Technology Adoption as a Multi-Stage Process

Full Research Paper

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Abstract

This study proposes that technology adoption be considered as a multi-stage process constituting several distinct stages. Using the Theory of Planned Behaviour (TPB), Ettlie's adoption stages and by employing data gathered from 162 owners of Small and Medium-sized Enterprises (SMEs), our findings show that the determinants of the intention to adopt packaged software fluctuate significantly across adoption stages.

Keywords

multi-stage, technology adoption, TPB, SMEs, cloud ERP

INTRODUCTION

Past studies on technology adoption have focused predominantly on a single action (i.e., a snapshot – to adopt or not adopt) (Aguirre-Urreta and Marakas 2012) without considering other actions (e.g., information search, evaluation and trial). Such explanation prevents a holistic understanding of the technology adoption process especially for organisations having widespread technology resources where the process needed to arrive at the final decision is a far more complex phenomenon (Damanpour and Schneider 2006). Few other studies, however, have recognised the importance of illustrating technology adoption as a process (e.g., Campbell et al. 2013; Choudhury and Karahanna 2008) by demonstrating the fact that determinants of technology adoption vary during the adoption process (i.e., progression from one stage to another). Those studies have only discussed the following issues, namely: (i) simple technology adoption (e.g., electronic commerce or electronic channels adoption); and (ii) captured technology adoption factors within a single broad stage (e.g., pre-adoption, adoption).

Firms tend to switch to other technologies if they do not receive adequate information during the early stages of the adoption process (Cisco 2012). This signifies the criticality of actions at the commencement of the adoption process and their importance in relation to the successful adoption of technology. In understanding the process of technology adoption, we follow the definition of Rogers (1995, p.5) which states that technology adoption *"is a process in which the technology is communicated through certain channels over time among the members of social systems"*. This view has stated that a holistic explanation comprising (but not limited to) process and time elements are essential in the adoption of new technology. However, studies investigating the inclusive view of technology adoption are still scant.

Motivated by the paucity of research explaining technology adoption as a process view, our research will investigate how corporate-wide systems can be adopted through a multi-stage approach. We see this approach as being highly beneficial to both researchers and prospective adopters (i.e., firms) as it will: (i) enhance understanding as to how technology adoption is implemented by emphasising that each factor in each of the

adoption stages will have a different level of significant; and (ii) it presents the justification as to why certain factors will be either superior or inferior in certain adoption stages.

This research was conducted using two theoretical lenses where the critical adoption factors are identified through the Theory of Planned Behaviour (TPB) (Ajzen 1991) and the progression of each factor will be observed through Ettlie's (1980) multi-stage adoption model. From five adoption stages, only "evaluation" and "trial" have been selected to be discussed further in our study. Selecting evaluation and trial will enable us to observe the fluctuation of adoption factors of both stages that have apparent differences (i.e., before and after experiencing the use of cloud ERP). Our study contributes to the research in a threefold manner. First, it provides better understanding of the technology adoption process in organisations by taking into consideration determinants and their progression during the adoption process. Second, we explain our study in the context of cloud ERP adoption in Small and Medium-sized Enterprises (henceforth called SMEs) [1] providing guidelines to both prospective adopters and vendors to better suit the adoption process. Third, we demonstrate a new theoretical lens of technology adoption as a multi-stage process rather than a snapshot decision.

This paper proceeds as follows. First, the prior work of technology adoption is discussed, outlining the phases of adoption. Second, we show the methodology for developing study hypotheses. Third, the analysis methods used to validate the scales and test the research model are presented, followed by the results of the study. The paper concludes with a discussion of the theoretical and practical implications and limitations, together with a recommendation for future research directions.

RESEARCH BACKGROUND

Technology Adoption

The idea of presenting technology adoption as a process commenced in the 1960's when Rogers (1962) introduced the five adoption stages. Later, the same model was reviewed and updated by Zaltman et al. (1973) in order to render it more consistent. The updated model then appeared in a few technology adoption studies (e.g., Fichman and Kemerer 1997; Fichman and Kemerer 2012). According to Fichman and Kemerer (2012), the term "technology adoption stages" refers to a process of spanning an organisation's awareness of technology through to its widespread deployment. This view is in line with the broader stages of technology adoption, including pre-adoption, adoption and post-adoption. Some studies refer to it as initiation, adoption decision and implementation respectively (e.g., Pierce and Delbecq 1977; Rogers 1995; Zmud 1982). Our study has restricted the focus to the adoption process (prior to use) since it focuses on the decision stages. It is also considered as being the most important period for a firm in its progression to the next level of the adoption process (i.e., the acceptance stage). During this time period, firms need to evaluate and select the technology which will be the most suitable for them. Our study uses the adoption definition of Frambach and Schillewaert (2002) which defines it as *the sequence of stages an innovation (i.e., new technology) passes through before the new product, service or idea will be accepted by a potential adopter.*

Several studies have mentioned the adoption stages and Table 1 further summarises observations from literature concerning these stages. The details of the stages are illustrated, with the number of stages ranging from five (e.g., Ettlie 1980; Shoham 1992) to seven (e.g., Mintzberg et al. 1976). Some agreement is obvious with five common phases spanning the technology adoption stages. These include: (1) awareness / need identification / knowledge, (2) interest / information search / product brokering, (3) evaluation / selection / negotiation, (4) trial / choice / decision, and (5) commitment / purchase / implementation / adoption. More concisely, Table 1 suggests five stages, specifically: awareness → interest → evaluation → trial → commitment, where these represent the full technology adoption stages. From eight adoption stages studies, we have chose Ettlie (1980) as this study is nevertheless among the earlier founding works of the adoption stages and has also been adapted in few Information Systems (IS) studies (e.g., Fichman and Kemerer 1997).

We have only selected evaluation and trial for our study discussion as both stages are recognised as being the most critical elements in the decision-making process (Howard and Sheth 1969). According to Ettlie (1980), evaluation is the action of comparing and contrasting the relative advantages and disadvantages of the potential technology, while trial is denoted as the stage where the firm has a chance to use the technology on a limited basis in order to determine its utility in a full-scale implementation (Ettlie 1980). With a cloud ERP package, adopters (firms) are offered free trial services of the product. With this free service, the prospective adopters are then able to use the technology and understand how the system would integrate into the firm's business process. Hence, it would facilitate making a decision regarding choice of the most suitable module for the firm (Budrienė and Zalieckaitė 2012). This kind of opportunity could also assist in reducing any perceived uncertainty for the firm concerning the new technology (Rogers 1995). Our respondents are from SMEs where, in most cases, the owner will be the person who makes the final decision as to whether or not the technology will be adopted. Thus, a few of the behavioural theories regarding adoption have been reviewed. Fishbein and Ajzen's (1975)

[1] The advent of cloud technology has given SMEs an opportunity to embrace a new wave of information technologies in business use; that is, cloud-based ERP (i.e., cloud ERP).

Theory of Reasoned Action (TRA) and Ajzen's (1991) Theory of Planned Behaviour (TPB) are well-researched behavioural intention (henceforth called intention) models that integrate grounded concepts and principles (Harrison et al. 1997). Both theories have successfully been used in predicting important behavioural patterns in several research domains. As TPB is an extended version of TRA, additional variables are included in the theory. In contrast to other theories that have been used in technology adoption (Burda and Teuteberg 2013) (such as Technology Acceptance Model (TAM) (Davis 1989) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003)), TPB covers a wide range of other factors (henceforth called determinants). These are related equally to individual factors (e.g., owner's attitude) as well as other factors that are beyond the control of the individual, including social influences and the facilitating conditions. Further, while UTAUT displays a high degree of explanatory power, its application has focused on contexts where intentions were modelled as a decision to adopt or not adopt (Aguirre-Urreta and Marakas 2012) (i.e., snapshot). Given the variety and flexibility that TPB's factors cover, we have selected this theoretical lens to predict the determinants that are relevant for owners of SMEs during the decision-making process concerning the adoption of the particular cloud ERP systems.

Table 1. Prior Studies on Adoption Stages

Reference	Adoption Phases									
(Ettlie 1980)	**Awareness**	**Interest**			**Evaluation**			**Trial**	**Commitment**	
(Robinson et al. 1967)	recognition of need	determination of characteristics and quantity	description of characteristics and quantity	search for potential sources	acquire and analyse proposal	evaluate proposals and select suppliers		select an order routine	performance feedback and evaluation	
(Mintzberg et al. 1976)	recognition	diagnosis	search		screen	design	evaluation-choice		authorization	
(Engel et al 1978)	recognition	search			alternative evaluation			choice	outcomes	
(Scanzoni 1979)	awareness	exploration	expansion						commitment	dissolution
(Shoham 1992)	awareness	interest			evaluation			trial	adoption	
(Guttman et al 1998)	need identification	product brokering	merchant brokering		negotiation				purchase and delivery	
(Verville and Halingten 2003)	planning	information search			selection	evaluations	choice (s)	negotiations		

Determinants of behavioural decisions through the lens of TPB

TPB has long been employed in providing understanding and prediction of an individual's intention to adopt new technology (Pelling and White 2009). Further, TPB suggests that an individual's intention to perform various kinds of behaviour can be predicted by, namely: (1) high precision of attitudes towards the behavior; (2) subjective norms; and (3) perceived behavioural control (Ajzen 1985; Ajzen 1991; Phang et al. 2006). The theory also suggests that behaviour can be explained by behavioural belief; normative belief (in addition to control belief as the antecedents of attitudes); subjective norms and perceived behavioural control respectively (Ajzen 1991; Bulgurcu et al. 2010). However, the large majority of existing literature in the technology adoption field has focused on three determinants (attitude, subjective norms and control) rather than including the three antecedents of the determinants.

Past literature has provided rich understanding into the manner whereby the aforementioned determinants can lead to intention and adoption. Harrison et al. (1997) found strong support for the theory that the process of adoption is influenced by the following factors, namely: attitude (e.g., perceived positive and negative), subjective norms (e.g., social expectations) and perceived behavioural control (resources to overcome obstacles). In another study, Pavlou and Fygenson (2006) have extended the capabilities of TPB to predict two prevalent online behaviours, specifically: acquiring information and purchasing products from web vendors. By looking at the two exemplars mentioned above, it can be seen that TPB could possibly be extended to SMEs and multi-staged contexts.

Generally, the adoption of a new technology system involves a series of cognitive activities (attitude) within the individual's mind. Further, when making a decision, the individual may be influenced by issues involving social pressure (Nuwangi et al. 2013) such as competitors, government compliance, customers, vendors or employees (subjective norms) (Alarifi and Sedera 2013). In addition, individual conditions such as perceived ease or difficulty (perceived behavioural control) help to facilitate the adoption of new technology (e.g., Bulgurcu et al. 2010; Grandon and Pearson 2004). Thus, we have employed these core concepts for our underlying theory, as explained by TPB. Further, these three determinants (attitude, subjective norms and perceived behavioural control) rooted in TPB are relevant to a wide variety of complex and subjective factors associated with cloud ERP adoption. In addition, in order to examine the adoption determinants, we will also polarise these determinants into two most critical stages in the adoption process, specifically: evaluation and trial.

HYPOTHESES DEVELOPMENT

In this section, we aim to explain the motivation behind an owner's intention regarding the adoption of cloud ERP. Applying the relationship of TPB constructs to the context of our research, we posit that the SME owner's intention to adopt cloud ERP is determined by the attitude of the owner him/herself. In this study, we conceptualise the attitude towards the intention to adopt cloud ERP as "individuals' overall positive or negative evaluation of the behaviour" (Pelling and White 2009, p.3). Attitude is considered as one of the most significant

predictors of behaviour (Kraus 1995). In addition, it is acknowledged that the majority of prior research confirms a positive effect of attitude upon intention towards various contexts. A few adoption studies have demonstrated that positive attitudes are more likely to lead to the adoption of technology (e.g., Curran and Meuter 2005). Accordingly, we posit that a favourable attitude towards cloud ERP is expected to cultivate an intention of adoption. Based on the above arguments, we hypothesise that:

H1: The SME owner's optimistic attitude towards the adoption of cloud ERP positively affects his/her intention to adopt the system.

Subjective norms reflect one's intention to adopt through the referent of others' actions or thoughts (Burda and Teuteberg 2013). Thus, it is suggested that when technology is relatively new, an owner may have insufficient knowledge (Nuwangi et al. 2012) or information (Nuwangi et al. 2014) by which to formulate his/her feelings towards this new procedure. Therefore, behavioural intention can be influenced greatly by the opinions expressed by others (Thompson et al. 1994). Subjective norms can be defined as "the degree to which an individual perceives the opinion of others that he/she should adopt the technology" (Venkatesh et al. 2003). In the context of SMEs, where the owner makes the majority of the critical decisions, a strong influence could arise from external pressures such as large customers, vendors or government. Pressure could also come from the organisation itself, for example, by the needs of employees and the firm. Based on the above arguments, we hypothesise that:

H2: The subjective norms that support cloud ERP adoption positively affect the SME owner's intention to adopt the system.

Further drawing on the attributes of TPB, it is expected that the intention to adopt cloud ERP is determined by the level of perceived behavioural control. In this study, perceived behavioural control is defined as "a person's intention to adopt new technology based on the extent to which the person believes that he or she has control over personal or external factors that may facilitate or restrain the behavioural performance" (Ajzen 1991). Perceived behavioural control could also be explained as a person's perception as to the respective ease or difficulty involved in managing the interest (Ajzen 1991; Pelling and White 2009). Prior studies have verified that the ability to provide adequate resources can facilitate the adoption of new technology. For example, perceived behavioural control (defined as the level of controllability and self-efficacy) was the second most salient predictor (after attitude) of e-commerce adoption among internet users (Pavlou and Fygenson 2006). The characteristics of SMEs (e.g., smaller size, less complexity) could make the implementation of cloud ERP less complex, thereby encouraging the owner to continue with his/her intention to adopt the system. Based on the above arguments, we hypothesise that:

H3: The SME owner's perceived behavioural control over the adoption of cloud ERP positively influences the SME owner's intentions towards cloud ERP adoption.

Extending and polarising TPB determinants into evaluation and trial stages

Past studies into technology adoption have rarely attempted to provide an understanding of how the relationships between TPB constructs fluctuate at different stages of the adoption process. To the best of our knowledge, only Pavlou and Fygenson (2006) have applied TPB to study behavioural intention in two distinct stages. Their focus, however, was restricted to a single determinant (i.e., perceived behavioural control) with less discussion on the other two determinants (i.e., attitude and subjective norms). Limiting the discussion prevents a holistic understanding of how TPB determinants behave differently in different stages of the adoption process.

To justify our choice for investigating TPB determinants in two distinct stages we use the following scenarios. First, during the evaluation stage, owners form perceptions as to the benefits of the technology that he/she is planning to adopt (Ettlie 1980). These perceptions are formed through different perspectives, however, according to TPB and the adoption context of SMEs, the perception is typically formed through the opinion or pressure (Grandon and Pearson 2004) given by the stakeholders (e.g., vendors, clients or government). Using this scenario as an example, social influence (i.e., subjective norms) provides a greater impact upon the intention of adoption as compared to other determinants. In the trial stage, the owner is given the opportunity to use (trial) the system for a limited period. In contrast with stages that occur prior to trial, in this stage the owners receive a hands-on opportunity to use the system and gain a better sense of the technology. Thus, in the trial stage, the attitude (i.e., perception and belief developed as a result of experiencing use of the system) can be seen as the critical determinant of adoption intention for the cloud ERP system. Based on these justifications and examples, we hypothesise as follows:

H4: The subjective norms of the SME owner relating to the adoption of cloud ERP are more significant than attitude and perceived behavioural control in the evaluation stage of the adoption.

H5: The decision-maker's attitude towards adoption of cloud ERP is more significant than subjective norms and perceived behavioural control in the trial stage of the adoption.

METHODOLOGY

Instrument development

The measurement items[2] were drawn from literature and subsequently adapted using standard psychometric instrument development procedures (Boudreau et al. 2001). The survey instruments were adapted from three different sources. For validating questions relating to adoption determinants, findings from a study by Harrison et al. (1997) were adopted. Seven-point Likert's scales, ranging from strongly disagree to strongly agree, were used for these types of questions. The instruments suggested by Harrison et al. (1997) were selected since the group of respondents that they investigated are similar to our respondents (i.e., owners of SMEs), in that they were using the same theoretical lens (i.e., TPB) and focusing on the same firm size. Studies from Ettlie (1980), as well as Fichman and Kemerer (1997), were personalised in order to develop questions pertaining to adoption stages. In this particular question, respondents were asked to tick the relevant option indicating which stage they were at in relation to cloud ERP adoption (each stage has an appropriate definition). Answers provided through this question enabled us to identify and divide our total sample into different stages. The recommendations of the Fichman and Kemerer (1997) study were selected as their study has operationalised and empirically validated the adoption stages. Ettlie's (1980) study is nevertheless among the earlier founding works of the adoption stages and has also been adapted by Fichman and Kemerer (1997). Thus, throughout our discussion, we have cited the original adoption stages which are from Ettlie (1980). Our final instrument comprises six components, specifically: intention, attitude, subjective norms, normative belief, control belief and perceived behavioural controls.

Data collection and sample

We selected a sample of SMEs in Southeast Asia (Malaysia) [3] for our data collection. The structures of SMEs are generally centralised, with the owner making most of the critical decisions. Also, the same owner tends to regularly make decisions at divergent levels (Salles 2006). In most cases, the same individual who makes the adoption decision will be the primary user of the technology to be adopted; hence, individual and firm level decisions are related (Li et al. 2011). In ensuring that individuals report accurately on behalf of their organisation or group, the key informant approach was applied following the guidelines of Segars and Grover (1998). In this study, the key informants were the owners of the respective SMEs where their opinion represented the voice of the entire firm. We administrated a paper-based survey for data collection where items measuring the different constructs were drawn from previously-validated scales. A total of 162 respondents (i.e., a response rate of more than 80 percent) drawn from SME decision-makers or owners participated in and answered our survey. We received a very high response rate as the questionnaires were distributed and collected during an event where the speaker was one of our research members. Two hundred and ten (210) surveys were distributed to those key stakeholders representing each organisation. The most common industries represented in the sample were: automotive 2%, construction 10%, design consultancy 16%, electrical 36%, financial services 21%, manufacturing 12% and others 4% respectively.

Data analysis

The partial least square (PLS) technique of structural equation modelling in SmartPLS 2.0 (Ringle et al. 2005) software has been used to evaluate our research model and the measurement properties of the constructs and individual items. PLS also allows a researcher to simultaneously test the psychometric properties of the scales used to measure variables in a measurement model. Further, it enables the estimation of the structural model on the strength and direction of the relationships between the variables (Xu et al. 2011). We used PLS as it supports small and medium sample sizes well (Chin et al. 2003; Hulland 1999) thereby providing parameter estimates for relatively low sample sizes. The recommended "rule of ten" with a minimum sample size of 10 times the maximum numbers of arrows pointing towards a construct was also met (Hair et al. 2011) in our analysis. PLS is also well-suited for predictive applications due to its variance-based nature (Hair et al. 2011). Further, PLS was chosen to accommodate the presence of formative factors. Since the objective of the research is to determine the impact of different stages of adoption intention, this research focuses on prediction rather than theory testing.

RESULT

For evaluating and reporting the PLS estimates, recommendations by Hair et al. (2011) were followed in a 2-step approach suggested by Chin (2010).

[2] Due to space limitations we have not included the measurement tables.

Reflective measurement model

The assessment of the measurement model included an estimation of the internal consistency, discriminant and convergent validity. The measurement instrument for reflective constructs demonstrated sufficient reliability with all the factor loadings above 0.70 which is over the proposed threshold level of 0.5 (Nunnally and Bernstein 1991). Average variance extracted (AVE) of all reflective latent constructs was above the recommended threshold level of 0.5 (Fornell and Larcker 1981), showing sufficient convergent validity. Further, we calculated the composite reliability for each reflective construct to examine the internal consistency of all constructs and all met the suggested tolerances of above 0.70 (Fornell and Larcker 1981). Discriminant validity of all latent constructs was given as the square root of each construct's AVE being greater than the latent-variable correlation between each construct and its comparing construct (Hair et al. 2011) (please refer to Table 2).

Table 2. Test for discriminant validity

Latent Construct	1	2	3	4	5	6
1. Attitude	**0.82**					
2. Control Belief	0.2713	**0**				
3. Intention	0.4479	0.2792	**0.83**			
4. Normative Belief	0.1611	0.2358	0.2895	**0**		
5. Perceived Beh. Control	0.0889	0.1371	-0.0933	-0.075	**0.84**	
6. Subjective Norm	0.2666	0.3022	0.3994	0.3891	0.1239	**0**

Note: The diagonal (bold and colored) shows the construct's square root of AVE

Formative measurement model

Differing from the original TPB, our research model has a formative construct where the measurement provides "specific and actionable attributes" of a concept (Mathieson et al. 2001). With formative construct, the weight of a single indicator can be used to observe practical implications regarding the importance of specific details and thus guide practical execution of these formative constructs (Sedera et al. 2013). Following the guidelines of Diamantopoulos and Siguaw (2006), as well as those of Cenfetelli and Bassellier (2009), we first checked for multi-collinearity among the measures. Formative measurement models are essentially based in regression (formative construct against its measures) (Gable et al. 2008). As a result, the stability of the coefficients of the measures can be influenced by the strength of the respective intercorrelations and sample size (Gable et al. 2008). The VIF result from the multi-collinearity test is below 3; this falls under the proposed threshold of below 5. At the same time, the result for measurement instrument for formative construct showed sufficient reliability of factor weights.

Testing Hypothesis

Since we wished to ascertain the different significance of the relationships of three determinants in the evaluation and trial stages, we analysed the structural model using two different conditions of respondents (as described in the instrument development section). The conditions are, namely: (1) respondents in the evaluation stage, and (2) respondents in the trial stage. Using PLS, we examined the standardised path coefficients, path significances and variance explained (R^2) so as to test the predictive power of the structural model and the relationships between the determinants using two different condition samples.

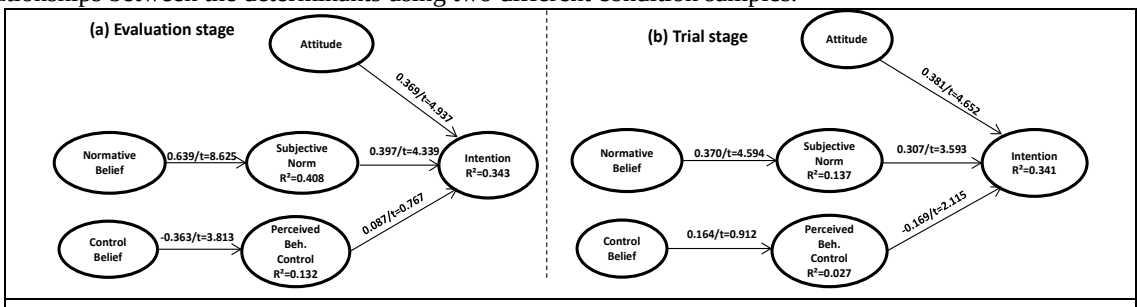

Figure 1. The assessment of structural model for (a) evaluation and (b) trial stages of the adoption

Testing hypothesis 1:

To test our first hypothesised relationship, we refer back to the structural models illustrated in Figures 1a and 1b. These structural models support our hypothesised relationship where models concerning evaluation and trial (Figures 1a and 1b) also confirm significant positive relationships between attitude-intention (evaluation → β=0.369, $p<0.001$, trial → β=0.381, $p<0.001$) thereby lending support to our first hypothesis.

Testing hypothesis 2:

To test our second hypothesised relationship, we refer to the structural models presented in Figures 1a and 1b. Structural models in both models showed a significant positive relationship between subjective norms and

intention (i.e., evaluation stage →β=0.397, p<0.001, and trial stage → β=0.307, p<0.001) thereby lending support to our second hypothesised relationship.

Testing hypothesis 3:

To test our third hypothesised relationship, we refer to the path coefficients and the significance of the relationship between perceived behavioural control and intention, as shown in the model in Figures 1a and 1b. Although we have predicted a positive relationship between perceived behavioural control and intention, the results show a negative relationship for the complete data set and trial stage. Similarly, a positive relationship in the evaluation stage (i.e., evaluation stage → β=0.087, p<0.001, and trial stage → β= - 0.169, p<0.001) challenges the relationship that we have hypothesised.

Testing hypothesis 4 and 5:

To test our fourth hypothesised relationship, we first refer back to the two structural models illustrated in Figure 1a. As shown in Figure 1a (i.e., evaluation stage), the path coefficient between subjective norms and intention shows a much more powerful and significant relationship compared to the other two predictor determinants (i.e., attitude and perceived behavioural control) (attitude-intention, β=0.369, p<0.001, subjective norms-intention β=0.397, p<0.001, and perceived control-intention β=0.087, p<0.001)). This comprises three predictor determinants' attitudes, subjective norms and perceived behavioural control explaining 34.3% of the variance in behavioural intention (R^2). Next, we refer to Figure 1b (i.e., trial stage) for our fifth hypothesized relationship. As can be seen therein, the attitude displays a much stronger relationship to intention than subjective norms and perceived behavioural control in the trial stage (attitude-intention, β=0.381, p<0.001, subjective norm-intention β=0.307, p<0.001, perceived control-intention β=-0.169, p<0.001), with the three predictor determinants' attitudes, subjective norms and perceived behavioural control explaining 34.1% of the variance in behavioural intention (R^2). Accordingly, the result of hypotheses 4 and 5 suggests that the level of significance of attitude, subjective norms and perceived behavioural control on intention will vary as the condition of the adoption process changes (i.e., progressing from one stage to another), thereby lending support to our fourth and fifth hypothesised relationships.

DISCUSSION AND IMPLICATIONS FOR RESEARCH

Interpretation of result

The objective of this study is to investigate how SMEs adopt the cloud ERP system using multiple theoretical lenses; TPB (Ajzen 1991) and technology adoption stages respectively (Ettlie 1980). Using these theoretical lenses, we examined the relationship between an SME owner's attitude, subjective norms and perceived behavioural control towards the intention to adopt cloud ERP in two distinct stages: evaluation and trial. As hypothesised in hypotheses 1 and 2, attitude and subjective norms displayed a significant positive relationship towards the intention of SMEs to adopt cloud ERP. Despite predicting a positive relationship towards intention, our findings showed a negative relationship for perceived behavioural control which accordingly rejected our third hypothesised relationship. Although a negative relationship of perceived behavioural control toward intention is not common in past adoption studies (with the exception of a few studies (e.g., Sheeran et al. 2002; Trafimow et al. 2002)), the inclusion of this construct will give us a better understanding of the importance of resources and capabilities for cloud ERP adoption in the context of SMEs. From the result, it can be seen that the intention to adopt is still high (regardless of the condition of the firms having less capabilities). This is due to the overriding influence of subjective norms (e.g., the enormous pressure exerted on SMEs by the government and other regulatory bodies to implement cloud ERP (i.e., compliance)) as well as a positive attitude maintained by the owner.

Next, following our second contribution (as stated earlier in the introduction section), we analysed our data to ascertain variances in intention determinants towards cloud ERP adoption. Our findings showed that attitude, subjective norms and perceived behavioural control respectively behave differently during the evaluation and trial stages (refer Figures 2a and 2b). The path significance of subjective norms towards intention is greater in the evaluation rather than in the trial stage. This occurs as a result of the owner receiving pressure from an external source (e.g., vendors, clients or government). On the other hand, results have demonstrated that an owner's attitude can supersede subjective norms and perceived behavioural control in the trial stage. The use of cloud ERP system over a limited time period gives the owner an opportunity to better sense the system, thus leading to a superiority of attitude in the trial stage. This finding is supported by a number of studies (e.g., Petty 1998), where it is stated that direct and indirect experiences will lead to either a positive or negative change in attitude. In our study, the change has been geared towards a positive outcome.

Implications

This study makes theoretical contributions to the body of technology adoption research specifically in the domain of technology adoption by SMEs. There is no doubt that a considerable number of past studies have focused on a single course of action. However, the decision to adopt new technology (especially corporate-wide

systems) comprises several activities such as: searching for information, comparing, evaluating, trialling and committing respectively. Treating complex technology adoption as a snapshot can lead to erroneous adoption decisions (e.g., forcing firms to deal with non-suitable applications for a period of time). These issues call for the inclusion of multi-stages in technology adoption models. Viewing corporate-wide systems' adoption as a multi-stage process not only capitulates to a more complete understanding of owners' behaviour patterns, but could also improve the predictive power of corporate-wide systems adoption models. Accordingly, this study presents an intention model by which to explain and predict owners' behaviour patterns regarding cloud ERP adoption. As the trend towards cloud ERP adoption has been predicted to result in revenues of about $32.8 billion by the year 2016 (Anderson et al. 2013), understanding the important determinants that influence these key people (e.g., decision-makers) could assist vendors as well as consultants in prioritising their strategies regarding the provision of more detailed information.

Further, this paper has extended the scope of TPB in five different ways. First, through this work, we are extending TPB into the field of corporate-wide systems. Although Pavlou and Fygenson (2006) have extended TPB by examining two different behaviours (i.e., stages), their work is still limited to individuals (consumers) whilst we have focused on owners of SMEs. In addition, we have examined the whole set of TPB determinants in two different stages, namely: evaluation and trial. Given that the majority of past studies have used TPB at the individual level of adoption, our work can be used as a reference to understand the organisational level of adoption provided the subject of interest is individual as well (i.e., an owner of a firm who represents the voice of the entire firm). Second, our study has succeeded in changing the normal perception of TPB where earlier studies have always treated the adoption determinants as positive or significant. However, in our research context, the result showed that perceived behavioural control has a negative relationship towards intention where the level of significance for perceived behavioural control is very low as compared to attitude and subjective norms determinants. Third, as we modelled two distinct stages of technology adoption in parallel, dependency of the evaluation and trial stages upon the final stage (i.e., commitment) could be observed. Providing two related stages (activities) to be concurrently modelled could open a new avenue of future research. Fourth, our study has shown theoretically and empirically that subjective norms, normative belief and control belief are formative constructs. These findings are unusual in prior TPB studies which have mostly treated all TPB's constructs as reflective. Although the majority of researchers assume that the correct measurement model is a reflective one, there are in fact many instances in which this assumption may not be theoretically or empirically justified. Fifth, from the practitioner's point of view, our study contributes to industry by providing guidance to vendors in an attempt to understand their potential buyer's behaviour and perception toward the adoption of cloud ERP. It also shows the role of external agencies (such as government or business partners) in triggering the continuity of cloud ERP adoption, especially in the early stages of the process. However, the owner's attitude supersedes other determinants once they are using cloud ERP on a trial basis.

LIMITATION, FUTURE WORK AND CONCLUSION

We acknowledge that our research has encountered a number of limitations and accordingly see a need for additional research. The limitations are as follows. First, complex technology adoption cannot fully be explained in only two stages (evaluation and trial). Therefore, we propose that future research should examine other stages in the adoption process such as awareness and interest, as well as commitment. Second, we only have one dependent variable (intention) for both stages. This cannot predict the transformation of intention from evaluation towards the trial stage. Third, in reference to TPB, all constructs in the proposed model reflect the assessment of cloud ERP adoption. Consequently, this prevents the generalisation of other types of technology adoption. Therefore, additional research that could capture a general construct pertaining to other types of corporate-wide systems could be undertaken in the future. In conclusion, this study demonstrates that predictors or determinants of cloud ERP adoption have different effects at different stages of the adoption process. By using TPB, in addition to Ettlie's stages, as the theoretical lens, we have shown that these determinants (i.e., attitude, subjective norms and perceived behavioural control) provide different levels of significance at different stages. Among all these determinants, subjective norms provide the most significant impact in the evaluation stage, while the owner's attitude towards technology provides the most significant impact in the trial stage. Additionally, this study complements existing technology adoption research (e.g., Harrison et al. 1997) by integrating two stages and testing them simultaneously.

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