

# An empirical investigation of organizations' switching intention to cloud enterprise resource planning: a cost-benefit perspective

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## Abstract

Although cloud computing has a number of benefits, privacy risks play a critical role in organizations' decisions to switch to cloud services. However, few studies on cloud adoption have investigated effects of both benefits and costs on switching intention. Based on cost-benefit analysis and technology acceptance model, this study develops a research model to investigate how benefits (perceived usefulness and perceived ease of use) and costs (perceived risk and privacy concerns) influence organizations' switching intention to cloud Enterprise Resource Planning (ERP). The model also accounts for trust and perceived control in the context of cloud computing. Perceived usefulness, perceived ease of use, and privacy concerns significantly affect switching intention. Trust can enhance perceived usefulness and perceived ease of use and reduce perceived risk. Perceived control can also reduce perceived risk and privacy concerns. The findings are useful to understand switching issues from traditional ERP to cloud ERP for both researchers and practitioners.

## Keywords

cloud computing, technology acceptance model, cost-benefit analysis, enterprise resource planning, switching intention

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## Introduction

In recent years, cloud computing has become an emerging information technology (IT) development. It provides business products, services, and solutions that are delivered and consumed in real-time over the Internet (Gen 2008). Cloud-based models can be categorized into public, private, and hybrid clouds. In the public cloud model, services and resources are provided by cloud service providers and accessed over the Internet; in the private cloud model, IT resources and services remain within an organization and are accessed via the Intranet. Hybrid clouds mix the models of public and private clouds. Recently, public clouds have received increasing attention in IT industries. As International Data Corporation (IDC) reports, public cloud services reached US\$47.4 billion

in 2013. Furthermore, the market for cloud services is expected to reach US\$107 billion by 2017 (Mishra 2013).

Several organizations tend to switch to public cloud systems because of the benefits and useful interfaces of cloud computing (Low et al. 2011). However, the switch from traditional systems to cloud systems is still in the early stages (Park and Ryoo 2013). Accessing to data and services over the Internet increases the chances of compromising security.

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Security risks over their data are the major concern that inhibits cloud system adoption (Gartner 2015). The cloud systems being investigated in this study are cloud Enterprise Resource Planning (ERP) systems because ERP is the common application of public cloud services in organizations (Low et al. 2011). Thus, this study attempts to understand the factors that affect organizations' switching intention from traditional ERP to cloud ERP.

This study uses cost-benefit analysis (CBA) to examine the effects of benefits and costs on switching intention. From the benefit perspective, perceived usefulness and perceived ease of use are extracted from Technology Acceptance Model (TAM) constructs. Although existing IS studies have applied TAM to investigate factors that affect usage intention of e-commerce (Agag and El-Masry 2016; Gefen et al. 2003; Pavlou 2003; Heijden et al. 2003), the Internet (Lederer et al. 2000; Moon and Kim 2001), and enterprise systems (Chang et al. 2014; Davis et al. 1989; Venkatesh and Davis 2000), no prior studies have addressed switching intention from the viewpoint of TAM.

From the cost perspective, perceived risk and privacy concerns are considered because of the uncertainty of cloud environments (Gartner 2015, Gen 2009). A number of studies have found that privacy risks reduce consumer acceptance of e-commerce because consumers conduct transactions and provide personal information on the Internet (Dinev and Hart 2006; Dinev et al. 2006; Heijden et al. 2003; Pavlou 2003). Since organizations move all of their business processes and organizational information to public clouds, the organizations' challenge of privacy risks would be greater than an individual's privacy risk. To our knowledge, there are no studies to investigate the effects of perceived risk and privacy concerns at the organizational level.

To reduce risk or risk perception, trust plays a critical role in uncertain environments. Trust has been found to mitigate perceived risk and facilitate consumer behavior (Zhou 2013). Perceived control is also an important element to control uncertain environments. Perceived control acts as a mechanism to adjust consumers' privacy risks (Li et al. 2014; Xu et al. 2011). Since trust and perceived control can enhance benefits and reduce costs, the two constructs are integrated into the proposed model to be key drivers to enhance benefits and reduce costs. Thus, the following three research questions are addressed:

1. What are the benefits that motivate organizations to switch to cloud ERP?
2. What are the costs that inhibit organizations to switch to cloud ERP?
3. What are the factors that enhance benefits and reduce costs?

By answering these research questions, this study can help researchers and practitioners enhance the understanding of organizations' decisions to switch to cloud ERP. From a theoretical perspective, the investigation is based on a model grounded on CBA and TAM. We confirm that benefits and costs affect switching intention. The results also show that trust and perceived control can help to enhance benefits and reduce costs.

From a managerial perspective, the findings show that system functionalities and interfaces are still the key benefits to attract organizations to switch to cloud ERP. Cloud service providers should strive to increase their reputation to earn customers' trust. Additionally, cloud service providers should implement user authority management for controlling data access and dissemination to enhance customers' perceived control.

The remainder of this paper is organized as follows. In the next section, we review the literature on cloud computing, TAM, and CBA. Then, we develop the research model and hypotheses in section three. Section four describes data collection and the research methodology, section five presents our results, and section six discusses the research results. We present the theoretical and practical implications in section seven. Conclusion and limitations are presented in the final section.

## Literature review

### *Cloud computing*

The National Institute of Standards (NIST) (2011) defined cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." NIST broadly categorized cloud service models into Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). IaaS delivers computing servers, data storage, and networks as services. System administrators can deploy and run operating systems and applications on

the hardware and network infrastructures provided by cloud service providers. PaaS delivers application development and deployment platforms as services. Developers can design and develop applications on computing platforms. SaaS provides functionalities of software and applications as on-demand services. End-users can access to on-demand services and resources over the Internet (Géczy et al. 2012; Welsh and Gregory 2012).

Previous studies have explored the factors that affect cloud adoption. From the benefit perspective, scholars posited to emphasize the importance of technological factors. For example, expected benefits and useful interfaces of cloud systems affect organizations' intention to adopt cloud computing (Low et al. 2011; Lian et al. 2014). Additionally, organizational and CIO innovativeness play important roles in the diffusion of cloud computing (Lian et al. 2014; Ratten 2016). From the cost perspective, scholars argued that security risk is the most important cost factor for organizations (Lee et al. 2013; Paquette et al. 2010; Ratten 2016). The uncertainty of cloud environments might reduce organizations' intention to adopt cloud computing (Lanois 2010; Subsashini and Kavitha 2011).

However, few studies on cloud adoption have investigated effects of both benefits and costs. Since most existing organizations have currently implemented ERP, we address switching issues from current ERP to cloud ERP. Therefore, this study investigates the benefits and costs that affect organizations' switching intention to cloud ERP.

### *Technology acceptance model*

The Technology Acceptance Model (TAM) was adapted from the Theory of Reasoned Action (TRA). TRA posited that an individual's attitude toward behavior and subjective norm determines his/her behavioral intention (Fishbein and Ajzen 1975). Subjective norm is defined as "an individual's perception of whether people important to the individual think the behavior should be performed." Attitude toward behavior is defined as "an individual's positive or negative feelings about performing a behavior."

According to TRA, Davis (1986) developed TAM to explain IS adoption. In TAM, an individual's perceived usefulness and ease of use determine his/her behavioral intention to use a system. Additionally, the individual's perceived usefulness is influenced by his/her perceived ease of use. Perceived usefulness is

defined as "an individual believes that using a particular system would enhance his/her job performance." Perceived ease of use is defined as "an individual believes that using a particular system would be free of effort."

Based on TAM, perceived usefulness and perceived ease of use are important drivers of technology acceptance. The findings have been verified in different contexts, such as e-commerce (Agag and El-Masry 2016; Gefen et al. 2003; Pavlou 2003; Heijden et al. 2003), the Internet (Lederer et al. 2000; Moon and Kim 2001), and enterprise systems (Chang et al. 2014; Davis et al. 1989; Venkatesh and Davis 2000). Therefore, this study examines the effects of perceived usefulness and perceived ease of use in understanding organizations' cloud ERP adoption.

### *Cost-benefit analysis*

Cost-benefit analysis (CBA) is used to explain an individual's behavioral decision. Before an individual makes a choice, he/she compares and weighs anticipated costs and benefits involving the alternative. If perceived costs are balanced by perceived benefits, the individual will be likely to engage in the alternative. CBA has also been applied to organizations' behavioral decisions on IT investment (Accounting Financial & Tax, 2014; Liu et al., 2008; Shiau et al., 2009; TechTarget, 2017). In this study, we characterize perceived usefulness and perceived ease of use as benefits and characterize perceived risk and privacy concerns as costs.

According to TAM, perceived usefulness and perceived ease of use are the benefit factors that motivate organizations to use IS. Perceived usefulness refers to expected usefulness from IS, while perceived ease of use refers to useful interfaces of IS (Davis 1989; Davis et al. 1989).

Perceived risk and privacy concerns are the major concerns stopping organizations' cloud adoption (Gartner 2015, Gen 2009). Between private and public clouds, the latter poses the highest privacy risks because organizations access data and services over the public Internet, and their data are stored in an area controlled by cloud service providers (Géczy et al. 2012). Thus, organizations worry that their information may be hacked or that the cloud service providers may disclose it to others. Perceived risk and privacy concerns have been investigated in several Internet-based contexts, such as e-commerce and mobile

services (Dinev and Hart 2006; Dinev et al. 2006; Xu et al. 2011, Heijden et al. 2003; Li et al. 2014; Pavlou 2003; Zhou 2013). These results showed that perceived risk or privacy concerns negatively affect usage intention. Thus, perceived risk and privacy concerns are considered as cost factors in this study.

### *Factors enhancing benefits and reducing costs*

In the business world connected by the Internet where people do not know each other and yet have to conduct online transactions, trust plays a critical role in building a mutual relationship. Trust can not only facilitate consumer behavior but also decrease risk or risk perception in uncertain environments (Zhou 2013). Existing empirical evidence has found that trust increases perceived utility, such as perceived usefulness and perceived ease of use (Gefen et al. 2003; Pavlou 2003; Tung et al. 2008). Additionally, previous studies found that trust has a negative influence on perceived risk (Heijden et al. 2003; Jarvenpaa et al. 2000; Pavlou 2003; Zhou 2013). Therefore, trust is adopted as the determinants of enhancing benefits and reducing costs.

Perceived control is viewed as an important element to control uncertain environments, such as Internet-based contexts. When individuals engage in consumer behaviors over the Internet, online activities are related to personal information disclosure. Individuals' decisions on whether to share their information or not involve a privacy calculus where privacy risks are weighed against perceived control (Dinev and Hart 2006; Li et al. 2014). If organizations perceive that they can control the uncertainty of cloud environments, perceived risk and privacy concerns will be reduced. The existing empirical research has supported the links between perceived control, perceived risk, and privacy concerns (Li et al. 2014; Xu et al. 2011). Therefore, perceived control is adopted to reduce perceived risk and privacy concerns.

### **Research hypotheses and model**

In the context of cloud computing, this study defines perceived usefulness as the degree to which an organization believes that using cloud ERP would enhance its job performance and defines perceived ease of use as the degree to which an organization believes that using cloud ERP would be free of effort. According to TAM (Davis 1989; Davis et al. 1989), perceived ease of use directly and indirectly determines behavioral intention through perceived usefulness. Several

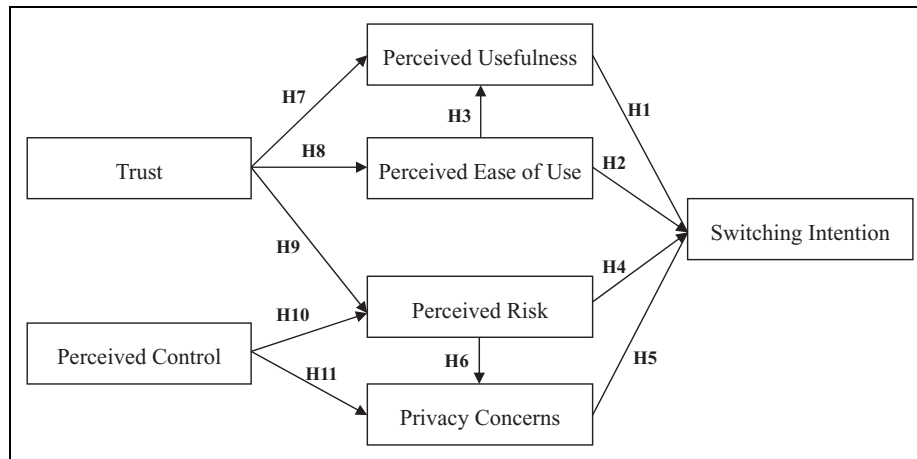
studies have indicated that perceived usefulness and perceived ease of use influenced behavioral intention and that perceived ease of use influenced perceived usefulness (Chang et al. 2014; Moon and Kim 2001; Pavlou 2003; Wu and Wang 2005). If organizations find cloud ERP is useful and easy to use, their switching intention to the systems will be high. Thus, this study hypothesizes the following:

- H1. Perceived usefulness positively affects switching intention.
- H2. Perceived ease of use positively affects switching intention.
- H3. Perceived ease of use positively affects perceived usefulness.

In this study, perceived risk of opportunistic behaviors is related to the disclosure of organizational information submitted by the cloud ERP adopters. Privacy concerns refer to concerns about opportunistic behaviors related to organizational information submitted by the cloud ERP adopters. Perceived risk and privacy concerns increase uncertainty when cloud service providers might behave opportunistically. For example, organizational information or records of transactions could be disclosed to third parties, such as government agencies or other competitors. When organizations perceive potential losses and uncertainty, they lower their switching intention to cloud ERP.

On the other hand, perceived risk is closely related to privacy concerns since potential losses and uncertainty are associated with disclosing organizational information. The causal relationships between perceived risk and privacy concerns are ambiguous. Some research has posited that perceived risk causes perceived concerns (Dinev and Hart 2006; Dinev et al. 2006; Xu et al. 2011). Other research has suggested that perceived concerns was the cause (Zhou 2013). Since most of the literature treats perceived risk as the cause, we posit that when organizations perceive more risk, they also have more privacy concerns. Thus, this study hypothesizes the following:

- H4. Perceived risk negatively affects switching intention.
- H5. Privacy concerns negatively affect switching intention.
- H6. Perceived risk positively affects privacy concerns.



**Figure 1.** Research model.

Trust in this study refers to an organization's expectations about the motives and behaviors of cloud service providers. Trust can be viewed as an external variable of TAM, meaning trust is an antecedent of perceived usefulness and perceived ease of use (Pavlou 2003). Several studies have also integrated trust with TAM to increase IS adoption (Agag and El-Masry 2016; Gefen et al. 2003; Heijden et al. 2003). When organizations trust cloud service providers, they increase switching intention to cloud ERP. Trust also helps organizations increase the expected utility of cloud ERP and feel free of effort in using the interfaces of cloud ERP.

On the other hand, trust reduces risks associated with cloud service providers' opportunistic behaviors. When organizations trust cloud service providers, they tend to believe that the cloud service providers are less likely to engage in opportunistic behaviors. Thus, trust plays an important role in reducing risk perception (Li et al. 2014). Indeed, several studies have found that trust decreases perceived risk (Heijden et al. 2003; Jarvenpaa et al. 2000; Li et al. 2014; Nicolaou and McKnight 2006; Pavlou 2003; Zhou 2013). Thus, this study hypothesizes the following:

- H7. Trust positively affects perceived usefulness.
- H8. Trust positively affects perceived ease of use.
- H9. Trust negatively affects perceived risk.

Perceived control in this study refers to an organization's beliefs in its ability to manage the release and dissemination of its information. In the context of cloud computing, organizations' perception of control may reduce perceived risk and privacy concerns. If

organizations have control over their information disclosure, they will believe that cloud service providers are less likely to behave opportunistically. On the other hand, when organizations perceive that they have less control of the information, they perceive cloud ERP with higher risks and exhibit more privacy concerns. Since perceived control directly affects perceived risk and privacy concerns, it may also indirectly influence switching intention. Previous studies have shown that perceived control negatively affects perceived risk (Li et al. 2014) and privacy concerns (Xu et al. 2011). Thus, this study hypothesizes the following:

- H10. Perceived control negatively affects perceived risk.
- H11. Perceived control negatively affects privacy concerns.

Our research model is shown in Figure 1.

## Research methodology

### Measurement instrument

The research model was empirically tested using data collected from a survey. Measures for perceived usefulness and perceived ease of use were adapted from Davis et al. (1989). Measures for perceived risk and privacy concerns were adapted from Dinev et al. (2006). Measures for trust were adapted from Jarvenpaa et al. (2000). Measures for perceived control were adapted from Xu et al. (2011). Measures for switching intention were adapted from Venkatesh et al. (2003). All constructs are modeled as reflective based on the existing literatures. The 21 items were measured on a 7-point Likert scale ranging from "strongly disagree"

(1) to “strongly agree” (7). Appendix 1 lists the final items and their sources.

### Sample

The respondents were participants invited by cloud service providers to attend conferences illustrating the benefits of cloud ERP. The questionnaires were distributed at the end of the conferences. Thus, the respondents should have some knowledge of cloud ERP when answering the questionnaires. The participants who were invited to the conferences were deemed by the cloud service providers as having influence in making switching decisions. The background information collected the names of the ERP and the modules being utilized in organizations. Thus, questionnaires filled out by participants whose organizations do not have ERP were filtered out from the analyzed data. Out of 500 questionnaires, we obtained 277 valid responses. The valid response rate was 55.4%. Appendix 2 lists the respondents' demographics.

### Data analysis

This study uses covariance-based structural equation modeling (CB-SEM) with AMOS to test the measurement and structural models. In the measurement model, we use Cronbach's alpha and confirmatory factor analysis to examine the reliability and discriminant validity of each item and construct. In the structural model, we examine the hypothesized relationships between constructs in the research model. Additionally, common method bias is used to examine potential bias during the data collection process.

## Results

### Common method bias

To assess common method bias, Harman's one-factor test was examined by using a principal component analysis. If a single construct accounts for more than 50% of variance, the common method bias may threaten the validity (Harman 1976; Mattila and Enz 2002; Pee et al. 2010). The results show that the combined 7 constructs account for 90.43% of total variance. The variance of the 7 constructs ranges from 8.74% to 17.10%, which is less than 50% of variance. Therefore, the items of this study may exclude common method bias.

**Table 1.** Reliability.

Construct	Mean	S.D.	CR	Cronbach's	
				alpha	AVE
Perceived Usefulness (PU)	5.22	1.04	0.94	0.95	0.92
Perceived Ease of Use (PEOU)	5.08	0.96	0.96	0.96	0.92
Perceived Risk (PR)	3.60	1.43	0.83	0.91	0.84
Privacy Concerns (PCC)	3.59	1.49	0.92	0.97	0.93
Trust (TR)	2.51	0.93	0.89	0.89	0.73
Perceived Control (PCT)	3.10	1.05	0.95	0.96	0.89
Switching Intention (SI)	4.77	1.2	0.95	0.96	0.90

**Table 2.** Cross-loadings for the measures.

	PU	PEOU	PR	PCC	TR	PCT	SI
PUI	<b>0.82</b>	0.31	-0.01	-0.03	0.20	0.16	0.26
PU2	<b>0.82</b>	0.30	-0.05	-0.05	0.20	0.18	0.23
PU3	<b>0.86</b>	0.23	0.02	-0.05	0.20	0.15	0.25
PU4	<b>0.81</b>	0.25	-0.09	-0.01	0.09	0.19	0.23
PEOU1	0.25	<b>0.80</b>	-0.14	-0.04	0.24	0.26	0.18
PEOU2	0.36	<b>0.78</b>	-0.12	-0.03	0.22	0.24	0.16
PEOU3	0.31	<b>0.83</b>	-0.05	-0.08	0.25	0.18	0.18
PEOU4	0.26	<b>0.84</b>	-0.01	-0.06	0.24	0.17	0.17
PR1	-0.01	-0.08	<b>0.89</b>	0.34	-0.07	-0.11	0.01
PR2	-0.06	-0.11	<b>0.88</b>	0.33	-0.12	-0.07	0.02
PCC1	-0.06	-0.05	0.44	<b>0.86</b>	-0.10	-0.14	-0.05
PCC2	-0.04	-0.08	0.37	<b>0.89</b>	-0.10	-0.13	-0.02
TR1	0.12	0.26	-0.12	-0.03	<b>0.86</b>	0.09	0.13
TR2	0.22	0.27	-0.11	-0.11	<b>0.81</b>	0.22	0.09
TR3	0.36	0.27	0.01	-0.13	<b>0.70</b>	0.26	0.18
PCT1	0.16	0.17	-0.04	-0.07	0.15	<b>0.90</b>	0.13
PCT2	0.21	0.25	-0.09	-0.13	0.17	<b>0.87</b>	0.18
PCT3	0.19	0.24	-0.11	-0.11	0.17	<b>0.87</b>	0.20
SI1	0.21	0.17	-0.03	0.01	0.10	0.17	<b>0.89</b>
SI2	0.28	0.18	0.04	-0.04	0.12	0.14	<b>0.90</b>
SI3	0.28	0.16	0.02	-0.04	0.12	0.17	<b>0.89</b>

### Measurement model

CB-SEM was used to analyze reliability and validity. Convergent validity was assessed using item reliability, composite reliability (CR), Cronbach's alpha, and average variance extracted (AVE) (Gefen et al. 2000). As shown in Table 2, item reliability is assessed using factor loading, which ranges from 0.70 to 0.90, which exceed the 0.7 recommended level. CR for each construct ranges from 0.83 to 0.96, which exceed the 0.7 recommended level. Cronbach's alpha for all constructs ranges from 0.89 to 0.97, which exceed the 0.5 recommended level. AVE for each construct

**Table 3.** Inter-construct correlations.

	PU	PEOU	PR	PCC	TR	PCT	SI
PU	<b>0.92</b>						
PEOU	0.69	<b>0.92</b>					
PR	-0.14	-0.24	<b>0.92</b>				
PCC	-0.17	-0.22	0.76	<b>0.96</b>			
TR	0.61	0.68	-0.29	-0.30	<b>0.85</b>		
PCT	0.51	0.57	-0.27	-0.32	0.55	<b>0.95</b>	
SI	0.60	0.48	-0.03	-0.12	0.41	0.44	<b>0.95</b>

ranges from 0.73 to 0.93, which exceed the 0.5 recommended level. Table 3 shows that the square root of AVE for each construct exceeds the correlations between the construct and other constructs. Thus, reliability and validity are supported.

The fitness measures for the measurement model are tested by  $\chi^2$ , GFI, AGFI, NFI, CFI, RMSEA, and SRMR. The proposed model shows that the  $\chi^2$ /d.f. is 2.087 ( $\chi^2 = 350.63$ ; d.f. = 168), which is less than 5 (Kettinger and Lee 1994). The GFI and AGFI are 0.89 and 0.85, which are greater than the recommended value of 0.8 (Scott 1995). The NFI and CFI are 0.95 and 0.97, which are higher than the recommended value of 0.9 (Bentler and Bonett 1980). The RMSEA is 0.06, which does not exceed the recommended value of 0.08 (Brown and Cudeck 1993). Meanwhile, SRMR is 0.04, which is lower than the recommended value of 1 (Hu and Bentler 1999). Both indices of the RMSEA and SRMR fall into acceptable ranges.

### Structural model

CB-SEM was applied to test hypothesized relationships among all constructs. As shown in Figure 2, perceived usefulness ( $\beta = 0.503$ ,  $p < 0.001$ ) and perceived ease of use ( $\beta = 0.148$ ,  $p < 0.05$ ) have a significant positive effect on switching intention, and privacy concerns ( $\beta = -0.141$ ,  $p < 0.05$ ) have significant negative effect on switching intention, providing support for H1, H2, and H5. The proposed model explains 37.5% of the variance in switching intention. Contrary to our expectations, perceived risk ( $\beta = 0.182$ ) has no negative effect on switching intention; therefore, H4 is not supported.

Perceived ease of use ( $\beta = 0.484$ ,  $p < 0.001$ ) and trust ( $\beta = 0.289$ ,  $p < 0.001$ ) has a significant positive effect on perceived usefulness, supporting H3 and H7. The model accounts for 51.6% of the variance in perceived usefulness. Trust ( $\beta = 0.708$ ,  $p < 0.001$ ) also has a significant positive effect on perceived ease of use,

supporting H8. This path accounts for 50.1% of the variance in perceived ease of use.

Furthermore, perceived risk ( $\beta = 0.748$ ,  $p < 0.001$ ) has a significant positive effect on privacy concerns, and perceived control ( $\beta = -0.116$ ,  $p < 0.01$ ) has a significant negative effect on privacy concerns, supporting H6 and H11. The two paths account for 61.9% of the variance in privacy concerns. Trust ( $\beta = -0.203$ ,  $p < 0.05$ ) and perceived control ( $\beta = -0.145$ ,  $p < 0.05$ ) have significant negative effects on perceived risk, providing support for H9 and H10. The two paths account for 10.7% of the variance in perceived risk.

### Discussion

The results show that perceived ease of use positively influences perceived usefulness, which in turn influences switching intention. Perceived usefulness, perceived ease of use, and privacy concerns significantly affect switching intention. Our results are in line with arguments of CBA (Dinev and Hart 2006; Li et al. 2014; Pavlou 2003). Extending a cost-benefit perspective, trust is found to significantly affect perceived usefulness, perceived ease of use, and perceived risk, while perceived control is found to significantly affect perceived risk and privacy concerns. In contrast, we do not find that perceived risk significantly influences switching intention.

Although we speculate that perceived risk as well as privacy concerns affect switching intention, only privacy concerns significantly affect it. One possible explanation is that the investigated organizations are using traditional ERP. Therefore, only organizations that have actually switched to public clouds are concerned about the cloud service providers' opportunistic behaviors.

On the other hand, the unsupported hypothesis might be explained based on the concept of Two-Factor Theory (Herzberg 1959). This theory posits that motivators lead to job satisfaction (e.g., advancement, recognition, responsibility, and achievement), but their absence does not cause job dissatisfaction. Hygiene factors lead to job dissatisfaction (e.g., supervision, pay, company policies, and working conditions), but their absence does not increase job satisfaction. Although low perceived risk may or may not increase organizations' switching intention, high perceived risk will definitely decrease it. Similar to hygiene factors, perceived risk affects organizations' unwillingness to switch but does not affect their willingness to switch.

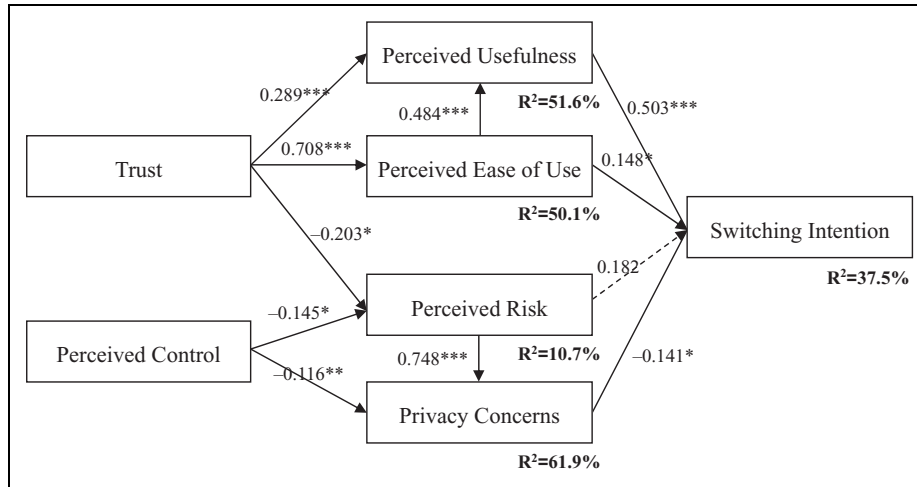


Figure 2. Results.

**Implications for theory and practice**

*Implications for theory*

Several studies have investigated the effects of the benefits and costs of cloud adoption (Lian et al. 2014; Low et al. 2011; Ratten 2016). However, since most organizations have implemented ERP, investigating adoption alone may not truly reflect the dilemma faced by managers and owners of enterprises. Thus, this study addresses switching issues from current ERP to cloud ERP. Our research model also differs from these previous studies by investigating the factors of trust and perceived control in enhancing benefits and reducing costs.

Although switching intention is an important issue to discuss, few studies have been devoted to investigate these factors. Park and Ryoo (2013) investigate the factors influencing users to switch to cloud-based office software. The cost factors are satisfaction with and breadth of use of incumbent systems rather than perceived risk and privacy concerns, even though privacy risks are the major concerns in the context of cloud computing (Gartner 2015, Gen 2009). This study shows that factors influencing organizations’ switching intention to cloud ERP can be organized based on CBA and TAM. We also demonstrate that trust and perceived control are the determinants of benefits and costs.

In this study, perceived usefulness and perceived ease of use are regarded as the benefits that motivate organizations’ switching intention. TAM was originally proposed to explain IS adoption. Several studies have employed TAM to investigate IS usage intention rather than switching intention (Agag and El-Masry

2016; Chang et al. 2014; Gefen et al. 2003; Heijden et al. 2003; Lederer et al. 2000; Moon and Kim 2001; Pavlou 2003). Thus, future research can adapt TAM to examine switching issues of other technologies.

Perceived risk and privacy concerns are considered as the costs that inhibit organizations’ switching intention. The two constructs are known to affect consumer behavior in uncertain environments, such as e-commerce (Dinev and Hart 2006; Dinev et al. 2006; Heijden et al. 2003; Pavlou 2003). However, this study also confirms that perceived risk plays a critical role in influencing organizations’ decisions and increases organizations’ privacy concerns in the context of cloud computing. Thus, future studies should consider the effects of perceived risk and privacy concerns when uncertainty is present in organizations.

Trust and perceived control are included in the proposed model. Trust is shown to not only increase perceived usefulness and perceived ease of use but also reduce perceived risk. Perceived control also helps to reduce perceived risk and privacy concerns. Although trust and perceived control are often independently investigated in different contexts (Li et al. 2014; Xu et al. 2011), this study demonstrates that the two constructs facilitate organizations’ decisions and mitigate privacy risks in the context of cloud computing. Future research can further examine both effects of trust and perceived control in the contexts involving high uncertainties.

*Implications for practice*

This study has important practical implications for increasing organizations’ switching intention from



traditional ERP to cloud ERP. The findings suggest that perceived usefulness is the benefit factor that motivates organizations' switching intention to cloud ERP. Cloud service providers should promote the functional benefits of their systems, such as improved performance, increased productivity, and enhanced effectiveness. Additionally, perceived ease of use directly or indirectly influences organizations' switching intention through perceived usefulness. Thus, cloud service providers should strive to improve the interfaces of cloud ERP even though the interfaces of ERP tend to be dull. Some companies have even tried to redesign their system interfaces to provide Facebook-like interfaces.

Perceived risk is a cost factor that inhibits organizations' switching intention to cloud ERP. Cloud service providers should endeavor to reduce organizations' risk perception. For example, they should provide courses and information to managers of potential customers to help them gauge the possible risks. In addition, data confidentiality and encryption should be established to avoid any unauthorized information discourse. Cloud service providers should also promise that they never engage in opportunistic behaviors for their customers.

Trust can increase perceived usefulness and perceived ease of use as well as reduce perceived risk. Cloud service providers should proactively work to earn trust. On the one hand, they can cooperate with enterprises with large brand names to enhance customers' trust. On the other hand, these providers should increase their reputation through providing good service qualities, such as 24×7 technical support, system monitoring, and system upgrading.

Perceived control helps to reduce organizations' perceived risk and privacy concerns. Cloud service providers should ensure access to control data and utilized services through user authentication and authorization. For example, only authorized users in the customer site can access and disseminate the data. Cloud service providers should also implement ISO27001/ISO27002 information security management to enhance the security of the computer facility.

## Conclusion and limitations

This study develops a research model to examine the effects of benefits (perceived usefulness and perceived ease of use) and costs (perceived risk and privacy concerns) on switching intention based on CBA and TAM. The model also accounts for trust and

perceived control in the context of cloud computing. Perceived usefulness, perceived ease of use, and privacy concerns significantly affect switching intention. Trust can enhance perceived usefulness and perceived ease of use and reduce perceived risk. Perceived control can also reduce perceived risk and privacy concerns. The findings are useful to understand switching issues from traditional ERP to cloud ERP for both researchers and practitioners.

Our study has some limitations. First, this study focuses only on public clouds. Future research can address other cloud service models, including private or hybrid clouds. Second, the cloud system under this study is cloud ERP. Future work could use our research model to examine other cloud-based systems, such as business accounting, CRM, and e-commerce software. Third, the empirical data for our study was collected from organizations in Taiwan. Generalizing the results may be limited. Future studies may need to verify findings in other areas or countries. Finally, this study does not measure actual switching behaviors; however, future studies could extend this study to examine switching behaviors.

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## Appendix I. Measurement items of constructs

Construct	Measurement items	Sources
Perceived Usefulness	1. Using this cloud ERP system would improve my company's performance.	Davis et al. (1989)
	2. Using this cloud ERP system would increase my company's productivity.	
	3. Using this cloud ERP system would enhance my company's effectiveness.	
	4. I would find this cloud ERP system useful.	
Perceived Ease of Use	1. Learning to use this cloud ERP system would be easy for me.	Davis et al. (1989)
	2. I would find it easy to get this cloud ERP system to do what I want it to do.	
	3. It would be easy for me to become skillful at using this cloud ERP system.	
	4. I would find this cloud ERP system easy to use.	

(continued)

**Appendix 1. (continued)**

Construct	Measurement items	Sources
Trust	<ol style="list-style-type: none"> <li>1. This cloud ERP vendor is trustworthy.</li> <li>2. This cloud ERP vendor wants to be known as one who keeps promises and commitments.</li> <li>3. I trust this cloud ERP vendor keeps my best interests in mind.</li> </ol>	Jarvenpaa et al. (2000)
Perceived Risk	<p>How much risk do you believe is there if you use this cloud ERP system and give my company's information (private or financial):</p> <ol style="list-style-type: none"> <li>1. Information submitted could be misused?</li> <li>2. Information could be made available to others without my knowledge.</li> </ol>	Dinev et al. (2006)
Privacy Concerns	<ol style="list-style-type: none"> <li>1. I am concerned that my company's information submitted to this cloud ERP system could be misused.</li> <li>2. I am concerned about submitting my company's information to this cloud ERP system, because it could be used in a way I did not foresee.</li> </ol>	Dinev et al. (2006)
Perceived Control	<ol style="list-style-type: none"> <li>1. I believe my company has control over who can get access to the information stored on this cloud ERP system.</li> <li>2. I think my company has control over what information is released by this cloud ERP system.</li> <li>3. I believe I can control the information stored on this cloud ERP system.</li> </ol>	Xu et al. (2011)
Switching Intention	<ol style="list-style-type: none"> <li>1. My company intends to use the cloud ERP system in the future.</li> <li>2. I predict my company would use the cloud ERP system in the future.</li> <li>3. My company plans to use the cloud ERP system in the future.</li> </ol>	Venkatesh et al. (2003)

**Appendix 2. Profile of respondents**

Measure	Items	Frequency	Percent (%)
Gender	Female	95	34.3
	Male	182	65.7
Age	18-25 years	11	4.0
	26-35 years	71	25.6
	36-45 years	98	35.4
	46-55 years	68	24.5
	56-65 years	26	9.4
	Over 65 years	3	1.1
Education	Senior high school	28	10.1
	University	176	63.5
	Master	68	24.5
	Doctor	5	1.8
Department	Administration	21	7.6
	Financial accounting	31	11.2
	Information Technology	64	23.1
	Human resources	7	2.5
	Manufacturing	6	2.2
	Purchase	7	2.5
	Research and development	6	2.2

(continued)

**Appendix 2.** (continued)

Measure	Items	Frequency	Percent (%)
Industry	Sales and distribution	50	18.1
	Strategy	69	24.9
	Others	16	5.8
	Education services	9	3.2
	Electronic & electrical equipment	103	37.2
	Retail	61	22.0
	Household goods & home construction	23	8.3
	Health care	15	5.4
	Technology hardware & equipment	15	5.4
	Telecommunications	11	4.0
	Food & beverage	7	2.5
	Financial and insurance	6	2.2
	Oil & gas	4	1.4
	Travel & leisure	4	1.4
	Media	3	1.1
	Software & computer services	2	0.7
	Numbers of employees	Others	14
1-10		97	35.0
11-50		88	31.8
51-100		30	10.8
101-150		8	2.9
151-200		14	5.1
201-500		23	8.3
501-1000		7	2.5
Capital (NT\$ million)	More than 1000	10	3.6
	Less than 10	118	42.6
	10-25	41	14.8
	25-30	14	5.1
	30-35	5	1.8
	40-45	3	1.1
	45-50	6	2.2
	50-55	4	1.4
	55-80	7	2.5
	More than 80	75	27.1
Missing (Unknown)	4	1.4	