UNDERSTANDING CLOUD-BASED ERP CUSTOMIZATION FROM KEY STAKEHOLDERS’ PERSPECTIVES: A RESEARCH MODEL

Qian Huang  
*Monash University*, qian.huang@monash.edu

Gillian C. Oliver  
*Monash University*, gillian.Oliver@monash.edu

MD Mahbubur Mahbubur  
*MONASH University*, mahbubur.rahim@infotech.monash.edu.au

misita anwar  
*Monash University*, misita.anwar@monash.edu

Susan Foster  
*Monash University*, sue.foster@monash.edu

Follow this and additional works at: [https://aisel.aisnet.org/ecis2021_rip](https://aisel.aisnet.org/ecis2021_rip)

**Recommended Citation**

Huang, Qian; Oliver, Gillian C.; Mahbubur, MD Mahbubur; anwar, misita; and Foster, Susan, "UNDERSTANDING CLOUD-BASED ERP CUSTOMIZATION FROM KEY STAKEHOLDERS’ PERSPECTIVES: A RESEARCH MODEL" (2021). *ECIS 2021 Research-in-Progress Papers*. 33.  
[https://aisel.aisnet.org/ecis2021_rip/33](https://aisel.aisnet.org/ecis2021_rip/33)

This material is brought to you by the ECIS 2021 Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2021 Research-in-Progress Papers by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
UNDERSTANDING CLOUD-BASED ERP CUSTOMIZATION FROM KEY STAKEHOLDERS’ PERSPECTIVES: A RESEARCH MODEL

Research in Progress

Qian Huang*, Monash University, Melbourne, Australia
Gillian Oliver, Monash University, Melbourne, Australia
Mahbubur Rahim, Monash University, Melbourne, Australia
Misita Anwar, Monash University, Melbourne, Australia
Susan Foster, Monash University, Melbourne, Australia
* Corresponding author: Qian.Huang@monash.edu

Abstract

Cloud-based Enterprise Resource Planning (CERP) systems have become a strategic tool in today’s competitive business environment. However, implementation of these systems is challenging because various risks are to be considered to ensure implementation success. Customization represents a major challenge in CERP implementation, but it has so far received limited research attention from the IS researchers. The objective of this paper that draws on an ongoing doctoral study is thus to develop a research model on CERP customization to help explain a) how key stakeholders’ engagement and interaction influence customization processes, and b) how the actual benefits resulting from CERP customization are realized. The proposed model can serve as a foundation to provide useful guidelines to business managers who are contemplating the consideration of a CERP system in the near future.

Keywords: Cloud ERP, customization, customization process, stakeholders

1 Introduction

Cloud-based Enterprise Resource Planning (CERP) systems are emerging as a significant technological tool in today’s organizational environment with enormous business potential for organizations (López and Ishizaka, 2017). The market potential of CERP is expected to exceed US$ 37.7 billion by 2024 (MarketsandMarkets, 2019). Given the market penetration potential of CERP systems, researchers are paying attention to various aspects (e.g. adoption, challenges, outcomes) of these systems. Much of the existing literature however focuses on the organizational adoption of CERP systems (Huang et al., 2021). In contrast, research addressing implementation issues is limited (Wulf, 2020). One particular implementation issue that has been identified as a major challenge is customization of CERP systems (Gupta et al., 2017). The main reason for the need to customize is because systems offered by CERP vendors are based on standard or best business practices that do not take into account the unique processes present in client organizations (Nowak and Kurbel, 2016). Several existing studies have suggested that the successful implementation of ERP systems requires the accurate alignment between organizations’ processes and those of ERP systems if the full benefits are to be realized (Khadrourf et al., 2018). Without this alignment, CERP cannot fulfil the specific and unique expectations of the client organizations. The major issues involved in the customization process of ERP systems that require attention is the strong knowledge about the current systems and the likelihood of innovations ERP (Wang, 2016). As
As a result, carefully carrying out the customization during ERP implementation is essential because of the gap between customers and vendors (Song et al., 2017).

Unlike on-premise ERP customization, customization of CERP systems become more difficult because of the varied degree of involvement as well as a divergence in preferences over client ERP features among diverse stakeholders (Nowak and Kurbel, 2016). These stakeholders (i.e., client organizations, CERP vendors, and third-party consultant companies) may exhibit different intentions to achieve the levels of engagement and interaction needed for customization. Accordingly, understanding their engagement in deciding which CERP customization will be applied for implementation is important. Furthermore, multiple activities are generally involved in the customization process of CERP systems (Nowak and Kurbel, 2016), and hence, the extent to which those activities are undertaken would vary among various client organizations (Arif et al., 2010). Due to the variation in the extent to which customization can be incorporated in CERP systems, differences in the outcomes (i.e., realized benefits) can be observed as perceived by client organizations (Wolters et al., 2018). Therefore, investigating the benefits (Howard, Vidgen, & Powell, 2006) realized as a result of customization within different organizations is yet to be determined. No such research has investigated these issues in the context of CERP system customization. Therefore, the following two research questions (RQs) are addressed:

**RQ1:** How does the engagement of key stakeholders (i.e., vendors, clients, and consultants) influence CERP systems customization process?

**RQ2:** How does the implementation of CERP systems customization help client organizations to realize benefits in line with their expectations set during customization engagement?

This research project expects to provide important insights into the CERP implementation phenomenon by developing a model that explicitly links stakeholder engagement, customization process, and realized benefits arising from implementing customization. An empirical study will need to be conducted to confirm the role of customization during CERP implementation (for instance, the expected benefits cannot be achieved without customization) or identify other contributing factors that are least known in the existing literature. It is anticipated that the stakeholder lens may provide insight into contradictory attitudes towards the need for customization, the extent to which customization can be accommodated, and the realized benefits arising from customization, among client organizations, vendors, and consultant companies. The model would contribute towards improved understanding about how the key stakeholders engage in deciding the extent to which CERP customization will be agreed upon for implementation. It will also provide rich insights on how the link between “customization process” and “benefits realization” can be interpreted by investigating the variations (differences between expected benefits with realized benefits) of realized benefits with the differences in activities involved in CERP customization process.

### 2 Definition of Key Terms

**Cloud-based ERP systems:** CERP is a software system composed together of all functional modules of the enterprise containing supply chain, human resources, sales, manufacturing, and other modules to offer integration for the whole enterprise to make effective communication channels within the business processes (Aulia et al., 2019). Given CERP are usually based on are Software as a Service (SaaS) delivery model (Demi and Haddara, 2018), thus this research focuses on CERP based on SaaS delivery model.

**Customization:** A popular definition is proposed by Rothenberger and Srite (2009). According to them, customization refers to an activity that some standard programming languages or the ERP system’s language is deployed for changing the ERP system code to build custom features or include third-party packages. Customization involves changes in source code, which requires skilled people and adequate resources to manage it. Accordingly, customization is complex and costly.

**Customization process:** For CERP context, it means the manner in which a functionality of an ERP system is to be modified to meet specific requirements of client organizations (Rolland and Prakash, 2000).

### 3 Literature Review

Drawing on the stage model notion (Yu, 2005), existing research on CERP systems can be divided based on three key stages: adoption, implementation, post-implementation. Much of the existing literature focuses...
on organizational adoption of these systems. In particular, issues like adoption motives (Garverick, 2014) and critical factors affecting adoption decision (Huang et al., 2021) have been frequently discussed. As this study is concerned with CERP customization, a major challenge for CERP implementation, issues relating to CERP adoption are not reported. Taking into consideration of the issues (e.g. stakeholder engagement, realized benefits) raised in RQ1 and RQ2, in the following sections a succinct but informative related literature is provided.

3.1 CERP Implementation

Implementation is defined as the process of providing an efficient operating system by configuring technical, organizational, and financial resources (Fleck, 1994). Therefore, CERP implementation means the process of technical, organizational, and financial resources are configured for organizations to efficiently implement CERP. Several studies focus on identifying implementation challenges. The most frequently cited three challenges include: a) data security and privacy issue, b) customization, and c) network and Internet failure. Although challenges of CERP implementation have received some attention by scholars (Rabaya and Graffi, 2019), only a few scholars discuss issues about customization as one of the main obstacles of implementing CERP in extant literature. Given that customization is often unavoidable for most organizations because of the misalignment between the business requirements and CERP systems (Nowak and Kurbel, 2016), a more detailed discussion on customization for the CERP context is discussed in the following section.

3.2 CERP Customization

Traditionally, customization is realized in the software that is deployed on the client organizations’ own premise, so that client organizations have full control of the systems and can customize them. The situation changes significantly when enterprise software moves to multi-tenant SaaS since the software is running in the Cloud and managed by vendors. As a result, existing literature suggests SaaS customization presents different challenges compared to on-premise customization (Song et al., 2017). For example, on-premise ERP customization requires client organizations to have the necessary system development expertise as they need to undertake customization themselves (Wang, 2016). CERP customization requires vendors and consultant companies with the technical capability to support specific customization needs and the ability to negotiate with clients about the customization scope (Mijač et al., 2013).

Drawing on a systematic literature review conducted on on-premise and CERP customization, the following three key themes are identified and briefly described below.

Theme 1: Organizational motivations for the customization: The motivations for on-premise and CERP customization mentioned in the existing literature are similar. These motivations are all from client organizations’ perspective. The main reason for the customization of both on-premise and CERP is a functional defect between the existing business process and the functionality of the system. Other motivations, such as adapting the organizational structure, integration with other systems, can motivate client organizations to conduct the customization for their on-premise and CERP (Kurbel, 2016, Khadrouf et al., 2018).

Theme 2: The customization approaches: While there are several customization approaches for on-premise ERP described in the literatures, Uppström et al. (2015) suggest that this existing model for on-premise ERP systems cannot be fully applied for the CERP system context. For example, screen masks and workflow programming can be realized by configuration options of CERP without customization. Furthermore, as new customization options (e.g. package customization, conversions and mobile platform customization) are provided for CERP, there are calls for a framework to determine the level of configuration and customization ability of CERP systems (Mijač et al., 2013).

Theme 3: Outcomes of the customization: On-premise ERP customization provides benefits in several ways. Gattiker and Goodhue (2005) divided customization benefits into the intermediate and overall ERP benefits and suggest overall benefits (e.g. higher profits) do not automatically happen without any key intermediate benefits (e.g. higher data quality for decision-making, increased task efficiency in business processes). In comparison existing literature about CERP customization benefits is scarce. Only one paper (van der Borg et al. (2017) investigated the relationship between degree of customization and customer
perceived benefits. The authors identified three types of customer benefits from the individual perspective: decision-making improvement, IT infrastructure improvement, and operational improvement.

Previous research on the customization of CERP is incomplete to comprehensively understand its importance, which requires further investigation (Nowak and Kurbel, 2016). Two research gaps are identified from the systematic literature review of CERP customization: 1) customization of CERP requires significant attention from both external and internal organizations with different interests and power to achieve the levels of engagement and interaction. However, the issue of how to realize the customization has not been adequately discussed in extant studies; 2) The research conducted by van der Borg et al. (2017) only identify the relationship between level of customization and customer perceived benefits. As different type of customization have different consequences (Wolters et al., 2018), no studies have yet examined the benefits of difference in activities involved in CERP customization process. This particular concern is thus addressed in this study.

### 3.3 Stakeholder Engagement

Engagement is defined as “deep involvement” or “interaction” (Bruce and Shelley, 2010). Stakeholder engagement refers to the process used by organizations, for a clear purpose, through interactions and consultations with relevant stakeholders to set and achieve expected outcomes (Kaur and Lodhia, 2018). Participation of three stakeholders (i.e. client organizations, IT vendors, consulting companies) is commonly observed for introducing complex organization-wide systems (Markus et al., 2000). This applies to the context of CERP implementation as well as customization process. CERP customization is complex in nature since it requires more than one stakeholder. According to the existing literature, customization can be realized only when three stakeholders with different roles work together. The vendors’ responsibility is to host the function and ensure the quality of systems for all client organizations with their customization. Under the CERP, vendors are forced to directly interact with client organizations. Consultants are not allowed to access to CERP but take the responsibility for ensuring the quality of their customization to the vendors (Song et al., 2017).

In developing such complex IT systems, the effectiveness of their engagement can influence the realization of expected benefits (i.e. system success) (Markus et al., 2000). The outcome of stakeholder engagement generally results in a shared agreement on the expectations of benefits from IT project adoption/implementation (Torelli et al., 2020). IS literatures have identified the relationship between stakeholder engagement and implementation process. For example, Chan and Pan (2008) suggest stakeholder engagement is important that drives successful implementation of e-government system. This is because such a system can be adapted through refinement (i.e. customization) to improve user acceptance based on the common expectations resulted from stakeholder engagement in the earlier stage of system implementation. In another study, Moucheraud et al. (2017) emphasize the need of stakeholder engagement during the implementation and sustained usage process of health information systems because aligning perspectives and agreeing on the systems’ goals established through stakeholder engagement is considered as a determinant of successful and sustainable health information systems. Given the nature of CERP, it is argued that stakeholder engagement is needed for setting initial set of expected benefits in undertaking CERP customization. However, the existing literature about CERP customization has not addressed the issue of how these initial expected benefits are developed through stakeholder engagement and its influence on the customization process.

### 3.4 Stakeholder Theory and CERP Customization

This paper is grounded in the Stakeholder Theory (ST) introduced by Freeman (1984). According to Freeman (1984), a stakeholder in an organizational context represents any group or individual who can affect or can be affected by the action of that organization. ST advocates that in the outcome organizational decision making and the actions undertaken by an organization are likely to affect the goals and interests of multiple stakeholders (Hatch, 2018).

Existing literature on stakeholder identifies two key characteristics (i.e. interest, power) to describe stakeholders (Mitchell et al., 1997). Stakeholder power means capability of those who exert their will over others to realize the outcomes they desire (Mitchell et al., 1997). Stakeholder interest refers to the possibility that stakeholders would raise their desire or exert their impacts (Mitchell et al., 1997). The
association between stakeholder power and interest has drawn attention from researchers. Stakeholder power/interest matrix is used in the literature to identify the influence of stakeholders’ engagement on the success of systems implementation (Slabá, 2014). According to Newcombe (2003), it can be used to investigate three interaction issues: the likelihood of each stakeholder enforcing their expectation on the project; whether these stakeholders have the means to do so, and the influence of stakeholders’ expectation on the strategy of the project. A powerful stakeholder with clear interest can contribute to the successful adoption and implementation of an IT application because they can force less powerful stakeholders to use it regardless of their interest (Boonstra and Govers, 2009).

CERP customization process requires the involvement of three stakeholders (CERP vendors, client organizations, and consultants) with different interests and power. The conflict of interests amongst client organizations, consultant companies and CERP vendors exist arise from their different expectations of CERP systems. CERP vendors tend to keep customization at the lower level for it to be standardized for more customers (Vadivelu et al., 2018). CERP systems with heavy customization would increase the complexity of update and maintenance (Uppström et al., 2015). However, vendors will accept customization requirements from client organizations if functional aspects of their products are similar to other existing ones in the market, which can improve their competitive advantages through high level of customization competency (Sun et al., 2008). For some client organizations, customization cannot be affordable. The main reason for the need to customize is to achieve the alignment between the business process and a CERP system (Nowak and Kurbel, 2016). This is because systems offered by CERP vendors are based on standard flow or best business practices without considering the specific context of each organization. Those organizations that attempt to roll back their processes to conform to standards of CERP systems can even contribute to the loss of competitive advantages (Mijač et al., 2013). The existing literature about CERP customization only considers the perspective of individual stakeholders without detailing their interactions. Therefore, ST is chosen for this doctoral study to explore how stakeholders negotiate using their power and interest to reach an agreement on the customization expectation that is acceptable to vendors and client organizations alike. The notion of stakeholder power/interest matrix will thus serve as a guide to identify the role and interaction of stakeholders in the CERP customization context.

### 3.5 CERP Benefits and Its Taxonomy

Drawing on an analysis of the existing literature, a total of twenty-one benefits of CERP are reported. The three most frequently cited benefit include reduction in IT costs, elasticity and scalability and improved IT security. None has proposed the taxonomy of benefits for CERP implementation as well as customization context. As a result, a well-known taxonomy of ERP benefits proposed by Shang and Seddon (2000) is considered relevant for this study. According to them, five categories of benefits are identified: operational, managerial, strategic, IT infrastructure and organizational benefit dimension. This taxonomy was derived from integrated IT infrastructure (i.e. the traditional on-premise ERP) and has been widely applied by IS researchers for the context of integrated IT systems, for example, e-government, enterprise systems, e-procurement (Koumaditis et al., 2013). As CERP is also one of integration technologies, this taxonomy is considered appropriate to be used in this context. Mapping the CERP benefits into the taxonomy shows that out of twenty-one, eight benefits (e.g. reducing IT costs, improve IT security) are IT infrastructure dimension in nature, whereas three benefits (e.g. resource sharing and allocation, cost transparency) are managerial in nature. Four benefit are related to the operational (e.g. faster implementation, efficiency) and organizational (e.g. improve collaboration, focus on core competencies) issues respectively. Only two benefits are concerned with the strategic dimension (i.e. sales automation, scalability and elasticity). Furthermore, most existing literature does not clearly distinguish between business process performance and organizational performance (Wieder et al., 2006). However, according to Barua et al. (1995), a research model that includes intermediate benefits is required because of two reasons: a) it aids understanding of how the value for the organization is created by IT investments; b) it helps to explain why the overall impacts do or do not occur. As a result, we will introduce the intermediate benefits to the research model to investigate how CERP customization realizes the expected benefits.
4 Research Model

A research model (Figure 1) is now proposed that seeks to explain CERP system customization phenomenon based on the premise of SaaS delivery model. The model is influenced by the underlying concepts of stakeholder theory (Freeman, 1984), to address the research questions (Section 1).

The model consists of four key constructs: stakeholder engagement, customization process, client process performance, and client firm performance. In stakeholder engagement construct, three sub-constructs are involved: client organizations, vendors, and consultants. The relationships between the key constructs are explained in the following sub-sections.

![Research Model Diagram]

**Figure 1. A research model**

4.1 Relationship Between Stakeholder Engagement and Customization Process

In line with the importance of stakeholder engagement as mentioned in IS literature (Section 3.1) and drawing on the views of Markus et al. (2000), as well as the empirical findings presented by Moucheraud et al. (2017) and Chan and Pan (2008), it can be logically argued that the customization for CERP context requires significant attention from client organizations, vendors and third-party consultant companies. Further, upon reflection on different interests and power, they would eventually reach an agreement for undertaking an appropriate level of customization needed for implementation as desired by client organizations. CERP vendors intend to keep their systems with lower level of customization as much as possible, as they want to promote their standard CERP solution to many customers (Vadivelu et al., 2018). For some client organizations, customization cannot be avoided as it is an effective way to achieve an alignment between their own business processes and a CERP system (Nowak and Kurbel, 2016). Those client organizations that attempt to roll back their business processes in order to conform to standards of CERP, may experience a loss of competitive advantages (Mijač et al., 2013). As a result, they engage in deliberations and negotiate with CERP vendors as well as CERP consulting companies to reach an agreement on what customizations can be pursued while clarifying the benefits they expect to receive from the agreed upon customization. Hence, consultant companies take the responsibility to work on customization under the constraints set by vendors and ensure the quality of the customized systems to meet the expected requirements and expectations of client organizations (Song et al., 2017).
The expected benefits are formed through the engagement of three key stakeholders. Drawing on the expected benefits set by client organizations and well recognized by the stakeholders, a set of customization requirements will be considered which will in turn decide what activities involved in the CERP customization process are to be initiated. According to Nowak and Kurbel (2016), six activities are generally involved in the CERP customization process. As indicated in Figure 1, these activities include: composition, API, model-based code generation, extension points, extension, code modification. However, we still open mind to remove and add new customization activities. Different customization requirements can invoke different customization activities involved in the customization process (Aslam, 2014). For example, in order to improve decision making (managerial benefit), CERP systems are required to integrate with individual functional extensions, so extension customization activity will be included in the customization process (Aslam, 2014). Not only activities will vary, but also the extent of those activities will also differ. In this paper, we introduce the notion of “extent of CERP customization” which is measured in terms of three indicators (i.e. number of customization activities, intensity of customization activities, quality of customization activities). Hence, the following proposition is proposed:

P1: Stakeholder engagement is positively related to the extent CERP customization process is initiated.

4.2 Relationship Between Customization Process, Client process performance and Firm performance

Following Gattiker and Goodhue (2005), this study will measure the performance of CERP customization at two levels: intermediate CERP customization benefits at a process level (i.e. client process performance) and CERP customization benefits at a firm level (i.e. client firm performance). The intermediate benefits are effective ways to explain how the overall benefits are achieved (Staehr et al., 2012). The activities involved in the customization process can redesign the functionalities included in the CERP system. Such redesigned and modified functionalities would better support business process quality and thus influence performance of the client organizations. Extant literatures have identified the relationship between the IS implementation process, the firm processes, the firm performance. For example, the findings of Gattiker and Goodhue (2005) indicate that all the ERP implementation benefits were mediated by intermediate benefits and the intermediate benefits serve as the precondition to achieve overall ERP benefits. In another study, Chou and Chang (2008) asserted the role of intermediate benefits as predictor of overall ERP benefits and also suggest that customization was one of the robust predictors of intermediate ERP benefits. However, they do not consider the influence of the type of customization since different customizations activities may lead to different outcomes for client process performance. This assertion is in line with the suggestions offered by Aslam (2014), who argues that different customization activities can result in the realization of different types of benefits. Given customization has the capability to facilitate integration and address misalignment, it is expected to positively affect the process performance (i.e. coordination improvements, task efficiency and operational performance) (Liang et al., 2007, Chou and Chang, 2008).

The ultimate dependent variable is client firm performance, which is defined as the overall business impact of CERP customization. Our model proposes that CERP customization benefits at a firm level will come substantially through the intermediate ERP benefits at a process level. For example, the coordination (intermediate benefit) is improved through integrating CERP with individual functional extensions during the customization process. Coordination improvement will further provide strategic benefits (e.g. clients’ satisfaction, market share increase). Client firm performance will be classified into three categories: managerial, strategic and organizational benefit dimension (Shang and Seddon, 2000). It is however possible that the categories of benefits might need enhancement or replacement due to the characteristics of CERP customization. For example, reducing IT costs (in IT infrastructure dimension) might not be a realized benefit for CERP customization since considerable costs are incurred by changing software source codes (Vadivelu et al., 2018). Furthermore, one category has
been excluded in the “client firm performance” variable since operational benefit has been included in “firm process performance” variable. Drawing on the arguments expressed above, the following proposition is suggested, based on the assumption that customization process went as planned:

P2: CERP customization process positively contributes to the process performance of client organizations.

P3: The firm process performance is positively related to overall firm performance.

5 Future Empirical Directions

We propose to empirically evaluate and refine the research model (Figure 1) in two stages. Stage one involves conducting a pilot case study, which will provide clarity into the key constructs and their relationships. The pilot study will be conducted in the tertiary education sector. All key stakeholders will be interviewed, including IT professionals and managers of affected business units, the cloud vendor and the consultant company. Stage two will involve conducting multiple case studies in two different sectors). Applying more than one case to study a research phenomenon (e.g. CERP customization) helps in improving generalizability of research findings (Eisenhardt, 1989). Within-case comparisons further enhances the understanding about variations under which the phenomenon manifests itself (Miles and Huberman, 1994).

6 Conclusion

This paper, drawing on one part of an ongoing doctoral study, presents a research model that explains how customization process of CERP systems is negotiated among key stakeholders and how various benefits can be realized. The proposed model is useful for scholars as well as business managers. IS scholars can use this model as a platform to undertake further in-depth studies to explore mechanisms underlying CERP customization process and how such mechanisms can result in diverse benefits. Furthermore, scholars can investigate the presence of divergence or convergence of perceptions about the benefits from the viewpoint of stakeholders. Another direction of research for scholars is to consider an alternative theoretical model (e.g. Technology-Organization-Environment) and related it with the realized benefits from CERP customization. For business managers, proposed research model can guide them to recognize how client organizations work with other stakeholders and the responsibility for each of them during CERP customization undertaking or the importance of those activities that are involved in the customization process.

References


