Understanding Implementation Challenges of Cloud-based Enterprise Systems at Universities

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

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

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

Follow this and additional works at: [https://aisel.aisnet.org/pacis2022](https://aisel.aisnet.org/pacis2022)

**Recommended Citation**
Huang, Qian; anwar, misita; and Oliver, Gillian C., "Understanding Implementation Challenges of Cloud-based Enterprise Systems at Universities" (2022). *PACIS 2022 Proceedings*. 197.
[https://aisel.aisnet.org/pacis2022/197](https://aisel.aisnet.org/pacis2022/197)

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 2022 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
Abstract

Cloud-based enterprise systems (Cloud ES) are developing rapidly and their application has increased substantially. Early research suggested that tertiary educational institutions adopt Cloud ES due to benefits such as increased productivity and easy access to data. Although existing studies have identified some advantages, Cloud ES implementation is a complex initiative, and we do not yet have sufficient knowledge for successful implementation. This study identifies the challenges of Cloud ES implementation and investigates how the various stakeholders mitigated these challenges in an Australian university. A qualitative case study approach employing semi-structured interviews with the stakeholders was employed to explore the issues. The study shows the role of stakeholders in implementation and how they interacted with others to mitigate challenges. The results can serve as a foundation to develop guidelines for tertiary educational institutions who are considering implementing Cloud ES.

Keywords: Cloud ES, Implementation, Challenges, Stakeholder Theory

Introduction

Cloud Computing (CC) is a popular technology that delivers software, infrastructure and the entire computation platform as a service (Chauhan and Kumar 2013). Compared to the traditional web hosting providers, CC is based on a "pay on-demand" model for the use of information communications and technology (Mehraeen et al. 2017). It allows users to access the hardware and software through a third platform in remote locations, which fundamentally changes how the information is stored and accessed (Bildosola Agirregomezkorta et al. 2015). CC is relatively easy for client organizations’ deployment and does not require extensive IT infrastructure in terms of software and hardware. It allows companies with limited budgets to access the technology in a more affordable manner (Huang et al. 2021c). As a result, several Enterprise Systems (ES) are offered through CC, such as Cloud ERP and Cloud CRM. According to Salleh
et al. (2012), Cloud ES is a scalable and flexible integrated ES used via the Internet with the concept of pay-per-use. These Cloud ES are gaining popularity for SMEs and large organizations (Gupta et al. 2017).

Implementing Cloud ES is different from implementing traditional on-premise systems in several ways, including the vendor’s degree of engagement, the degree of control over the vendor and complexity of integration (Ahmed et al. 2018). Cloud ES often fails to offer customers a greater sense of ownership as they neither run the application nor own the infrastructure (Salleh et al. 2012). Compared to using on-premise ES, it is harder for organizations to integrate Cloud ES with in-house IT systems and to customize organizations’ specific needs (Huang et al. 2021b). Furthermore, different stakeholders (i.e. client organizations, Cloud ES providers, and implementation partners) are involved, contributing to the high degree of complexity in Cloud ES implementation. According to Huang et al. (2021b), customization may provide a challenge for both clients and vendors. This is because clients require the system to align with their business processes, whereas vendors tend to maintain customization at a lower level for it to be standardized for more potential clients. As a result, it is challenging for both stakeholders to agree on the level of customization. Moreover, the failure rates of systems implementation are relatively high (Hentschel et al. 2019). The main reason for implementation failure is often the inadequate management of implementation-specific challenges (Remus 2012). Accordingly, researchers from different disciplines are paying increased attention to investigating this topic within Cloud ES systems. For example, Gupta et al. (2017) identified security as the critical challenge in implementing Cloud ERP for SMEs and large organizations. Costello and Willcocks (2018) highlight the technical and non-technical challenges of implementing Cloud CRM in banks, such as business value realization and integration difficulties. However, very few existing papers investigate Cloud ES challenges from multiple stakeholders’ perspectives.

Research on the implementation of Cloud ES in tertiary educational institutions is scarce. Tertiary education means formal education beyond high school (Dawkins et al. 2019). Existing research on Cloud-based systems in tertiary educational institutions is mainly focused on introducing CC framework and e-learning implementation. There is a lack of studies that explicitly focus on the challenges of Cloud ES implementation in tertiary educational institutions (Ali et al. 2018). Educational institutions are heavily dependent on IT for content delivery, communication and collaboration; Cloud ES is a good alternative to optimize the cost and operational efficiency of the information platforms provided (Attaran et al. 2017). According to Strong et al. (2006), the challenges tertiary educational institutions face in achieving educational benefits from Cloud ES implementation differs from those of business organizations, but are no less difficult. As such, the challenges that tertiary educational institutions are experiencing may differ from those in other industries. Furthermore, the successful implementation of Cloud ES in tertiary educational institutions is low due to the absence of proper implementation guidelines (Al-Sharafi et al. 2021). However, still very few existing papers provide corresponding solutions for challenges. Stakeholder Theory (ST) is used in this study. Implementing Cloud ES requires significant technical as well as organizational changes. These will impact stakeholders with varying interests and power in the system. It is essential to analyze stakeholders and understand their interactions and roles during implementation. Such an understanding will help mitigate implementation challenges and encourage acceptance, improving the success rate. Therefore, this paper aims to understand the role and interactions of various stakeholders in terms of power, legitimacy and urgency in Cloud ES implementation in tertiary educational institutions.

To address this research aim, the following specific research questions are formulated:

**RQ1:** What are the main challenges associated with Cloud ES implementation experienced by tertiary educational institution?

**RQ2:** How did the stakeholders mitigate Cloud ES implementation challenges?

The intended contribution of this paper is twofold: First, identifying challenges in the implementation of Cloud ES will contribute to the scientific knowledge towards the unexplored area of Cloud ES implementation in tertiary educational institutions. This theoretical contribution will expand the scientific body of knowledge with empirical results of several case studies, which will support the management of Cloud ES implementation. Furthermore, the project would contribute towards an improved understanding of the role of stakeholders in such a Cloud ES implementation context. Second, as a contribution to practice, this project can explicitly provide a guideline for client organizations and vendors to understand the significant challenges they may encounter during implementation and corresponding solutions for them, which can improve the successful implementation rate for tertiary educational institutions in the future.
Key terms are defined in the next section, and this is followed by a review of the literature concerned with Cloud ES implementation and introduces Stakeholder Theory. The methodology is outlined. The preliminary results are presented and the paper concludes by identifying expected contributions and next steps.

**Definition of Key Terms**

Cloud ES: There is no standard definition of Cloud ES (Salleh et al. 2012; Walther et al. 2018). The most frequently used definition was formulated by Salleh et al. (2012) who suggests Cloud ES is a scalable and flexible integrated ES used through the Internet with the concept of pay-per-use. Given that Cloud ES is usually based on the software as a Service (SaaS) delivery model (Demi and Haddara 2018); thus this research focuses on Cloud ES based on the SaaS delivery model.

Cloud ES implementation: The process of offering and using an efficient Cloud ES through configuring technical, organizational, and financial resources (Huang et al. 2021b). The implementation process is crucial for adopting and deriving the benefits of Cloud ES (Al-Fawaz et al. 2010). Implementation involves changes in some components of organizations, such as business processes, planning, stakeholders, and firms’ resources (e.g. finance, technology) (Olsen 2000).

Cloud ES implementation challenges: Setbacks faced in implementing the Cloud ES project (Omondi 2014).

**Cloud ES Implementation Challenges**

Drawing on the stage model notion (Yu 2005), existing research on Cloud ES can be divided into three key stages: adoption, implementation, post-implementation. Much of the existing literature focuses on the organizational adoption of these systems. In particular, issues like adoption motives (Garverick 2014) and critical factors affecting adoption decisions (Huang et al. 2021a) have been frequently discussed. As this study is concerned with Cloud ES implementation challenges, one sub-topic of Cloud ES implementation, issues relating to Cloud ES adoption, are not reported. Literature relating to the issues (e.g. Cloud ES implementation challenges) raised in RQ1 and RQ2 is summarized below.

The articles reported in this section are based on a systematic literature review following the process as outlined in Jones and Gatrell (2014). A literature search of Cloud ES from top Information Systems journals (e.g. Information Systems Journal, Information Systems Research, MIS Quarterly), journal databases and conference proceedings (e.g. PACIS, HICSS) were conducted. The keywords "Cloud ES", "Cloud Computing", or "Software as a Service (SaaS)" were used as the basis for searching. The articles selected for review met two criteria: a) a sole focus on Cloud ES implementation, and b) specific use of the term ‘challenges’ in the title, abstract, keywords or body of the text. This resulted in a total of sixteen papers relevant papers. A total of twenty-one challenges were identified from analysis of the literature (see Appendix). The most frequently cited three challenges were a) data security and privacy issues, b) customization, c) network and Internet failure. Comparing these findings with the challenges for on-premise ES implementation identified by Mahmood et al. (2019), challenges for Cloud ES and on-premise ES differ: the most frequently cited three challenges for on-premise ES were a) top management, b) change management, c) training. This demonstrates that existing solutions or frameworks for on-premise ES are not adequate for Cloud ES.

**Cloud ES implementation challenges in terms of different stakeholders**

Some challenges could be resolved by either internal stakeholders (e.g. users) or external stakeholders (e.g. Cloud ES vendors) individually. For example, one of the challenges for vendors relates to compliance risks. The vendors are required to provide systems that are in compliance with government regulations and rules. Therefore, it is difficult for vendors to adapt their systems to follow all country-based or location-based rules or regulations at the same time (Gupta et al. 2017). However, different stakeholders are likely to have the same implementation challenges (Huang et al. 2022). In other words, some challenges must be addressed by both internal and external stakeholders. For example, Cloud ES depends heavily on high-speed Internet quality as any network failures may disrupt the usual business function of client organizations (Mac-Anigboro and Usoro 2015). As a result, it is a mandatory requirement for both client
organizations and vendors to maintain a high-speed network to ensure Cloud ERP implementation (Chand et al. 2018).

While several research studies have been conducted, only a few scholars offer solutions for most challenges. Security and privacy issues are considered the top challenge for Cloud ES implementation and have received the most attention from researchers. For example, Ambavane et al. (2018) recommend that Cloud vendors adopt security strategies and introduce regular security assessments to reduce the security issues in implementing Cloud ERP. In another study, Rabaya and Graffi (2019) suggest that regular monitoring and measure from vendor and client sides is an effective way to ensure the quality of SLAs. While being theoretically feasible, these proposed solutions are general and abstract. As a result, there is no evidence of how these solutions are likely to deal with security and privacy issues (Rabaya and Graffi 2019). In addition, very limited solutions are provided for other significant challenges in the existing literature. For these same implementation challenges that different stakeholders might have in the same project, little research has discussed how these stakeholders mitigate these challenges together in the real world.

Cloud ES implementation challenges in terms of specific Cloud ES systems

The most common Cloud ES include Cloud ERP, Cloud CRM and Cloud SCM (Salleh et al. 2012). Cloud ERP has been paid most attention by researchers: thirteen papers out of the total of sixteen are concerned with Cloud ERP implementation challenges. There are some similar challenges common to all. For example, integration is found to be a frequently reported challenge for Cloud ERP implementation. Integration may happen either in a single organization or across organizational boundaries since organizations may purchase different modules from different vendors (Ali and Miller 2017). If there is no proper integration strategy in place, there is a risk of data loss and new system delays. Integrating the system with internal systems is also a significant issue for Cloud CRM (Costello and Willcocks 2018). Some unique challenges for these systems are found in existing research studies. For example, the issue of how the client-supplier relationship evolves was only mentioned in the financial industry (i.e. bank) for Cloud CRM implementation. According to Costello and Willcocks (2018), finding people in both the banks and the service providers who had the technical capability and the time to identify the root causes when a system has some problems is challenging. Most of the existing studies are focused on investigating the implementation challenges for Cloud ERP butther Cloud ES systems, such as Cloud CRM, have received little attention. As a result, the conclusions of existing papers might lack generalizability to investigate the implementation challenges from a general Cloud ES perspective.

Research Gaps

After conducting the literature review, some research gaps are identified: compared with on-premise ES implementation challenges, most of Cloud ES implementation challenges are different. However, very little research has discussed how these Cloud ES implementation challenges were migrated in the real world. Furthermore, different challenges might be related to various stakeholders, and some stakeholders are likely to experience and mitigate the same implementation challenges simultaneously. However, very few existing papers have discussed the implementation challenges and their mitigation from different stakeholders’ perspectives. Moreover, the composition of stakeholders in the specific Cloud ES systems involved in implementation vary. The interaction among these stakeholders might be different in terms of different Cloud ES systems. Therefore, stakeholder analysis plays a significant role in understanding the implementation challenges of different Cloud ES systems.

Cloud-based Systems in Tertiary Educational Institutions

Although three papers concentrate on tertiary educational institutions, none comprehensively investigated the challenges of Cloud ES systems implementation in this sector. El Mhouti et al. (2018) identified the challenges of introducing CC into the e-learning process (connectivity weakness, cloud privacy and security issues), while Akin et al. (2014) mainly investigated the challenges of moving collaboration services (e.g. email, Calendar, Google Docs) to CC by surveying public universities in Southwestern Nigeria. Al-Sheerah et al. (2017) discussed the security challenges universities face in implementing CC technology; however, they did not mention any specific Cloud-based systems. All three used the same method (survey) which
although facilitated the identification of users’ perceptions, did not enable any more detailed insights into their actual implementation (Boillat and Legner 2014).

Tertiary educational institutions commonly implement Cloud ES systems such as Cloud CRM and Cloud ERP, but this has received little attention. According to Goel et al. (2011), Cloud ERP implementation offers several benefits to higher education institutions, such as reduced cost and scalability. The challenges educational institutions face mainly include the difficulty of integrating an ES into the curriculum and achieving educational benefits (Strong et al. 2006). Compared to traditional hierarchical organizations where decision-making follows a strict line of control, tertiary educational institutions are likely to be loosely-coupled systems with components that function together but exhibit significant independence from each other (Okunoye et al. 2008). Accordingly, it is necessary to understand the challenges of Cloud ES systems implementation in the context of tertiary educational institutions.

**Stakeholder Theory**

Stakeholder theory (ST) was developed by Freeman (1984) who proposed that a stakeholder in an organizational context represents any group or individual who can affect or be affected by that organization’s action. ST advocates that the outcome of organizational decision making and the actions undertaken by an organization are likely to be affected by the goals and interests of multiple stakeholders (Hatch 2018).

Existing literature on stakeholder theory identifies three key characteristics of stakeholders (Mitchell et al. 1997; Olander and Landin 2005): power, urgency, and legitimacy. Stakeholder power means the capability of those who exert their will over others to realize the outcomes they desire (Mitchell et al., 1997). Legitimacy is a social good shared amongst groups, communities, or cultures, which is more generalized than individual perception. Finally, urgency refers to the degree of immediate attention called by stakeholders (Mitchell et al. 1997). Drawing on these three characteristics, Mitchell et al. (1997) proposed a typology of stakeholders (see Figure 1).

![Figure 1. Stakeholder Typology](image)

This stakeholder typology includes eight types of stakeholders. For example, dormant stakeholders possess the power to exert their will over others, but their power remains unused since they do not have a legitimate relationship or an urgent claim. Discretionary stakeholders have no power for impacting the organizations and no urgent claims although they possess legitimacy. As a result, there is no pressure to engage in a relationship with stakeholders (Boonstra 2006). Stakeholder typology is frequently used to identify the role and interaction of stakeholders in IS projects. For example, Pandey and Gupta (2017) applied the stakeholder typology to analyze the reasons behind the failure of G2G e-government project implementation. Their findings suggested that some dominant stakeholders (e.g., the finance department) were coerced by less power and legitimacy, which meant that the implementing agency could not receive proper feedback to improve the system. Similarly, Boonstra (2006) and Sathish et al. (2003) used this taxonomy to understand the influence of stakeholders on the outcomes of ES implementation. In the present case, we found that the role of different stakeholders was a critical factor impacting project success. As a result, this theory examines the Cloud ES implementation phenomenon.
The stakeholders of Cloud ES implementations are any groups or individuals who can affect or be affected by the Cloud ES implementation project. Successful Cloud ES implementation requires the involvement of internal and external stakeholders (e.g., Cloud ES vendors, client organizations, and implementation partners) (Huang et al. 2021b). The ownership of Cloud ES solutions belongs to the Cloud ES vendors. Client organizations represent the users of the Cloud ES solutions deployed by the Cloud ES vendors. The implementation partners take the responsibility to work with client organizations to ensure the functions of the systems can be realized (Song et al. 2017). Sometimes the implementation partners come from vendors, but sometimes they are the individual entities. Each of the Cloud ES stakeholders may have different roles in terms of power, legitimacy and urgency, which further influences the implementation of the system. The existing literature about Cloud ES implementation challenges only considers individual stakeholders' perspectives without detailing their interactions. Therefore, ST is chosen for this study to explore the role of stakeholders in the successful implementation of Cloud ES. The stakeholder typology will thus serve as a guide to identify the role and interaction of stakeholders in the Cloud ES implementation context.

Research Design

Case study and description

Given the absence of an existing theoretical and conceptual framework to investigate the challenges of IS implementation and their mitigation, this research project is considered exploratory (Nickinson, 2003). We adopted an interpretive case study approach for the following three reasons. First, interpretive case studies can yield a rich understanding of key issues by minimizing the distance between the research and the key stakeholders of Cloud ES implementation to generate new or alternative theories and concepts (Lee 1999). Second, this research uses the perspectives of different stakeholders to perceive the challenges of Cloud ES implementation in organizations. Interpretivist research is ideally suited since it requires exploring an explanation within the participants' frame of reference and understanding the world from a subjective point of view rather than as an objective observer of the action (Lee 2004; Ponelis 2015). Third, existing studies regarding IS implementation challenges used a similar research approach after a literature review. Moreover, the existing IS literature research also applied the same approach to investigate the roles and interactions of stakeholders during implementation (e.g., Pandey and Gupta (2017), Boonstra (2006)).

The case study university was chosen based on the following criteria: 1) The university had successfully implemented more than one Cloud ES system. 2) The implementation projects involved collaboration between different stakeholders.

University X was selected for study. It is one of the biggest universities in Australia, employing over 10000 people. The organization had recently successfully implemented two Cloud ES systems (i.e., Cloud CRM and Cloud procurement). Data were collected from the main stakeholders who had been involved in the implementation projects. The role of the interviewees is shown as Table 1. For these two systems, the implementation partners came from the vendor sides.

<table>
<thead>
<tr>
<th>Cloud CRM</th>
<th>Cloud Procurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Department</td>
</tr>
<tr>
<td>P1</td>
<td>CRM</td>
</tr>
<tr>
<td>P2</td>
<td>CRM</td>
</tr>
<tr>
<td>P3</td>
<td>CRM</td>
</tr>
<tr>
<td>P4</td>
<td>IT</td>
</tr>
<tr>
<td>P5</td>
<td>IT</td>
</tr>
<tr>
<td>P6</td>
<td>Vendor</td>
</tr>
</tbody>
</table>
**Data Collection and Analysis**

A primary data source in both qualitative research and case studies is the interview (Yin 2009). Interviews were used for this project to facilitate in-depth analysis and provide room to explore new and relevant issues that emerge during the interview. We conducted 13 interviews at University X, each lasting 30-50 minutes. Most of the existing research studies about Cloud ES implementation challenges were not based on empirical analysis. The interview schedule in this project was developed based on papers about other systems implementation challenges, e.g. e-commerce (Waithaka and Mnkandla 2017), CRM (Ifrene and Kamenskii 2018). The interview schedule was divided into three parts: introduction, experience in implementation challenges and the migration process. The selection of stakeholders for interviews was done in consultation with the project manager or the team leader. The “snowball” method was also used to identify further potential interviewees. All interviews were recorded and transcribed.

The process of analyzing and interpreting data followed the four levels of analysis proposed by Cope (2005). Level 1 involves reviewing each transcript and making detailed notes to highlight significant issues (Ponelis 2015). This can help researchers familiarize themselves with the data and organize and structure the data. Writing up case study narratives and within-case analysis are involved in level 2. The overall idea of within-case analysis is becoming intimately familiar with each case which, in turn, facilitates cross-case comparison (Eisenhardt 1989). The case study narrative in this project is thematic. Level 3 is concerned with seeking out what is common and what is particular in the cases via comparing cases. The finding through the analysis can contribute to a unified description across cases, themes or categories (Ponelis 2015). Thematic analysis is used in level 3 to analyze data. Following the guidelines formulated by researchers (e.g. Peng and Gala (2014)), there are five stages in thematic analysis: a) getting familiar with the data, b) coding the data, c) connecting codes with themes (gather all data relevant to each theme), d) reviewing themes, e) defining and naming themes (coming up with a succinct and easily understandable name for each theme). Finally, the findings from level 3 will be compared to check if they are conflicting or consistent with the extant literature on Cloud-based system implementation challenges in level 4.

**Analysis and Findings**

University X provided an excellent environment for understanding the implementation challenges of Cloud ES. This university managed to implement Cloud CRM and Cloud procurement into the organization. In order to do this, stakeholders had to troubleshoot the implementation challenges of Cloud ES.

**Cloud ES Implementation Challenges**

The major challenges faced and mitigated by stakeholders in University X case are identified and discussed here.

**Security and privacy:** Cloud CRM and Cloud procurement stakeholders mentioned this challenge. For example, P2 stated that “…the first challenge is security in the cloud CRM...the data is not in the premises, it is outside...Salesforce is a shared kind of multi-tenant architecture”. This was supported by P6, who stated that “security has to be a challenge because we are on the Internet. So, security has to be foremost to the Cloud CRM design because it is exposed... so security is a challenge. It’s a constant challenge”. P11 in the procurement system also mentioned that “… given a lot of people the block on using an online system, the privacy issues exist”.

**Integration:** The Cloud CRM and Cloud procurement stakeholders proposed this challenge. For example, P11 suggested, “…we have a financial system (SAP) that follows global accounting standards... So then those are the anomalies that happen when the Cloud procurement system is very flexible in its design or not rigid in following global standards. And then you try to integrate that data into SAP, and then it fails”. This situation also happens in the Cloud CRM context. P2 and P3 stated that one of their key challenges was dealing with the integration between Cloud CRM and various existing systems. The external
stakeholder (i.e. P12) supported this remark, saying, “...So it struggles, or the challenges would have been integrated into your existing on-premise systems”.

User resistance: both Cloud CRM and Cloud procurement implementation experienced this challenge. Interviewees (e.g. P1, P8) suggested one of the biggest challenges for them is that a lot of people do not like and are resistant to changes.

Upgrade: only the Cloud CRM implementation faced this challenge. According to P1, Cloud CRM was growing fast and hard to find a straightforward way to adapt new upgrades directly in University X. The external stakeholder P7 supported P1 and elaborated that “another challenge is that the technology moves very quickly. And we have to keep up with it ... there might be a lot of planning and a testing cost that isn’t necessarily something that [University X] would do otherwise...therefore, you have to do work to be able to do that. So that is definitely a disadvantage”.

External users’ engagement: according to P10, University X had such challenge in terms of three reasons: a) “we (the group who work with suppliers) had challenges at the start with the suppliers being quite negative about the cloud-based platform, they are unwilling to use”; b) “there was a form in the system. The thing was this form was difficult. ...They were ambiguous questions ... it asked for repeated information”; c) “so there’s another challenge is how to handle smaller vendors who don’t want to put in invoices and don’t want to spend that time and go into the system”.

Analysis Using Stakeholder Theory

Stakeholder theory was then applied to examine the actual solutions for these challenges in University X. As different stakeholders solved each challenge in diverse ways according to different Cloud ES systems, this section is divided into two parts.

Step 1: Identification of the Power, Legitimacy and Urgency of Key Stakeholders in Cloud CRM Context

The key stakeholders and their power, legitimacy and urgency in the Cloud CRM context, as described by the descriptive aspect of stakeholder theory are shown in Table 2. Legitimacy is consistently high among these stakeholders since they are all connected to this system. For example, the project team and the implementation partner both had legitimate claims on how certain features or the system could be introduced to University X. The project team had the project management role, and the partner was the one who helped achieve successful implementation.

<table>
<thead>
<tr>
<th>Relevant stakeholders</th>
<th>Power</th>
<th>Legitimacy</th>
<th>Urgency</th>
<th>Typology of stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Project Team</td>
<td>High (as they are responsible for major decision making)</td>
<td>High</td>
<td>High (as it needs to complete the implementation based on the time schedule and the budget)</td>
<td>Definitive</td>
</tr>
<tr>
<td>The Implementation Partner</td>
<td>Medium (as they cannot make the decision but their suggestions could influence the decision making)</td>
<td>High</td>
<td>High (as the success of the project is their success and they have to follow the contract)</td>
<td>Dominant</td>
</tr>
</tbody>
</table>
The solution to mitigate security and privacy issues: as a definitive stakeholder, the project team (which includes project manager, technical developers, business analysts and product owners) had a conversation with the implementation partner about the security details of Cloud CRM. They ensure the system has some features, such as encryption-in-transit. The system complies with the ISO standards which are the internationally agreed security standards. They checked that the security policy involved in the system is consistent with the security policy in the case university and then came up with some new policies, such as the vendor cannot log into the database. Then, the project team discussed with the IT department to ensure this solution’s feasibility for University X. Finally, the project team decided to adopt this solution to mitigate the challenge.

The solution to mitigate integration issues: as the discretionary stakeholder, Cloud CRM users have the right to provide some integration requirements. However, their ideas could not directly be accepted by all stakeholders. Once receiving the requirements from users, the project team had to analyze them to ensure the requirements were achievable and feasible, which could lead to rejecting some requirements. Then they would decide how to meet the requirements (IT department might join in). After that, they would discuss with the implementation partner to ensure the impact of this requirement on the whole platform. The teams of other existing systems would provide the solution and the impact from their sides as well. Finally, the project team would make the final decision based on the discussion, the duration and the budget.

The solution to mitigate users’ resistance: the project team adopted the agile development methodology for this system. As a result, they enabled users to join the journey from the beginning. Similar to the previous process (i.e. the solution for integration challenge), the project team could not totally accept their requirements. The project team and the implementation partner also provided some training courses to users.

The solution to mitigate upgrading challenges: the project team had already developed the upgrade process for University X. When a new feature was introduced to the system, the implementation partner would provide the details to the project team. Then, the project team would discuss with users and the IT department, and decide whether University X would adopt it or not. If they made the decision to include it in the current system, the project team and IT department would consider the impact of this new feature on their roadmap and perform a test. The project team might provide some training sessions if needed. Users sometimes were forced to accept the upgrades (e.g. some old features were replaced). Some upgrades were quite complex, which might take a long time to realize, so the project team must constantly ensure progress.

Five stakeholders are involved in mitigating the implementation challenges of Cloud CRM. Although not all of them involved in every challenge, still some common stakeholders were there: a) the project team, which...
Cloud ES implementation challenges

is the *definitive stakeholder*, always has to make the final decisions for every challenge; b) the implementation partner, which is the *dominant stakeholder*, takes part in every decision making by providing the system information and advice for the project team. Their information and advice might influence the final decision making; c) users, which is *discretionary stakeholder*.

**Step 2: Identification of the Power, Legitimacy and Urgency of Key Stakeholders in Cloud procurement context**

The key stakeholders and their power, legitimacy and urgency in the Cloud procurement context, as described by the descriptive aspect of stakeholder theory are shown in Table 3. The reason for the legitimacy of the suppliers being medium is because they did not have any legitimate claims on how a system could be introduced to University X, but they could propose the features or requirements to the project team for consideration since they are still users of this system (but not mandate their use).

<table>
<thead>
<tr>
<th>Relevant stakeholders</th>
<th>Power</th>
<th>Legitimacy</th>
<th>Urgency</th>
<th>Typology of stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project team</td>
<td>High (as they are responsible for major decision making)</td>
<td>High</td>
<td>High (as it needs to complete the implementation based on the time schedule and the budget)</td>
<td>Definitive</td>
</tr>
<tr>
<td>The implementation partner</td>
<td>Medium (as they cannot make the decision but their suggestions could influence the decision making)</td>
<td>High</td>
<td>High (as the success of the project is their success and they have to follow the contract)</td>
<td>Dominant</td>
</tr>
<tr>
<td>The teams of other existing systems</td>
<td>Medium (as they cannot make the decision but their suggestions could influence the decision making)</td>
<td>High</td>
<td>Medium (as any change of the system might impact on the existing ones)</td>
<td>Dominant</td>
</tr>
<tr>
<td>Cloud procurement users (within the university)</td>
<td>Low (as they could not participate in the decision making)</td>
<td>High (as they are legitimate users)</td>
<td>Low (as they still had old systems to use)</td>
<td>Discretionary</td>
</tr>
<tr>
<td>Suppliers (who are responsible for providing their products or services for the case university)</td>
<td>Low (as they could not participate in the decision making)</td>
<td>Medium</td>
<td>Low (as they preferred to use the old ways)</td>
<td>Discretionary</td>
</tr>
<tr>
<td>IT department</td>
<td>Medium (as they cannot make the decision but their technical suggestions could influence the decision making)</td>
<td>High</td>
<td>Medium (The project team and IT department have common members; thus urgency adopt the system was shared by IT department as well)</td>
<td>Dependent</td>
</tr>
</tbody>
</table>
Cloud ES implementation challenges

<table>
<thead>
<tr>
<th>Cloud procurement vendor</th>
<th>Medium (as they still can provide some suggestions)</th>
<th>High</th>
<th>Medium (as some changes of the system might influence the whole one)</th>
<th>Dependently</th>
</tr>
</thead>
</table>

Table 3. Stakeholder Analysis for Cloud procurement Context

The solution to mitigate security and privacy: As a definitive stakeholder, the project team developed the approval process to restrict people to only be able to access parts of the system related to their particular areas. They discussed the feasibility of this solution with the implementation partner before introducing it and then cooperated with the IT department to introduce this process into the system.

The solution to mitigate integration: The users have legitimate claims on how certain integrations are required for the Cloud ES, such as they asked for integrating Cloud procurement with the existing financial system. Then the project team and implementation partner would review the requirements to evaluate their feasibility. Since a particular requirement could also be related to other systems, the project team had to discuss with other systems’ teams to understand the impact of this change. Finally, the project team would make the final decision. If this integration was within the project team’s capability, the vendor was not involved (the IT department might join in). If the integration is above their ability, the vendor side will take over this work.

The solution to mitigate users’ resistance: The project team provided more than one solution for this challenge. Firstly, they listened to the requirements and needs from users and then managed to put a balance in place for that. Secondly, the project team selected users who would frequently adopt this system to participate in the trial test and had a chat with users’ managers. Thirdly, the project team cooperated with the implementation partner to provide user presentations or training courses.

The solution for external users’ engagement: in order to increase suppliers’ motivation for using the new system, there is more than one solution developed by the project team. Firstly, project team members reached out to big suppliers to convince them before introducing the system. Secondly, they simplified the form that the vendor has to fill in in the system and developed a new form outside of the system. Thirdly, the accounts payable team was asked to take over the invoice submission work for one-time suppliers. These one-time suppliers do not have to go through the system and fill out the form anymore.

Similar to the Cloud CRM context, some stakeholders were involved in all mitigation activities in the Cloud procurement context with the same stakeholder typology (i.e. the project team, users, the team of other existing systems and the implementation partner). However, some unique stakeholders were identified from the Cloud procurement context, such as suppliers, the vendor.

Discussion

Five main challenges were identified from the data. Three of these challenges were found in both Cloud CRM and Cloud procurement implementation. Security and privacy is the most frequently reported challenge for Cloud ES implementation in the existing literature (e.g. Chand et al. (2018), Appandairajan et al. (2012)) which is consistent with our findings. However, different stakeholders may have different reasons for this challenge. For instance, internal stakeholders (e.g. P2, P11) were concerned about how the vendor would access and use the data, whereas the vendors (e.g. P6) had to find an effective way to convince the users to believe their security strategy is strong enough. Some significant challenges found in the literature, such as SLAs and customization, were not considered the main challenges in this study because of possible two reasons: a) most challenges reported in the literature are based on the Cloud ERP context, while our paper mainly focuses on Cloud CRM and Cloud procurement systems, b) the challenges reported in the literature were discussed in a general context while our paper concentrates on tertiary educational institutions.

Existing research shows inconsistent findings for the integration stage. According to Goel et al. (2011) and Abd Elmonem et al. (2016), easier integration is considered as the advantage of Cloud ES implementation. However, our findings suggest that integration is a challenge, and this is consistent with the study of Razzaq and Mohammed (2020) and Gupta et al. (2017). For example, Gupta et al. (2017) ’s study suggests the
integration challenge might happen in integrating Cloud ES with other systems since the users have less control over the system. Our findings add to this by showing that there are more reasons contributing to the integration challenges: a) Different data formats between two systems since they follow different standards; b) A large volume of master data with low data quality having to be cleaned and loaded into Cloud ES; c) It is hard to integrate with existing systems seamlessly and securely. Furthermore, we found that it is quite a challenge to require employees to adjust their routines to new ways of working. This can be a significant challenge for large organizations such as University X. This finding is consistent with the results of Sørheller et al. (2018) and Abd Elmonem et al. (2016).

Some unique challenges in terms of different Cloud ES systems were identified from the interviews. Most of the existing research suggests that ongoing upgrades is one of Cloud ES systems’ benefits (Abd Elmonem et al. 2016). This is because Cloud ES vendors keep improving their competitive advantages by providing software upgrades at any time (Chang 2020). However, our findings suggest that updates could challenge client organizations because of the technical and organizational issues encountered by introducing Cloud CRM updates. Considerable planning and testing are needed. It is more challenging if there is any integration between Cloud CRM and other systems since client organizations also have to check the performance of the integrations when updates are introduced.

External users’ engagement is considered as a challenge for Cloud procurement only. The sustained engagement of all stakeholders plays an important role in the successful implementation of Cloud procurement (Mohungoo et al. 2020). According to Vaidya et al. (2006), suppliers’ engagement significantly impacts the system implementation success. Our findings also suggest it is challenging for suppliers to adopt a Cloud procurement system which provides a one-size-fits-all process. The bigger suppliers are unwilling to change their routines for the new system, and the smaller suppliers are unwilling to navigate the interface. The quality of the interface and extent of form filling required in the system can discourage suppliers from using it. Since the new procurement system could not differentiate the requirements of different suppliers, University X developed their own strategy to mitigate it.

The different stakeholders involved in mitigation of challenges and their typology for both cloud CRM and procurement in the case university are identified. Some stakeholders (i.e. the project team, users, the teams of other existing systems and the implementation partner) were involved in both system implementations, and their stakeholder typologies are identical in terms of power, legitimacy and urgency. For example, since both systems required integration with other existing systems, the teams from other systems were involved in the implementation to ensure the feasibility and impact of the integration. Instead of making the final decisions about the implementation, they only provided some suggestions. As some integrations might impact the current systems, their urgency is medium. Therefore, the stakeholder typology for them is dominant in both system implementations. Analysis of the existing literature showed that some stakeholders are likely to experience and mitigate the same implementation challenges simultaneously. Our findings suggest that the main challenges experienced by University X were usually mitigated by more than one stakeholder regardless of Cloud ES systems. Some stakeholders were involved in all mitigation activities. Firstly, the project team is generally responsible for creating all project implementation schedules and conducting various implementation activities (Tsai et al. 2005). Much existing literature has mentioned that the project team has a significant impact on the success of Information System (IS) implementation, such as Saleh et al. (2013), AboAbdo et al. (2019). Secondly, the role of implementation partners (or consultants) was considered as an important factor for the success of IS implementations by several researchers (Hung et al. 2012). The implementation partners can be viewed as an external knowledge stock, which provides the necessary knowledge to the client organizations (Saleh et al. 2013). Thirdly, although users were not decision-makers, they were the people who would use the system. As a result, users’ requirements and attitudes toward the new system are significant to the successful implementation of an information system. Regardless of how powerful technology may be, it will not contribute to better performance unless more users are willing to adopt it (Mekadmi and Louati 2018). Some unique stakeholders were also identified in this research; the vendor and suppliers were only considered stakeholders in the Cloud procurement context. The vendor was not identified as a relevant stakeholder in Cloud CRM since the implementation partner in Cloud CRM is from the vendor side. Their role included the implementation partner and the vendor jobs. Furthermore, the suppliers are different from users (within the university) because: a) they get different services from the Cloud procurement system and adopt the system in different ways, b) compared with users within the university, suppliers do not have many legitimate claims on the system adoption and implementation. It is not compulsory for them to use the
system. This finding is also consistent with our analysis of the literature: different Cloud ES systems have different stakeholders involved in the implementation.

The flexibility of the system influences the three key characteristics of the stakeholders. Compared to cloud procurement systems, Cloud CRM is considered more flexible so the project team has more capability to conduct Cloud CRM activities by themselves, such as integration and configuration. On the other hand, the cloud procurement systems are often less flexible and there are some activities that require skills beyond the project team’s capability, in which case they will hand the requirement over to the Cloud procurement vendor. This suggests that vendors have significant power in cloud procurement implementation.

Conclusion

Given the lack of research regarding the implementation challenges of Cloud ES in tertiary educational institutions, the main objective of this paper is to identify the main challenges and ascertain how these challenges were mitigated. Interview data from a single case study was used to address the research questions. This university had successfully implemented two Cloud ES systems: Cloud CRM and Cloud procurement. Some common challenges were identified from these two systems: security and privacy, integration, users’ resistance. One unique challenge was identified for each Cloud ES system. The university experienced upgrade challenges for Cloud CRM implementation and experienced external users’ engagement for Cloud procurement. We also applied stakeholder theory to investigate stakeholders’ roles and interactions during the mitigation for these challenges. Some common stakeholders with the same stakeholder typology were identified from these two systems: the project team (definitive stakeholder), the implementation partner (dominant stakeholder) and users (discretionary stakeholder). Two unique stakeholders were identified in the Cloud procurement context: procurement system vendors and suppliers.

The next step of this project will investigate implementation challenges in three other universities and interview more stakeholders. This will enable us to undertake cross case analysis in order to gain more insight into implementation challenges and how stakeholders mitigate those challenges. Tertiary educational institutions are currently grappling with the implementation of Cloud ES, and our paper identifies the main challenges and the role and interaction of stakeholders in their mitigation. This study highlights the importance of the project team and the implementation partner in mitigating implementation challenges and provides deeper insights by adopting stakeholder theory as a theoretical lens and identifying the salience of various important stakeholders involved in the implementation project.

References


Pacific Asia Conference on Information Systems 2022
Cloud ES implementation challenges


Huang, Q., Oliver, G. C., Mahbubur, M., and Foster, S. 2021b. "Understanding Cloud-Based Erp Customization from Key Stakeholders’ Perspectives: A Research Model.").
Cloud ES implementation challenges


Appendix

<table>
<thead>
<tr>
<th>No</th>
<th>Challenges</th>
<th>Number</th>
<th>Cloud ERP</th>
<th>Cloud CRM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cloud ES implementation challenges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Long-term costs</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Network and internet</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Performance</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Elasticity and Scalability</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bank: Costello and Willcocks (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Functionality Fit</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Costello and Willcocks (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Integration</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>compliance</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appandairajan et al. (2012), Mac-Anigboro and Usoro (2015), Purohit et al. (2012), Abd Elmonem et al. (2016)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Costello and Willcocks (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Reliability</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Customers resistance</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Multiple Locations for Storage</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chand et al. (2018), Appandairajan et al. (2012), Iqbal et al. (2012), Singh and Nagpal (2014)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Monitoring, Analysis and Building Trust</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Goel et al. (2011), Gupta et al. (2017), Purohit et al. (2012), Abd Elmonem et al. (2016)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Organizational Change</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sorheller et al. (2018), Gupta et al. (2017), Abd Elmonem et al. (2016)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Increasing complexity (technical/business)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Strategic risk</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vadivelu et al. (2018, Abd Elmonem et al. (2016)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Denial of Service</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chand et al. (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Integrity of provider</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gupta et al. (2017)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Management Awareness</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gupta et al. (2017)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>How Do We Evolve the Client-Supplier Relationship</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Costello and Willcocks (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>