To what extent the customization level can improve the behavior intention?
Had the companies done sufficient customization in China?
Is over customization really a problem in ERP implementation in China?
To what extent the customization level can improve the performance expectancy?
To what extent the customization level can improve the effort expectancy?

To what extent the customization level can improve the social influence?
To what extent the ease of customization can improve the performance expectancy? Is direct effect, or through customization level?
To what extent the ease of customization can improve the effort expectancy? Is direct effect, or through customization level?
To what extent the ease of customization can improve the effort expectancy? Is direct effect, or through customization level?
Will the user with different position (decision maker or general user) have different perception on the customization's influence?
Will the user with different level of ERP experience have different perception on customization?

All the question got answers in the hypothesis and in discussion of research of chapter 6.

7.3. Inputs from research

This research aims to examine the influence of selected factors (customization) on end-user's usage of ERP systems. Implications to both the research community and practitioners will result from this study to have a better understanding of the impact of choices in levels of customization.

The aim of this paper is to check if we can evaluate the roles of customization use existing theoretical models in ERP implementation and facilitate organizations in diagnosing if customization can be helpful in achieving the expected objective. The outcome of the research could be to facilitate organizations in understanding the main contributors to end-user usage of ERP systems, to enable them to take necessary corrective actions to enhance end-user's ERP usage. A research model is proposed using factors identified from the literature review.

The goals of this study were to understand the customization as a factor that contribute to ERP system success at the individual level.

7.3.1. Theoretical Input

Due to the large scope of the ERP system and its tight link to business practices, any mismatches between organizational requirements and the processes supported by the system can be highly disruptive to an organization's operations. A lack of system-to-business fit in critical parts of the organization can lead to negative business outcomes (Gattiker & Goodhue, 2002; Harris, 2000; Stedman, 2000).

Enterprise Resource Planning (ERP) systems customization has been a source of pain for organizations since the inception of ERP software. Beyond being a source of pain in implementation, customization affects the organization in an on-going fashion through increased maintenance costs, increased complexity, and less flexibility of the system. For these reasons, many have argued that a "vanilla" implementation, i.e. without customization, is the "best" way to implement ERP systems.

In our research, based on literature review, we concluded that customization is a must in ERP implementation, acceptance and success, and strategic customization is of critical importance to the company. ERP adoption is an innovation and a complexity excise. To avoid the risk and the perception of the companies' potential long term cost, companies may not interested in customization, especially in project phase. So we assumed that there are more possibly lack of sufficient customization than over customization. Based on these discussion, we proposed 15 hypothesis to check if and how ease of customization and customization level are going to influence the ERP acceptance behavioral intention. The data analysis revealed that, 12 of the 15 hypothesis were supported, and the general hypothesis that, customization level has significant influence on behavioral intention, the higher customization done, and the higher behavioral intention to use was supported.

And as suggested by Brehm et al. (2001) and Ng et al. (2002) that complexity was a factor affecting adjustment, when the system or the type of adjustment is too complex, changing of system is generally avoided and vice versa. We proposed that, ease of customization has positive and significant influence on behavioral intention. And it was supported by our model analysis.

Another contribution to the ERP customization is that, position also impact on the behavioral intention. Act as a moderator, we found that, decision makers are more concern about budget and timeline of the project especially in the project implementation phase, are more cautious, and have relatively lower perception on effect of customization level on the performance and effort expectancy. After that, we checked moderator effect for experience as well, and verified our hypothesis that, the effect is not significant in the relationship between customization and performance expectancy, effort expectancy and social influence, because there are mixing factors in the effects of experience on the behavioral intentions, some of them increase the influence and some decrease the influence in the opposite site,

7.3.2. Methodological Inputs

There are three main contribution of our research in methodological area.

First, we mobilized the survey and attempted to generalize findings to all ERP users. As the audience must have ERP and customization experience, we leverage the benefit from the online survey to strengthen the quality of our samples.

Second, it is the first time, we extended UTAUT model and combined the constructs of customization and formed a new research framework.

Third, we employed the SmartPLS PLS-SEM, which is able to handle complex model with small sample size and extremely non normal data distribution. And it is similar capability to CB-SEM when the sample size is large enough.

7.3.3. Managerial Inputs

Many organizations reported success in implementing their ERP systems; however, Iskanius (2010) estimated the failure rate of ERP systems to be as high as 70%. Given the high failure rate, top management has come to realize that achieving ERP success is a very complex task.

Since exhortations against customization are plentiful in industry and academia (e.g., Pereira 1999). Note, however, it is important to know whether this benefit of customization outweighs the initial and ongoing IT costs related to programming, potential future upgrade difficulties, and other risks.

Realizing the high promise of ERP systems comes at a potentially high cost, as the transition to ERP is neither easy nor quick. The out-of-pocket costs of software, consultants, and staff training are considerably higher for ERP than for most system projects. It is common for companies to spend more than $100 million to implement an ERP system (Dornheim, 1999 and Miranda, 1999), especially when they implement multiple modules across multiple divisions. Moreover, ERP investments are risky because organizations often adjust slowly to ERP's inherently complex software. ERP projects often experience escalating budgets (Schneider, 1999), and approximately one-half of all ERP projects.

As found in our research, because of the various risks in information system projects, financial, technical, functionality, project and political. Vendors and consultants are keener on helping the project manager to meet the budget and time target than to reap more benefit for business performance. Thus, customization usually had been avoided, and insufficient customization are more common than over customization. It is a reminder for companies that, right level of customization should be achieved instead of avoiding customization.

So normally, there is a trade-off in decision whether or not how much customization should be done or when to do the customization. From a strategic alignment standpoint, a clear link is desirable between strategic business goals and the specialization of business assets. Thus, customizations should be linked to strategic business goals, and only higher strategic important customization should be included in the project when there is limitation in budget and time, which is normal in ERP project implementation. If it is not appropriate to do the customization in the project implementation phase, an alternative is to do more customization after go live, in the post implementation phase.

As discussed, the capability of customization is an important factor in our model, and it has significant influence on the ERP acceptance. So the company should evaluate the customization feasibility of the ERP system, and should emphasize on the customization knowledge and skill of the vendors or the consultants, as it is important for customization realization.

Another finding revealed that, normal users have stronger expectancy in more customization to increase their ERP acceptance, it is valuable to explain to the users, which type of customization is strategic, and which one is for consistency purpose which could jeopardize the real benefit of ERP system. And if there are limited resource to implement the customization in ERP implementation phase, a plan for future system enhancement or customization should be prepared and let the users be aware about it will be helpful for them to buy in existing system. It will ultimately improve the system success ratio.

7.4. Limitations of the research

Although this study has proven to provide a contribution to the ERP customization and acceptance research, there are several limitations to that may need to be addressed.

7.4.1. Methodological Limitations

The study faces limitations, due, in part, to the possibility of non-response bias (NRB) and common method bias (CMB). NRB results from the nonparticipation of subjects in the survey. Nonparticipation results in response misrepresentation, which limits external validity. Mitigation approaches to NRB include the application of careful survey design to research objectives, captivating messages to potential respondents, and persuasive approaches to gatekeepers (Urbach et al., 2010). In contrast, with CMB, the same data collection method tends to inflate or deflate correlations, due to correlations among item specific errors (Ylitalo, 2009). Mitigation approaches include procedural tactics (e.g., enhanced anonymity and minimal ambiguity) as well as statistical options (e.g., Harman's single-factor test and marker variable test). The marker variable test was not performed in this study, due to the exploratory nature of the research. Thus, this study suffers from NRB and CMB limitations, since adoption of Sojump's survey response service (SSRS) limits control of a priori mitigation procedures.

Another limitation in this research is that, we only adopted part of the UTAUT model in our research, facilitating conditions and use behavior were omitted. Even though we assumed the behavioral intention is an accurate predictor for use behavior, we still missed the chance to check if customization level lead to actual ERP acceptance or use behavior.

The last limitation as we know is that, to mitigate the survey fatigue issue, we omitted a few questions on demographic information, such as gender and age. Which was approved to act as moderator in the effects to behavior intention, and may behave different in our research domain.

7.4.2. Conceptual Limits

Although this research explained here that, ERP customization is an important factor for ERP acceptance, and strategic customization is of critical importance for the company performance. So far, customization implemented is less than desired. But as discussed, customization is a complex task and many factors influence the decision on customization. And there are different types of customization, too much consistency customization could result in over budget, ignore of process improvement and ultimately could jeopardize the business performance or even lead to the failure of ERP project. We could neither find the way in our research to identify the different type of customization, nor able to find the right level of desired customization.

7.5. Prospects and future research

7.5.1. At the methodological level

Future work should be able to identify and assess the impacts of the different type (strategic and consistency) of customization, and help in improving ERP implementation decision effectiveness.

Another consideration for future research is to encompass risk as a factor relevant to ERP customization decision, and check if and how risk is acting as a moderator or mediator in the research model.

7.5.2. At the conceptual level

Future work can investigate and find the tool to help managers to predict the level of desired customization, and achieve the maximized business performance by aligning business process to the best practice and in the meantime achieve the cooperate strategic competence by maximize the unique business functions via desired customization.

As depicted in Figure 51, desired customization is mapped to desired level of functions. Over customization will bring about higher cost and no sufficient business process improvement, and comparatively, under customization means insufficient system function, and company usually change business process to fit the system.

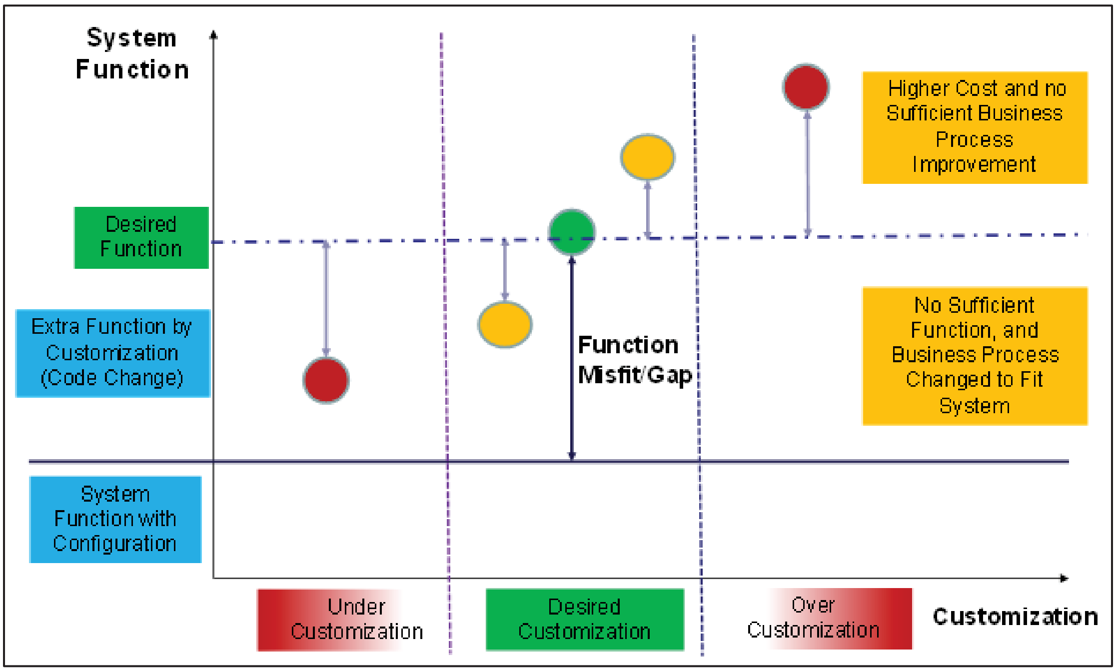


Figure 51. Scope of Desired-Customization

And if desired customization level can be identified, the maximum achievement of business performance and ERP acceptance may also be measured as depicted in Figure 52.

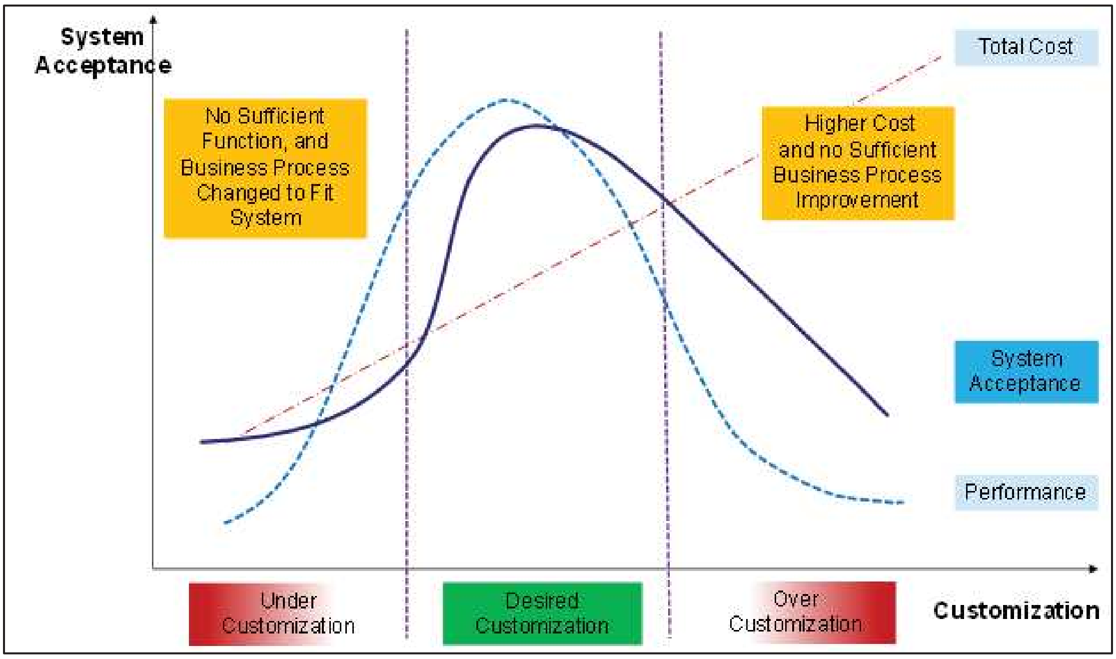


Figure 52. Pattern of Desired-Customization

The findings of the study will be useful for ERP consultant, vendors and adopting organizations. And can act as guiding principles for the choice of right ERP customization.

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ANNEX

4.1. Web Survey Questionnaire

ERP客制化（二次开发）问卷调查

您好！
感谢您在百忙之中抽出时间参与本次调查。
本问卷是针对ERP项目实施及后续使用中，所进行的客制化开发以及对ERP系统接受程度的影响进行的调查。
如果您对最终的研究结果感兴趣或者对问卷本身有任何建议，请发送邮件到 phd1360139000@163.com。 在研究结果出来后，会给您发送研究模型及结果报告。如果您的建议被采纳，将额外酬谢。
本问卷为匿名问卷，您的回答仅应用于本次学术研究，不会用于其它用途，没有其它商业目的。另外，您的部分个人信息，如IP地址和所在地区，可能被用来作为统计分析数据使用，本人无法对其它原因造成的此部分信息泄露承担责任，如果您对此有所顾虑，请放弃对此问卷做答。
问卷问题没有标准答案，您在回答问卷时，请选择最接近您个人经验和真实想法的答案。
再次感谢您的协助！
2016年6月

ERP客制化开发基本概念 *

	不清楚	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
1. ERP是指企业资源计划软件或企业信息管理系统。据我了解，ERP是打包销售的模块化软件，有配置功能，但无法在现有软件基础上进行功能增强或二次开发	○	○	○	○	○	○	○	○
2. ERP软件因为功能本身不能完全满足公司的业务需求，可能需要进行客制化(定制化)开发或二次开发	○	○	○	○	○	○	○	○
3. ERP客制化或二次开发不是指软件本身的配置功能，而是指“用户出口 User Exit”、“功能增强 Enhancement“或“程序插件 Plugin”，包含程序代码改变，一般会有程序员的参与	○	○	○	○	○	○	○	○

下一页

ERP客制化（二次开发）问卷调查

我公司ERP系统客制化(二次开发) *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
4. 为了使ERP软件适合我们公司自身的特点，我们的系统经过了修改(二次开发)。(如果您有多个ERP项目实施或系统使用经验，请以最熟悉或参与最多的为例)							
5. 我们的ERP项目实施以及所做的二次开发是针对公司本身业务需要进行的							
6. 公司里的员工提出了一些特定的业务需求，部分增强的功能得到了实现							
7. 我所使用的是ERP系统，只提供标准功能(包含配置功能)，没有为我们公司自身特殊要求做相应改动(功能增强或二次开发)							
8. 因为我们公司自身特殊要求，在ERP系统实施及后续使用时，系统做了相应改动(二次开发)							

我公司客制化(二次开发)的简易程度和弹性 *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
9. 为了适应业务需求，我们的ERP系统可以做相应更改或增强，功能增强或开发其他功能本身是容易的							
10. 与别的ERP系统相比，我所使用的ERP相对比较容易修改或进行二次开发							
11. 我们公司的ERP系统可以被修改并进行新功能开发，以适应公司在不同国家和不同工厂，以及不同业务流程的需要							
12. 我们的ERP系统能够与公司的其它信息系统兼容并进行集成							
13. 与别的ERP系统相比，我们使用的ERP系统能够或更方便与其它系统交换信息							
14. 我们的ERP系统能够与公司其它软件系统交换信息							
15. 公司的ERP系统能够与部署在不同地区，提供不同功能的软件交换信息，并与公司的业务伙伴通过系统集成协同工作							

下一页

ERP客制化（二次开发）问卷调查

我公司ERP系统客制化(二次开发) *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
4. 为了使ERP软件适合我们公司自身的特点，我们的系统经过了修改(二次开发)。(如果您有多个ERP项目实施或系统使用经验，请以最熟悉或参与最多的为例)							
5. 我们的ERP项目实施以及所做的二次开发是针对公司本身业务需要进行的							
6. 公司里的员工提出了一些特定的业务需求，部分增强的功能得到了实现							
7. 我所使用的是ERP系统，只提供标准功能(包含配置功能)，没有为我们公司自身特殊要求做相应改动(功能增强或二次开发)							
8. 因为我们公司自身特殊要求，在ERP系统实施及后续使用时，系统做了相应改动(二次开发)							

我公司客制化(二次开发)的简易程度和弹性 *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
9. 为了适应业务需求，我们的ERP系统可以做相应更改或增强， 功能增强或开发其他功能本身是容易的							
10. 与别的ERP系统相比，我所使用的ERP相对比较容易修改或进行二次开发							
11. 我们公司的ERP系统可以被修改并进行新功能开发，以适应公司在不同国家和不同工厂，以及不同业务流程的需要							
12. 我们的ERP系统能够与公司的其它信息系统兼容并进行集成							
13. 与别的ERP系统相比，我们使用的ERP系统能够或更方便与其它系统交换信息							
14. 我们的ERP系统能够与公司其它软件系统交换信息							
15. 公司的ERP系统能够与部署在不同地区，提供不同功能的软件交换信息，并与公司的业务伙伴通过系统集成协同工作							

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ERP客制化（二次开发）问卷调查

公司ERP软件性能和对我工作起到的作用 *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
16. 我发现公司的这个ERP系统对我的工作更有帮助							
17. 公司这个ERP系统使我的工作完成得更快							
18. 使用公司的这个系统提高了我的工作效率							
19. 使用公司的这个ERP系统，我能够获得更多的提升机会							
20. 公司的ERP系统项目实施和后续使用与我没有任何关系							

使用公司的ERP系统对我工作量的影响 *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
21. 我了解如何使用公司的ERP软件，也能够理解软件所实现的功能							
22. 我很快就能够熟练使用这个ERP系统							
23. 我觉得我们公司的这个ERP软件相对更容易使用							
24. 学习如何使用这个ERP软件是比较容易的							

社会因素对我使用公司ERP系统的影响 *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
25. 那些对我的行为有影响的同事及家人认为，我更应该在工作中使用这个ERP系统							
26. 那些对我而言重要的人认为，我应该使用这个系统							
27. 我在ERP项目实施和软件使用当中，得到了公司高级管理人员的支持和帮助							
28. 总体而言，到目前为止公司一直支持这个系统的使用							

未来我对使用公司这个ERP系统的意向 *

	非常不同意	不同意	稍微不同意	中立	稍微同意	同意	非常同意
29. 预计在未来的几个月里我将会继续使用这个ERP系统							
30. 即使可以选择，未来的若干个月内我也不会改变，还是会继续使用这套系统							
31. 我愿意或倾向于在以后的几个月里继续使用这个系统							
32. 我计划和打算在未来的若干个月里，继续使用这个系统							
33. 如果可以选择，我准备在未来的若干个月里继续使用这个系统							
34. 我不愿意继续使用这套系统，除非可以增强或修改这套系统							

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ERP客制化（二次开发）问卷调查

35. 我希望有机会在未来的几个月里使用ERP系统，因为目前我没有ERP系统的使用或项目经验 *

◎ 是	◎ 否

36. 我所使用的ERP 软件或公司名称(如果选其它，请提供ERP软件名称) *

◎ Activant	◎ Adonix	◎ BAAN	◎ JDE
◎ Consona Corp	◎ Epicor	◎ Exact	◎ IFS
◎ Infor	◎ Lawson	◎ Microsoft Dynamic	◎ NetSuit
◎ Oracle	◎ QAD	◎ SAP	◎ SAGE
◎ Visibility	◎ Window7	◎ Window8	◎ 安易
◎ 北极星	◎ 并捷	◎ 博科	◎ 鼎新
◎ 和佳	◎ 金蝶	◎ 金航联	◎ 金思维
◎ 金算盘	◎ 经纬	◎ 科思	◎ 浪潮
◎ 利玛	◎ 启明	◎ 沈鼓北方	◎ 速达
◎ 统率	◎ 天思	◎ 天心	◎ 万达宝
◎ 新中大	◎ 易飞	◎ 用友	◎ 有利
◎ 其他 请注明... *			

37. 我的ERP经验年限(年) *

◎ 0	◎ 1	◎ 2	◎ 3	◎ 4
◎ 5	◎ 6	◎ 7	◎ 8	◎ 9
◎ 10	◎ 11	◎ 12	◎ 13	◎ 14
◎ 15	◎ 16	◎ 17	◎ 18	◎ 19
◎ 20	◎ 21	◎ 22	◎ 23	◎ 24
◎ 25	◎ 26	◎ 27	◎ 28	◎ 29
◎ 30	◎ 40	◎ 50		

38. 我在ERP项目实施、后续使用，或者功能增强以及开发中的角色 *

◎ 使用者

◎ 决策者

◎ 既是使用者也是决策者

39. 我公司所在的行业(如果选其它，请提供行业名称) *

○ 机构组织	○ 农林牧渔	○ 医药卫生	○ 建筑建材
○ 冶金矿产	○ 石油化工	○ 水利水电	○ 交通运输
○ 信息产业	○ 机械机电	○ 轻工食品	○ 服装纺织
○ 专业服务	○ 安全防护	○ 环保绿化	○ 旅游休闲
○ 办公文教	○ 电子电工	○ 玩具礼品	○ 家居用品
○ 物资	○ 包装	○ 体育	○ 办公
○ 其它 请注明... *			

40. 我公司的年营业收入 *

○ 低于100万人民币

○ 介于100万-1000万人民币之间

○ 介于1000万-1亿人民币之间

○ 介于1亿-10亿人民币之间

○ 介于10亿-100亿人民币之间

○ 高于100亿人民币

提交答卷

问卷星 提供技术支持

4.2 Summary survey questionnaire English and Chinese

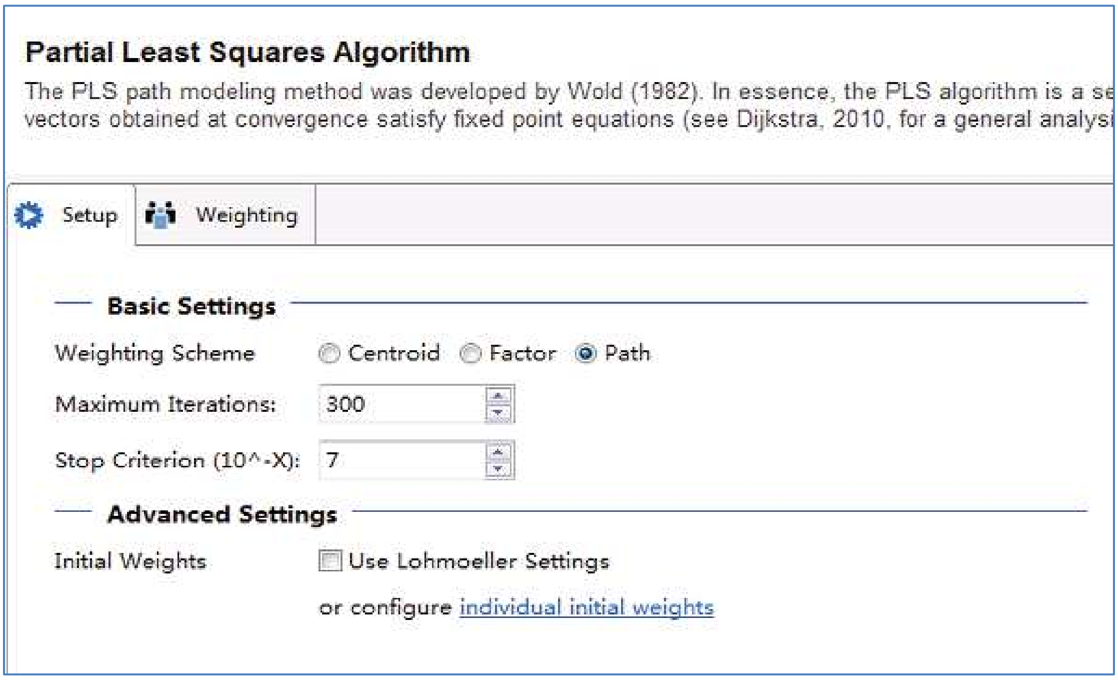
Variable	Item	Verify Item	Code	Questionnaire Items	Variable (Chinese)	Questionnarie Items(Chinese)
ERP & Customization Definition	0.1.1	X	V0.1.1_CDEF1	ERP is referring to enterprise resourcing planning software or enterprise information management system. As I know, ERP is modulized and packaged software, has Configuration function, but can't do enhancement, customized development or code change	ERP 客制化开发基本概念	ERP 是指企业资源计划软件或企业信息管理系统。据我了解，ERP 是打包销售的模块化软件，有配置功能，但无法在现有软件基础上进行功能增强或二次开发
	0.1.2	X	V0.1.2_CDEF2	ERP software possibly required Customized development or code change		ERP 软件因为功能本身不能完全满足公司的业务需求，可能需要进行客制化(定制化)开发或二次开发
	0.1.3	X	V0.1.3_CDEF3	ERP customization or code change is not software configuration, it is refer to User exit, Enhancement or plugin, including program code change, normally need participation of programmer		ERP 客制化或二次开发不是指软件本身的配置功能，而是指"用户出口 User Exit"、"功能增强 Enhancement "或"程序插件 Plugin"， 包含程序代码改变，一般会有程序员的参与
Customization Level	1.1.1	CLEV1	V1.1.1_CLEV1	The ERP system was altered to improve its fit with the organization(If you have more than one ERP project or usage experience, please use the one you most familiar with or the one you have been involved most)	我公司 ERP 系统客制化(二次开发)	为了使 ERP 软件适合我们公司自身的特点，我们的系统经过了修改(二次开发)。(如果您有多个 ERP 项目实施或系统使用经验，请以最熟悉或参与最多的为例)
	1.1.2	CLEV2	V1.1.2_CLEV2	The ERP implementation (or modification) team was responsive to the needs of the organization		我们的 ERP 项目实施以及所做的二次开发是针对公司本身业务需要进行的
	1.1.3	CLEV3	V1.1.3_CLEV3	Individuals from this organization had a great deal of influence on how the ERP system was set up		公司里的员工提出了一些特定的业务需求，部分增强的功能得到了实现
	1.1.4	CLEV4	V1.1.4_CLEV4	A standard version of the ERP software was implemented (or modified) and used without changes being made to fit the particular requirements of this firm		我所使用的是 ERP 系统，只提供标准功能(包含配置功能)，没有为我们公司自身特殊要求做相应改动(功能增强或二次开发)

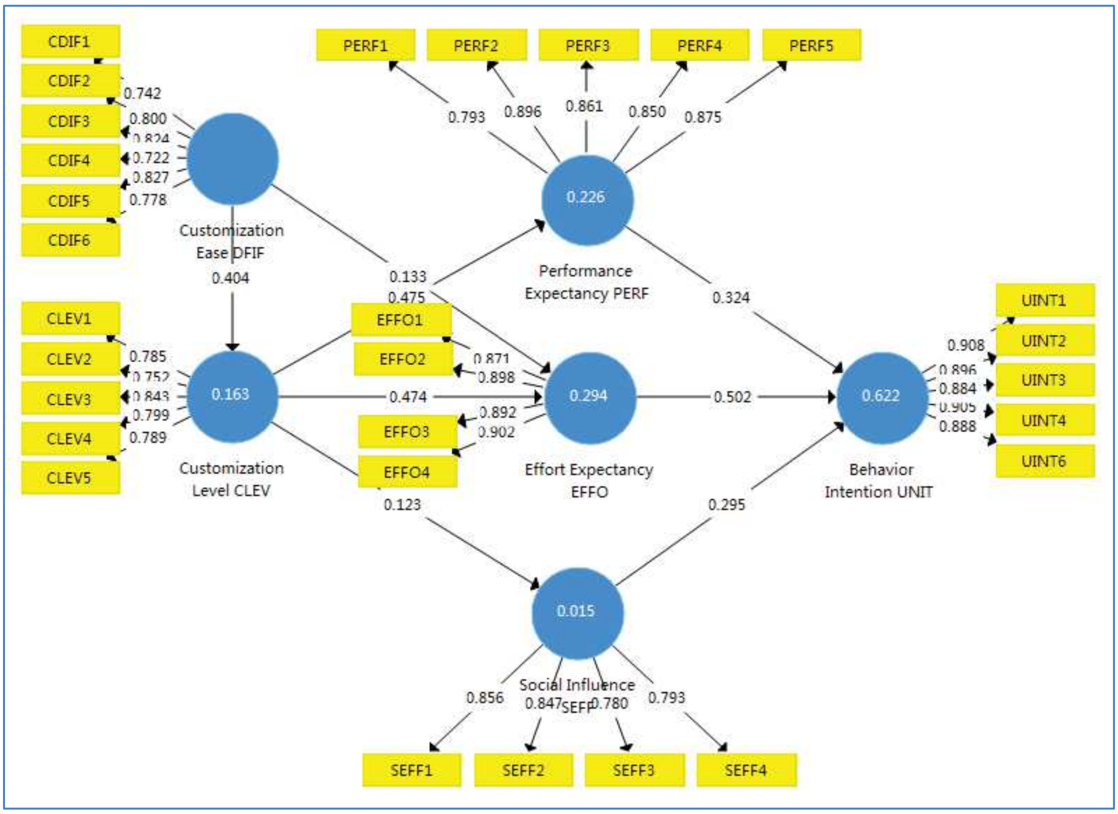
	1.1.5	CLEV5	V1.1.5_CLEV5	When the ERP system was being implemented (or modified) in this firm, the package was changed to better meet the needs of this organization		因为我们公司自身特殊要求，在 ERP 系统实施及后续使用时，系统做了相应改动(二次开发)
Customization Ease	1.2.1	CDIF1	V1.2.1_CDIF1	To adapt to business requirement, our ERP system can be changed and enhanced, and the customization is easily to be done	我公司客制化(二次开发)的简易程度和弹性	为了适应业务需求，我们的 ERP 系统可以做相应更改或增强， 功能增强或开发其他功能本身是容易的
	1.2.2	CDIF2	V1.2.2_CDIF2	Compare to other ERP system, the ERP we are using are relatively easier to change		与别的 ERP 系统相比，我所使用的 ERP 相对比较容易修改或进行二次开发
	1.2.3	CDIF3	V1.2.3_CDIF3	ERP system has the ability to change, to adjust, or to adapt to new conditions, processes, organization structure, or circumstances		我们公司的 ERP 系统可以被修改并进行新功能开发，以适应公司在不同国家和不同工厂，以及不同业务流程的需要
	1.2.4	CDIF4	V1.2.4_CDIF4	ERP is able to communicate with other IS of the organization		我们的 ERP 系统能够与公司的其它信息系统兼容并进行集成
	1.2.5	CDIF5	V1.2.5_CDIF5	Compare to other ERP system, the ERP we are using is easier to communicate with other IS of the organization		与别的 ERP 系统相比，我们使用的 ERP 系统能够或更方便与其它系统交换信息
	1.2.6	CDIF6	V1.2.6_CDIF6	ERP we are using is able to communicate or integrate with other IS of the organization		我们的 ERP 系统能够与公司其它软件系统交换信息
	1.2.7	CDIF7	V1.2.7_CDIF7	ERP system has the capacity to communicate data with other system servicing different functional areas, located in different geographical zones, or working for other business partners		公司的 ERP 系统能够与部署在不同地区，提供不同功能的软件交换信息，并与公司的业务伙伴通过系统集成协同工作
Performance expectancy	2.1.1	PERF1	V2.1.1_PERF1	I found our ERP system is more helpful than the others	公司 ERP 软件对我工作起到的作用	我发现公司的这个 ERP 系统对我的工作更有帮助
	2.1.2	PERF2	V2.1.2_PERF2	Using the system enables me to accomplish tasks more quickly.		公司这个 ERP 系统使我的工作完成得更快
	2.1.3	PERF3	V2.1.3_PERF3	Using the system increases my productivity.		使用公司的这个系统提高了我的工作效率
	2.1.4	PERF4	V2.1.4_PERF4	If I use the system. I will increase my chances of getting a raise		使用公司的这个 ERP 系统，我能够获得更多的提升机会
Effort expectancy	2.2.1	EFFO1	V2.2.1_EFFO1	My interaction with the system would be clear and understandable	使用公司的 ERP 系统	我了解如何使用公司的 ERP 软件，也能够理解软件所实现的功能

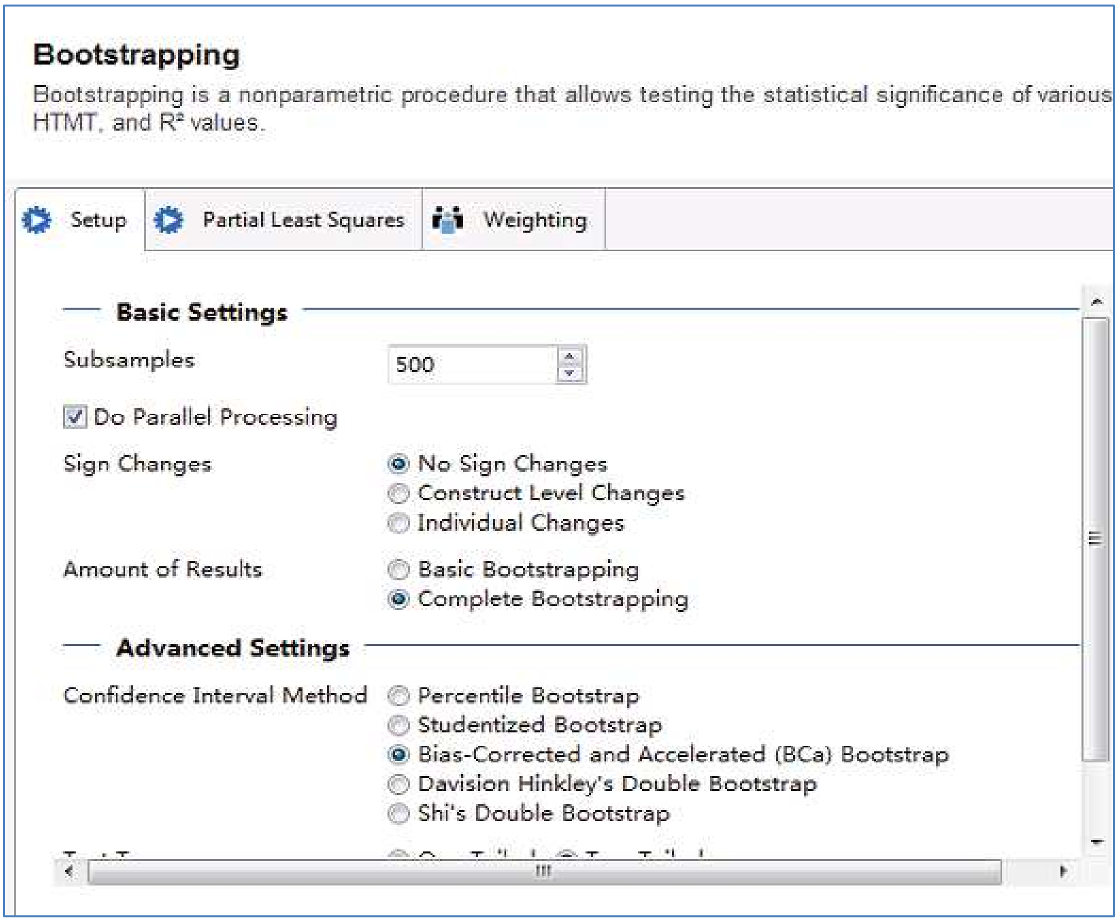
	2.2.2	EFFO2	V2.2.2_EFFO2	It would be easy for me to become skillful using the system	对我工作量的影响	我很快就能够熟练使用这个 ERP 系统
	2.2.3	EFFO3	V2.2.3_EFFO3	I would find the system easy to use.		我觉得我们公司的这个 ERP 软件相对更容易使用
	2.2.4	EFFO4	V2.2.4_EFFO4	Learning to operate the system is easy for me		学习如何使用这个 ERP 软件是比较容易的
Social influence	2.3.1	SEFF1	V2.3.1_SEFF1	People who influence my behavior think that I should use the system.	社会因素对我使用公司 ERP 系统的影响	那些对我的行为有影响的同事及家人认为，我更应该在工作中使用这个 ERP 系统
	2.3.2	SEFF2	V2.3.2_SEFF2	People who are important to me think that I should use the system.		那些对我而言重要的人认为，我应该使用这个系统
	2.3.3	SEFF3	V2.3.3_SEFF3	The senior management of this business has been helpful in the use of the system.		我在 ERP 项目实施和软件使用当中，得到了公司高级管理人员的支持和帮助
	2.3.4	SEFF4	V2.3.4_SEFF4	In general, the organization has supported the use of the system		总体而言，到目前为止公司一直支持这个系统的使用
Behavioral intention to use the system	3.1.1	UINT1	V3.1.1_UINT1	I predict I would use the system in the next <n> months.	未来我对使用公司这个 ERP 系统的意向	预计在未来的几个月里我将会继续使用这个 ERP 系统
	3.1.2	UINT2	V3.1.1_UINT2	If I can decide, I will use the system in the next <n> months		即使可以选择，未来的若干个月内我也不会改变，还是会继续使用这套系统
	3.1.3	UINT3	V3.1.1_UINT3	I intend to use the system in the next <n> months		我愿意或倾向于在以后的几个月里继续使用这个系统
	3.1.4	UINT4	V3.1.1_UINT4	I plan to use the system in the next <n> months.		我计划和打算在未来的若干个月里，继续使用这个系统
	3.1.5	UINT5	V3.1.1_UINT5	I would like to use the system if I can choose		如果可以选择，我准备在未来的若干个月里继续使用这个系统
	3.1.6	UINT6	V3.1.1_UINT6	I intend to use it if I can make more changes to the system		我不愿意继续使用这套系统，除非可以增强或修改这套系统
Validation Question	0.2.1	X	V0.2.1_VALD1	I hope I have chance to use ERP system, as I don't have ERP system usage and project implementation experience		我希望有机会在未来的几个月里使用 ERP 系统，因为目前我没有 ERP 系统的使用或项目经验
Demographic	0.3.1	ERP Name	V0.3.1_DEMO1	ERP Software Name		我所使用的 ERP 软件或公司名称(如果选其它，请提供 ERP 软件名称)

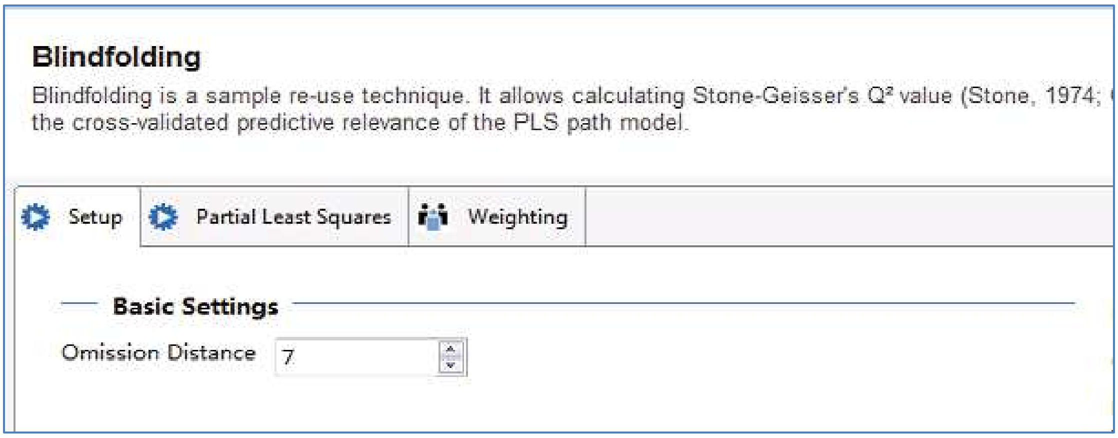
Experience	4.1.1	EXPE	V4.1.1_EXPE	How many years have you experienced in ERP		我的 ERP 经验年限(年)
Position	4.1.2	ROLE	V4.2.1_ROLE	Which role are you in ERP implementation/use		我在 ERP 项目实施、后续使用，或者功能增强以及开发中的角色
Demographic	0.4.1	INDUSTRY	V0.4.1_DEMO1	Industry of my company(if select others, please provide the name)		我公司所在的行业(如果选其它，请提供行业名称)
Demographic	0.5.1	REVENUE	V0.5.1_DEMO1	Company Size(revenue)		我公司的年营业收入

4.3 PLS Algorithm Result






Bootstrapping
Bootstrapping is a nonparametric procedure that allows testing the statistical significance of various
HTMT, and R² values.
Setup
Partial Least Squares
Weighting
Basic Settings
Subsamples
500
Do Parallel Processing
Sign Changes
No Sign Changes
Construct Level Changes
Individual Changes
Amount of Results
Basic Bootstrapping
Complete Bootstrapping
Advanced Settings
Confidence Interval Method
Percentile Bootstrap
Studentized Bootstrap
Bias-Corrected and Accelerated (BCa) Bootstrap
Davision Hinkley's Double Bootstrap
Shi's Double Bootstrap


Blindfolding
Blindfolding is a sample re-use technique. It allows calculating Stone-Geisser's Q² value (Stone, 1974;
the cross-validated predictive relevance of the PLS path model.
Setup
Partial Least Squares
Weighting
Basic Settings
Omission Distance
7

Résumé

Les systèmes ERP ont été largement étudiés au cours des dernières décennies, mais ils échouent souvent à offrir les avantages prévus initialement attendus. L'une des raisons est le manque de compréhension comment la personnalisation influence l'acceptation de l'utilisateur ERP par manque d'ajustement du système-à-business, ce qui peut conduire à des résultats négatifs de business. Pour certaines raisons, beaucoup ont fait valoir qu'une mise en oeuvre de 'vanille', à savoir sans personnalisation, est la «meilleure» façon de mettre en œuvre des systèmes ERP. Cependant, grâce à la recherche quantitative sur la base de sondage sur le Web, cette thèse a révélé que, en Chine, la personnalisation est une condition nécessaire dans l'acceptation de l'ERP et la réussite du projet. Étant donné d'une variété de risques dans le projet ERP, financier, technique, fonctionnel et politique, les fournisseurs et les consultants sont prêts à aider le chef de projet pour respecter le budget et le temps cible plutôt que de récolter plus d'avantages pour la performance des entreprises. Ainsi, la personnalisation habituellement avait été évitée, et la personnalisation insuffisante est plus fréquente que la personnalisation excessive. Nous avons proposé 15 hypothèses et 11 ont été soutenus, et la conclusion générale que, le niveau de personnalisation a une influence positive considérable sur l'intention comportementale, plus le niveau de personnalisation est élevé, plus l'intention comportementale (BI) à utiliser le système est élevée. C'est une instruction pour les entreprises dans lesquelles le bon niveau de personnalisation (CL) devrait être réalisé au lieu d'éviter la personnalisation. Et seulement la personnalisation importante stratégique plus élevée devrait être inclue dans le projet quand il y a la limitation dans le budget et le temps. Nous avons également confirmé que la facilité de personnalisation est un facteur important dans le choix de la solution ERP correcte. En tant que modérateur, différents rôles ont différentes perceptions sur la personnalisation, les utilisateurs normaux ont une espérance plus forte dans la personnalisation, il est donc essentiel d'expliquer aux utilisateurs, quelle personnalisation est stratégique, et quelle personnalisation est à des fins de cohérence et pourrait compromettre le bénéfice réel de l'ERP système. S'il ne convient pas de faire la personnalisation dans la phase de mise en oeuvre du projet, un plan pour la personnalisation future du système doit être préparé et il améliorera finalement le succès du système à long terme.

Mots-clés: ERP, Personnalisation, Renforcement, Misfit, Adaptation, PLS-SEM

Abstract

ERP systems have been widely studied during the past decades, yet they often fail to deliver the intended benefits originally expected. One notable reason is the lack of understanding how the customization influence the ERP user acceptance when there is lack of system-to-business fit, which can lead to negative business outcomes. For some reasons, many have argued that a "vanilla" implementation, i.e. without customization, is the "best" way to implement ERP systems. However, through quantitative research based on web survey, this dissertation revealed that, in China, customization is a must in ERP acceptance and project success. Because of the various risks in ERP project, financial, technical, functional and political, vendors and consultants are keen on helping the project manager to meet the budget and time target rather than to reap more benefit for business performance. Thus, customization usually had been avoided, and insufficient customization are more common than over customization. We proposed 15 hypothesis and 11 were supported, and the general conclusion that, customization level has significant positive influence on behavioral intention, the higher customization done, the higher behavioral intention (BI) to use the system. It is an instruction for companies that, right level of customization (CL) should be achieved instead of avoiding customization. And only higher strategic important customization should be included in the project when there is limitation in budget and time. We also confirmed that ease of customization is an important factor in selecting the right ERP solution. As a moderator, different role have different perception on customization, normal users have stronger expectancy in customization, so it is critical to explain to the users, which customization is strategic, and which one is for consistency purpose and could jeopardize the real benefit of ERP system. If it is not appropriate to do the customization in the project implementation phase, a plan for future system customization should be prepared and it will ultimately improve the system long term success.

Key words: ERP, Customization, Enhancement, Misfit, Adaptation, PLS-SEM