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Phan Thi Bao Quyen^{a,*} and Nguyen Phong Nguyen^a

^aUniversity of Economics Ho Chi Minh City, Ho Chi Minh City, Vietnam

*baoquyen@ueh.edu.vn

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The impact of perceived accounting benefits on the enterprise resource planning success: The mediating role of effective system use

Phan Thi Bao Quyen^{a,*} and Nguyen Phong Nguyen^a

^aUniversity of Economics Ho Chi Minh City, Ho Chi Minh City, Vietnam

*Corresponding author: baoquyen@ueh.edu.vn

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ABSTRACT In the past decades, enterprise resource planning (ERP) systems have become increasingly automated, particularly for routine management accounting tasks. However, there has been little research investigating the accounting benefits of adopting ERP systems. This study investigates the role of perceived accounting benefits in ERP success. Drawing on Juran's principle of 'fitness for use,' this study establishes a framework that captures how perceived accounting benefits influence effective system use, which, in turn, enhances enterprise success. Using Partial Least Squares – Structural Equation Modelling (PLS-SEM) with survey data collected from 120 enterprises in Vietnam that have implemented ERP, our findings provide strong support for the predicted positive effect of perceived accounting benefits on enterprise success, and for the hypothesis that this relationship is fully mediated by effective system use. This study is novel for two reasons. First, it is one of the first attempts to provide empirical evidence that effective system use and enterprise success are valuable outcomes of accounting benefits perceived to be gained from the use of ERP systems. Second, it discovers and demonstrates that effective system use is the most appropriate system-use concept in the present enterprise systems-related context, a topic that remains under discussion in the literature.

KEYWORDS Effective system use, enterprise resource planning, enterprise success, fitness for use, perceived accounting benefits

1. INTRODUCTION

An enterprise resource planning (ERP) system refers to commercial software that automates and integrates many or most of a firm's business processes. This type of system allows access to integrated data across the entire enterprise in real-time (Davenport, 1998). Thus, an ERP system is expected to increase firm productivity via processes standardisation, improve decision-making ability via information integration throughout the entire enterprise, enhance cooperation between organisational entities by connecting

them smoothly, and, most importantly, maintain competitive advantage once these benefits are realised (Davenport, 1998). These expected benefits serve to explain the increasing popularity of firm adoption of ERP systems. For example, Fortune 500 companies trust ERP systems, and in relation to the present study, large-sized organisations in Vietnam have been increasingly adopting ERP systems.

However, some firms have faced difficulties achieving the benefits they expected from adopting an ERP system. Therefore, as

suggested by Markus and Tanis (2000), it is of great interest to researchers and managers to discover whether investing in an ERP system will pay off. Several organisational-level econometric studies have found that, on average, investment in ERP systems does indeed create benefits (Anderson, Banker, & Ravindran, 2003; Hitt, Wu, & Zhou, 2002). However, such benefits vary among enterprises, and even among accounting modules (Nicolaou, 2004). Kanellou and Spathis (2013) review the literature related to the benefits of implementing ERP systems and conclude that ERP implementation has a considerable effect on the accounting departments of firms. Thus, managers must ask the following questions: What are the accounting-related benefits perceived from implementing an ERP system? Is it possible that these benefits can support organisations to implement ERP systems effectively? How do perceived ERP accounting benefits affect the success of the ERP system itself?

It is important to address these questions. Kanellou and Spathis (2013) provide the only study to investigate these questions. However, their study has several limitations. First, the outcome of perceived accounting benefits is conceptualised as user satisfaction, which is not an appropriate measure of ERP system success. To address this issue, this study adopts effective use and ERP success to measure the success of ERP systems. Second, while Kanellou and Spathis's (2013) analysis unit is the firm, their study is conducted at the operational level (the informants are accountants) rather than at the organisational level (in which case the informants would typically be managers such as accounting professionals working as chief accountants or controllers). To address this limitation, this study is conducted at the organisational level. Measuring the success of ERP systems at the organisational level allows for information to be aggregated at higher levels, enabling success to be evaluated at the industry, regional, national and global level. Therefore, the present study is expected to provide greater insight into the role of perceived accounting benefits in the success of ERP systems.

As stated, the present study aims to examine the effect of the perceived accounting benefits gained by the effective adoption of ERP on system success. The study draws on Juran's principle of fitness for use to establish a framework for the effect of perceived accounting benefits on effective system use,

and how this effect enhances enterprise success. The findings of this study will be of value to any companies considering including their accounting techniques and operations in an ERP system. Further, the results of this study will provide guidance and motivation for organisations that have implemented ERP systems but are in trouble.

The remainder of this paper is organised as follows. Section 2 begins with a review of the previous research, and then presents the research model and hypotheses. Section 3 justifies and describes the methodology employed for the study. Section 4 reports and analyses the results of the study. Section 5 concludes by presenting the theoretical and practical implications of the study, the study limitations, and suggestions for future research.

2. LITERATURE REVIEW, RESEARCH MODEL AND HYPOTHESES

2.1 Perceived accounting benefits (PAB) from the ERP system and PAB outcomes

Several studies have investigated the technical, managerial and economic advantages of ERP implementation. For example, Rouhani and Mehri (2016) show that ERP implementation benefits (e.g., decisional empowerment, improved interaction with customers, improved decision-making process, increased flexibility in information generation, and improved information flow among departments) have a positive impact on the level of readiness in business intelligence readiness. If ERP is integrated with business intelligence, it can provide additional value to organisations (Søilen & Hasslinger, 2012). Under a business intelligence platform, data collected by ERP can be stored in a data warehouse and then further analysed and exploited for problem-solving and value enhancements (Langlois & Chauvel, 2017). However, the evaluation of the accounting benefits generated by an ERP system remains inadequate and unsystematic. This section reviews studies that focus on the interaction between accounting and ERP systems to gain an understanding of the perceived accounting benefits derived from ERP.

Spathis and Constantinides (2004) find the following three most important motives leading business organisations to decide to adopt an ERP system rather than retain their traditional information system: increased

demand for real-time information, information generation for decision making, and need to integrate applications throughout the entire enterprise. These authors also explore several positive changes related to accounting applications arising from ERP implementation, such as flexibility in information generation, increased integration of accounting applications, improved quality of reports and statements of accounts, improved decisions based on timely and reliable accounting information, and reduction of time for closure of annual accounts.

Some studies have provided an in-depth analysis of the accounting benefits arising from improving the quality of an ERP system's output. For example, Velcu (2007) and Colmenares (2009) identify that ERP implementation allows reports and statements of accounts to be provided more accurately. Brazel and Dang (2008) state that ERP appearance reduces reporting lags. Olhager and Selldin (2003) explain that ERP implementation also increases the availability of information, the integration of business procedures and functions, and the quality of information.

Spathis (2006) and Colmenares (2009) find that an additional accounting benefit perceived to be gained from the use of ERP systems is connected to decision-making ability. Specifically, it was found that ERP supports enhancements to the decision-making process in a business organisation (Spathis, 2006) and ERP implementation is usually followed by improvements to the decision-making process and enterprise integration (Colmenares, 2009).

In addition, Gattiker and Goodhue (2004) and Chang (2006) find that other accounting benefits arising from ERP implementation are eliminating chores associated with report writing and data entry. Gattiker and Goodhue (2004) find specifically that an ERP system results in an increase in coordination within the enterprise, and Chang (2006) finds that an ERP system connects traditional business functions such as finance, production, warehousing and sales into a single integrated system based on a shared database.

Other studies have noted how the accounting process and the accountant's role are affected by the implementation of an ERP system. For example, Booth, Matolcsy, and Wieder (2000) examine the extent to which the application of an ERP system can lead to the adoption of new accounting practices. Booth et al. (2000) demonstrate that the entire ERP

system constitutes sources of data for new accounting practices, and thus can support these practices powerfully. More specifically, Rom and Rohde (2006) find that an ERP system not only provides considerable assistance in the collection of data but also increases the organisational breadth of management accounting. This finding is confirmed by Järvenpää (2007), who notes that an ERP system leads to new management accounting being adopted. Thus, accountants obtain several advantages from ERP implementation because they are able to conduct routine activities more effectively, handle large databases more quickly, and report in a faster and more flexible manner.

Several studies have found that the accountant's role considerably changes when the ERP system is implemented. Granlund and Malmi (2002) find that the most important benefit of ERP implementation in relation to accounting is the improvements made in the mass processing of documents. This improvement in efficiency allows management accountants to spend more time focusing on analysis and business support processes rather than on designing and generating appropriate reports. These findings are consistent with Scapens and Jazayeri (2003), who find that the implementation of ERP systems has shifted the work of management accountants from a traditional role focused on accounting activities to a more interpretative role focused on analysis, information evaluation and decision making. To reflect this shift, accountants are considered 'consultants' and 'analysts' rather than 'bookkeepers.'

Hyvönen, Järvinen, and Pellinen (2008) present the development of a management accounting control system, and suggest that information technology (IT) accounting solutions in general compel accountants not only to examine the logic of the solution but also to invent ways of combining accounting and management rationalities. Similarly, Newman and Westrup (2005) employ case studies and a survey to demonstrate empirically that the relationship between accountants and technologies (e.g., ERPs) has become increasingly intertwined. Indeed, Newman and Westrup (2005) argue that the development of ERP results in reshaping the management accountant's role, and that this redefinition of the management accountant's role then has a positive effect on ERP. More recently, Grabski, Leech, and Schmidt (2011) also acknowledged the change in the role of

management accountants during the process in which firms learn how to use ERP systems and obtain considerable value from these systems (Grabski et al., 2011). It is clear that ERP systems affect accounting processes and the role of accountants.

O'Leary (2004) analyses and measures 'ERP system benefits' and tests whether these benefits vary across different industries, and then classifies a list of these benefits into tangible and intangible. Some benefits relate to accounting functions such as inventory reduction, close financial cycle reduction, personnel reduction, management improvements, IT cost reduction, on-time delivery, information/visibility, integration, flexibility, better decisions, financial controls and new reports/reporting capability.

In an attempt to conceptualise and operationalise 'ERP benefits', Shang and Seddon (2002) proposed a comprehensive framework for assessing the benefits derived from ERP systems. Their framework groups ERP benefits according to five dimensions: operation, management, strategy, IT infrastructure and organisation. Similarly, but more narrowly, Esteves and Dwivedi (2009) develop a benefits-realisation road map for ERP usage focusing only on small and medium-sized enterprises. The analyses show that the dimensions of ERP benefits realisation are interconnected, and that managers should perceive this connection as a continuum cycle during the ERP post-implementation period to maximise ERP benefits. The accounting benefits gained through ERP use identified by Esteves and Dwivedi (2009) that are quite similar to those of Shang and Seddon (2002) are cycle time reduction, cost reduction, quality improvement, improved decision making, support of organisational changes, increase in IT infrastructure capability and increase in business flexibility.

More relevant to the present study, Spathis (2006), Spathis and Ananiadis (2005) and Kanellou and Spathis (2011) focus on developing a measurement of ERP accounting benefits. The analyses of Spathis (2006) are based on Shang and Seddon's (2002) ERP benefits classification. Thus, Spathis's (2006) perceived accounting benefits from ERP are classified into organisational benefits, operational benefits, managerial benefits and IT benefits. Spathis (2006) hypothesises that perceived accounting benefits can be explained by the following variables: the number of reasons for enterprise resource

implementation, the number of enterprise resource modules, enterprise resource cost as a percentage of sales and the company's total assets. According to Spathis's (2006) survey findings, the most important accounting benefits in the ERP environment are increased flexibility in information generation, increased integration of applications, improved quality of reports and statements of accounts, improved decisions based on timely and reliable accounting information and reduction of time for closure of annual accounts. These results are consistent with those of Spathis and Ananiadis (2005) and Kanellou and Spathis (2011).

The literature confirms the benefits of ERP through the examination of the effect of ERP systems on an organisation's financial performance. However, the present study is most interested in the direct effect of ERP systems on the accounting process, a topic that remains to be explicitly examined.

Most of the research noted above explains only what accounting-related benefits are or how accountants are affected in an ERP environment. Only four articles have investigated and developed a scale of the accounting benefits attained from ERP systems (i.e., Kanellou and Spathis (2013), Spathis (2006), Spathis and Ananiadis (2005), Spathis and Constantinides (2004)). As presented in Table 1, only the scale of Kanellou and Spathis (2013) is adequately validated by testing the relationship between perceived accounting benefits and user satisfaction. However, user satisfaction is only a part of system success, not a scale for measuring system success because a user being satisfied with an ERP system does not ensure that the ERP system leads to enterprise success.

2.2 System use

In the original DeLone and McLean information systems (D&M IS) success model, systems use is referred to as the 'recipient consumption of the output of an information system' (DeLone & McLean, 1992, p. 66). However, an information system is constantly changing. Enterprise systems adopted in business organisations nowadays are more mandatory than voluntary, thus, conceptualisation of the original system use in the D&M IS success model seems likely to be inappropriate.

In an excellent literature review, DeLone and McLean (2016) detail the development of information systems literature focusing on

systems use. However, they focus only on the context of adoption. Deng, Doll, and Truong (2004) list three available system contexts: training, adoption (sometimes understood as technology acceptance) and ongoing, which are often referred to as the ‘pre-implementation’, ‘implementation’ and ‘post-implementation’ stages, respectively (Chang, Gable, Smythe, & Timbrell, 2000). DeLone and McLean (2016) do not consider systems use in the training and ongoing contexts at all despite training being ‘one of the most important activities of the pre-implementation stage of any information system’ (Deng et al., 2004) and, more importantly, ongoing referring to the duration of the success of the ERP system, which is partly captured by the use construct (DeLone & McLean, 1992, 2016) and occurs to a great extent (Sternad, Gradisar, & Bobek, 2011). Previous research on the ERP lifecycle phases (Chang et al., 2000; Markus & Tanis, 2000; Ross & Vitale, 2000) finds that training belongs to the ERP pre-implementation stage—which includes the ERP design, chartering and project stages—and ongoing belongs to the ERP post-implementation stage—which includes the ERP stabilisation, continuous improvement and transformation stages, or the ERP onward and upward stage, as in Chang et al. (2000), Ross and Vitale (2000), and Markus and Tanis (2000), respectively.

Based on a highly insightful statement by Deng et al. (2004) about the differences between the training and ongoing use contexts, DeLone and McLean’s (2016) comprehensive review of system use, and the literature review presented here, this study summarises and analyses the differences in system use in different use contexts, which correspond to the pre-implementation, implementation and post-implementation stages. It must be remembered that systems used in the training, adoption and ongoing contexts are similar in relation to the aspect that IT usage always faces possible challenges in relation to technique, technology and human factors. Nevertheless, the three contexts differ in their goals, time horizons, knowledge domains, identification of solutions to problems, practice environments, requirements for user behaviours, nature of appropriate support, and characteristics of related information systems. These differences reflect the dynamic and complex nature of system use and become a prerequisite for selecting an appropriate conceptualisation of ‘system’ that can be used

in the present study’s focus on the ERP post-implementation stage.

The context is often implicit rather than explicit, which means that using an inappropriate system-use construct is likely to affect research findings. Therefore, we claim that the meaningful conceptualisation and operationalisation of system use must consider the characteristics of the information system (mandatory or voluntary), the users employing the information system, the task performed with the information system, and most importantly, the system context in which the information system occurs (i.e. training, adoption or ongoing). The present study also emphasises that once the ongoing use is formed, it can be acceptable to employ it as the system used in the adoption context because there are no great differences in the use characteristics of the adoption and ongoing contexts. The limitation of this approach is that users’ perceptions of ongoing use in the adoption context are perhaps different from what they are in the ongoing context because it takes time for a user to be familiar with a new system.

Given these criteria for selecting a meaningful and appropriate system-use construct, this study chose effective system use (Doll & Torkzadeh, 1998) to represent ERP adoption and ongoing use. When users become more sophisticated, they may be expected to accomplish their tasks more efficiently and effectively. Thus, following Doll and Torkzadeh (1998) and Deng et al. (2004), in the present study, the concept of ‘use’ refers to how effectively an ERP system is used for fundamental organisational functions such as problem solving, decision making, work integration, and work planning.

2.3 ERP system success

There are limited studies that have concentrated on measuring the success of an ERP system (Mukti & Rawani, 2016). Therefore, on the grounds that an ERP system is a type of information system, the present study reviews all popular measurements of the success of information systems and ERP systems in the literature.

A review of the success of information systems shows there are many definitions of success as it relates to information systems. Thus, there is no formal definition of the phenomenon of information systems success. Each kind of stakeholder has a different definition of the success of an information

system in an organisation (Grover, Seung Ryul, & Segars, 1996; Ifinedo, 2011). For example, from the perspective of the system developer, the information system's success is achieved when the information systems project is completed on time, under budget, and functions correctly. For customers or users, an information system is successful if it improves user performance and satisfaction (Guimaraes & Igbaria, 1997). From the organisational perspective, an information system's success is measured by its contribution to the company's profits or competitive advantage. In addition, the success of an information system also depends on the type of system to be evaluated (Seddon, Staples, Patnayakuni, & Bowtell, 1999).

Despite the value of these definitions of the success of an information system, this study focuses on DeLone and McLean's (1992) conceptualisation of measuring information systems success because this conceptualisation provides a schema for categorising the measures of information systems success (Ifinedo, 2011) and their framework has been widely used to assess the effectiveness or success of information systems at the organisational level (Petter, DeLone, & McLean, 2008). Accordingly, effectiveness constitutes the 'extent to which an information system actually contributes to achieving organisational goals' (Thong & Yap, 1996, p. 252). Therefore, this study defines ERP success as referring to whether the adoption of an ERP system has improved effectiveness in the implemented enterprises. Notably, by this definition, ERP success does not refer to success in relation to ERP technical installation or ERP technical implementation, which are measured by factors such as cost overruns, project management metrics and time estimates (Hong & Kim, 2002; Markus & Tanis, 2000).

2.4 Research model and hypotheses

Under a completely different approach, the framework of the present research is developed based on the principle of fitness for use concerning product and service quality, as defined by Juran (1988). We argue that a prerequisite for using an ERP system effectively is the quality of the ERP system. There are two reasons for this. First, the quality of an ERP system determines how the system can be used. Second, if the quality of the ERP system is reduced, there will be a low level of success in most cases (Kronbichler,

Ostermann, & Staudinger, 2010). Thus, the successful adoption of an ERP system must consider the quality of the ERP system. This is why the principle of fitness for use is applied in this study. In information systems literature, this principle is commonly adopted to examine data and data quality (Laudon, 1986; Redman, 1995; Strong, Lee, & Wang, 1997; Vermeer, 2000; Wang & Strong, 1996). Similarly, the present study adopts this principle to clarify the system and system-related qualities.

The enterprise system (i.e., ERP system) and other goods have distinct differences. First, an enterprise system is created through acquiring or self-designing, while organisations can produce products or services by themselves. Second, a product or service can be exhausted through use, but an enterprise system is not depleted through use. That is, the elements of an ERP system can be exploited simultaneously by multiple users and continue to be available for employment in a different context by subsequent users. These characteristics of an ERP system are significant when considering the principle of fitness for use.

The principle of fitness for use involves developing a shortlist of inputs that companies, organisations, and individuals can use to determine the fitness for the use of a product or service. Juran and Godfrey (1999) and Juran (1988) provide the following questions for consideration:

- Who are the users of the product or service? (Who)
- What are the economic resources of both the producer and the user? (What)
- How will the product or service be used? (How)
- What are the users' specific determinants of a product or service's fitness for use? (Economic benefits)
- What is the possibility and/or probability of the product or service endangering humans? (Privacy and security)

The present study does not consider the safety aspect of adopting an ERP system, thus it applies four of the above five queries to explain the appearances of, and connections among, all the constructs including PAB, system use and ERP success in the proposed framework. Accordingly, this study defines who, what, how and the economic benefits of an ERP system as follows:

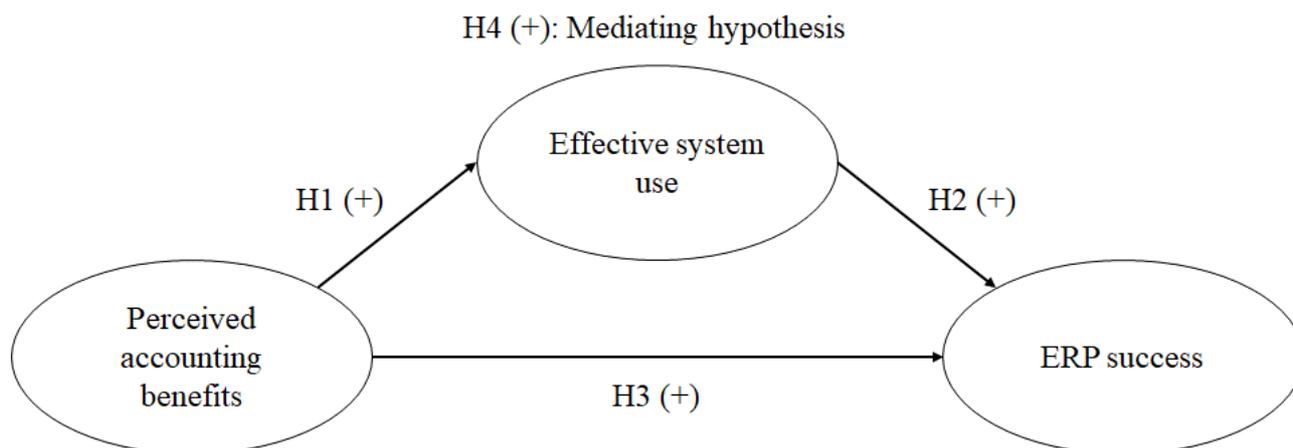


Figure 1 Research model and hypothesis.

- Who = the accounting professionals in this study; these professionals are expected to be the most knowledgeable and effective users of the ERP system
- What = the perceived accounting benefits are the economic resources of both the producer and the user of the enterprise system
- How = effective use, which refers to how the system is used
- Economic benefits = the ERP system's success is a specific determinant of the system's fitness for use.

Following the principle of fitness for use (Juran and Godfrey (1999), this study assumes that based on the perceived accounting benefit ('what'), accounting professionals ('who') will effectively exploit an ERP system ('how') to achieve the system effectiveness ('economic benefits') that accounting experts expect when using an ERP system. Accordingly, perceived accounting benefits are the antecedents of ERP system use and ERP system success is the outcome of ERP system use. Hence, the hypotheses are proposed:

H1. Perceived accounting benefits have a positive influence on use.

H2. Use has a positive influence on ERP system success.

H3. Perceived accounting benefits have a positive influence on ERP system success.

H4. Effective system use mediates the relationship between perceived accounting benefits and ERP system success.

The research model and corresponding hypothesis are shown in Figure 1.

3. RESEARCH METHOD

3.1 Sampling and data collection

This present study was conducted in Vietnam, and features a data set of 120 firms. The sample is restricted to organisations that have adopted an ERP system for at least one year because the research focuses on the implementation and post-implementation stages. The core aim of this study is to investigate perceived accounting benefits, thus the respondents are experienced accounting employees. However, this study is conducted at the organisational level, which means that each respondent represents one company.

Therefore, the most suitable informants are chief financial officers and chief accountants. Unfortunately, given that there are few enterprises in Vietnam that have implemented ERP (a very low percentage of the total enterprises operating in Vietnam), accessing potential respondents is extremely difficult. Thus, the study identifies acceptable alternatives such as internal controllers, internal auditors and management accountants who have accounting experience related to ERP and a general understanding of the operations of the entire enterprise. In addition, according to Shang and Seddon (2002), it takes two to three years for users to become familiar with a new enterprise system and extract the maximum benefits from that system. Thus, the informants in this study are chief financial officers, chief accountants, internal controllers, internal auditors, and management accountants who have worked in organisations that have been using an ERP system for at least one year and have at least two years of work experience in their current position.

The sampling frame includes 5,110 email addresses of the potential informants (who

have all the above characteristics) from the personal LinkedIn social network of the authors of this study. The original survey items in English were translated into Vietnamese and back-translated following Brislin's (1970) translation process. The official Vietnamese version of the survey questionnaire was circulated to potential informants via SurveyMonkey, an online survey administration tool.

We emailed the 5,110 potential respondents (with several follow-up emails) over two-and-a-half months, and received a total of 569 responses. After eliminating 177 organisations that had not adopted an ERP system, 78 responses from respondents whose

employment position did not meet the inclusion criteria, 50 responses from respondents who did not have sufficient work experience, 102 incomplete responses, 26 responses whose response duration was too short (less than 10 minutes), and 16 outliers, the final sample consists of 120 valid responses. The profile of the responding organisations is presented in Table 1.

The details of ERP systems adopted in organisations in Vietnam are summarised in Table 5. The sample enterprises utilise different ERP packages (most use either SAP or Oracle). All sample enterprises had ERP software installed and implemented for at least one year.

Table 1 Demographic characteristics of surveyed companies.

	Frequency	%
<i>Type of ownership</i>		
100% foreign-owned enterprises	23	19.2
State-owned enterprises ($\geq 51\%$ government capital)	22	18.3
Private enterprises/limited enterprises	54	45
Joint venture with foreign partners	14	11.7
Joint venture with domestic partners	7	5.8
Total	120	100.0
<i>Type of industry sector</i>		
Manufacturing	72	60.0
Commercial	44	36.7
Services	42	35.0
Total	120	100.0
<i>Type of industry</i>		
Bank, insurance, investment	2	1.7
Chemical and pharmaceuticals	3	2.5
Dairy, food and meat products	28	23.3
Electrical and electronics	7	5.8
Medical and healthcare	8	6.8
Information technology	10	8.3
Manufacturing	12	10.0
Retail/wholesale/distribution	25	20.8
Telecommunications	3	2.5
Transportation, logistics and courier	7	5.8
Construction	6	5.0
Others (e.g., beverages, fashion, design, fast-moving consumer goods)	9	7.5
Total	120	100.0
<i>Company size (paid-in capital) in VND billion</i>		
<10	3	2.5
10–50	6	5.0
>50–100	11	9.2
>100–200	12	10.0
>200–500	14	11.7
>500–1000	22	18.3
>1000	52	43.3
Total	120	100.0
<i>Company size (number of employees)</i>		
≤ 50	8	6.7
51–200	13	10.8
201–500	29	24.2
501–1000	23	19.2
1001–5000	32	26.7
5001–10000	9	7.5
>10000	6	5.0
Total	120	100.0

Table 2 Demographic characteristics of the ERP system.

	Frequency	%
<i>Type of ERP software</i>		
Oracle	20	16.7
SAP	43	35.8
XMAN (ERP)	2	1.7
SalesUp ERP	2	1.7
Navision	3	2.5
Microsoft Dynamic	4	3.3
Lemon	3	2.5
FAST (ERP)	3	2.5
Others (e.g., AMIS–MISA, Bamboo, Bravo, Bross, Maconomy, MMIS, Peoplesoft, PERP)	40	33.3
Total	120	100.0
<i>Years ERP has been implemented and used in the current company</i>		
<1 year	0	0.0
1–2 years	21	17.5
>2–4 years	16	13.3
>4–6 years	37	30.8
>6–8 years	13	10.8
>8 years	33	27.5
Total	120	100.0

The demographic characteristics of the informants are shown in Table 3. Most informants have a bachelor's degree, 52.5% are female and 47.5% male. Most are aged between 25 and 34 years. They have an average of 6.5 years of work experience, and an average of approximately 2.7 years of experience using the ERP system in their current position. Moreover, the informants report using the ERP system frequently (5.4 of a 7-point Likert scale).

3.2 Measurement scales

All research constructs included in this study have multi-item scales derived from the relevant literature. Each item in the survey employs a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). All instruments have been tested and defined in related research (Deng et al., 2004; Gable et al., 2003; Kanellou & Spathis, 2013) as reflective-reflective constructs. Perceived accounting benefits (PAB as a construct) are measured using the scales from Kanellou and Spathis (2013). This construct includes five dimensions: IT accounting benefit (5 items); operational accounting benefit—time (4 items); organisational accounting benefit (5 items); managerial accounting benefit (3 items); operational accounting benefit-cost (1 item). The scale for effective system use includes 11 items from Deng et al. (2004), which were adapted from Doll and Torkzadeh (1998). In Deng et al. (2004), these 11 items are partially aggregated into four unlabelled congeneric

indicators. ERP system success, according to Sedera and Gable (2004), is a second-order construct measured by four first-order components: information quality (5 items), system quality (8 items), individual impacts (4 items), and organisational impacts (8 items). It is tested and defined as a reflective-reflective construct (Sedera & Gable, 2004).

To ensure the content validity of the measurement scales in the research context of Vietnam, before collecting data, we conduct a preliminary measurement assessment through an expert panel composed of three academics who are knowledgeable about ERP and two managers: one internal controller and one expert that has experience in successfully implementing numerous ERP projects in large enterprises. The preliminary measurement assessment confirms the high consensus of the expert panel on the ability of the selected scales to measure the research concepts in the model. Next, the questionnaire is piloted with three accounting experts in enterprises that have adopted an ERP system, after which some minor adjustments are made to the survey to ensure the questions are worded clearly and concisely, and are easy for the informants to understand.

To ensure that the structure of the scale sets is consistent with the surveyed data collected in Vietnam, this study conducts exploratory factor analysis (EFA) to determine the appropriate structure of the variables without reducing the number of items employed to capture the concepts under investigation. In

doing so, this study employs principal axis factoring with Promax rotation and a minimum eigenvalue of 1 (Hendrickson & White, 1964) for data analysis. The exploratory factor analysis results determine that of the three scales, the ERP success construct is immediately acceptable, while the others need to be refined. PAB is a second-order construct with two factors extracted from 13 items (the remaining items are eliminated). Effective system use is also a second-order construct with two factors extracted from eight items (the remaining items are eliminated).

Table 3 Demographic characteristics of informants.

	Frequency	%	Min	Max	Mean
<i>Position in the firm (job title)</i>					
Chief finance officer	15	12.5			
Chief accountant	39	32.5			
Internal controller	45	37.5			
Internal auditor	15	12.5			
Management accountant	6	5.0			
Total	120	100.0			
<i>Position in the organisation's hierarchy</i>					
Top management position	27	22.5			
Mid-level personnel	51	42.5			
Senior staff	39	32.5			
Staff	3	2.5			
Total	120	100.0			
<i>Gender</i>					
Female	63	52.5			
Male	57	47.5			
Total	120	100.0			
<i>Education background</i>					
College degree	0	0.0			
University (bachelor's) degree	101	84.2			
University (master's) degree	19	15.8			
Total	120	100.0			
<i>Age</i>					
<25	3	2.5			
25–34	66	55.0			
35–44	51	42.5			
>44	0	00.0			
Total	120	100.0			
<i>Experience</i>					
Years in the current position			1	20	6.5
Years using ERP at the current position			1	5	2.7
<i>The extent of ERP system use</i>					
<i>(i.e., the degree to which informants agree with the following statements according to a 7-point Likert scale ranging from 1 "strongly disagree" to 7 "strongly agree")</i>					
'We use the ERP system for many hours per day at work.'			1	7	5.2
'We use the ERP system for many times per day at work.'			1	7	5.5
'Overall, we use ERP a lot.'			1	7	5.4
<i>Intention to continue the use of ERP system</i>					
<i>(i.e., the degree to which informants agree with the following statements according to a 7-Likert scale ranging from 1 strongly disagree to 7 strongly agree)</i>					
'We intend to continue using the ERP in our job.'			3	7	6.2
'We intend to use more functions of the ERP.'			3	7	6.1
'We intend to continue using the ERP to process more tasks'			2	7	6.2
'We intend to suggest that our company should continue to use the current ERP system.'			1	7	5.9

4. DATA ANALYSIS, RESULTS AND DISCUSSIONS

All instruments in this research model are second-order constructs. Partial least squares (PLS) allows the conceptualisation of higher-order factors through the repeated use of manifest variables (Tenenhaus, Amato, & Esposito Vinzi, 2004). A higher-order factor can thus be created by specifying a latent variable, which represents all the manifest variables of the underlying lower-order factors. The study uses the PLS approach because of the limited

Table 4 Internal consistency, indicator reliability and convergent validity analyses of the first-order measurement model.

First-order factor	Indicator	Loading ^a	Composite reliability ^b	AVE ^c
PAB_organizational	PAB11	0.84	0.94	0.65
	PAB12	0.89		
	PAB13	0.87		
	PAB14	0.78		
	PAB15	0.83		
	PAB16	0.80		
	PAB17	0.76		
	PAB18	0.64		
PAB_operational	PAB6	0.95	0.95	0.86
	PAB7	0.96		
	PAB8	0.95		
	PAB9	0.93		
	PAB10	0.86		
USE_work	USE5	0.91	0.93	0.77
	USE6	0.81		
	USE8	0.92		
USE_decision	USE11	0.87	0.90	0.69
	USE1	0.79		
	USE3	0.85		
	USE4	0.88		
	USE7	0.81		
IQ	IQ1	0.75	0.93	0.68
	IQ2	0.79		
	IQ3	0.86		
	IQ4	0.90		
	IQ5	0.81		
	IQ6	0.84		
SQ	SQ5	0.77	0.89	0.56
	SQ6	0.79		
	SQ8	0.70		
	SQ2	0.71		
	SQ1	0.76		
	SQ7	0.77		
	AP	AP1		
AP2		0.89		
AP3		0.92		
AP4		0.87		
OP	OP1	0.78	0.94	0.64
	OP2	0.85		
	OP3	0.80		
	OP4	0.75		
	OP5	0.81		
	OP6	0.81		
	OP7	0.82		
	OP8	0.78		

valid sample size and the desire to analyse the second-order constructs. Data are analysed in two stages through PLS using Smart PLS software (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014).

4.1 Assessment of the measurement model

Measurement instruments are assessed based on reliability, convergent validity and discriminant validity. Construct reliability measures the stability and consistency of the scale, and is evaluated through internal consistency reliability and indicator reliability

(Hair et al., 2014). Composite reliability measures the internal consistency reliability of the scale. Tables 7 and 8 demonstrate that all the reflective first-order factors and second-order factors have composite reliability that is over the cut-off value of 0.7, as suggested by Hair et al. (2014). However, some of the factors have quite a high value; for example, PAB_operational (0.95), PAB (0.96) and ERP success (0.95). These figures are considered sufficiently close to 0.95 (Hair et al., 2014). Hence, they are possibly acceptable.

Indicator reliability is assessed through outer loadings. Table 4 demonstrates that the

outer loadings of all but one (i.e., except item PAB18) of the observed first-order factors of all constructs range between 0.70 and 0.96, which is higher than the cut-off value of 0.70 (Hair et al., 2014). The loading of indicator PAB18 falls only slightly below 0.70 (0.64). We decide to retain this indicator for two reasons. First, we attempt to delete PAB18, and then re-estimate the internal consistency and convergent validity of the first-order factor ‘PAB_operational’. The results show that deleting PAB18 leads only to an extremely slight increase in composite reliability and average variance extracted. Second, and more importantly, PAB18 expresses the item ‘The ERP enables a reduction in the number of personnel in the accounting department’, which is indispensable because it explains the benefit of operational cost reduction that an organisation experiences when adopting an ERP system. This item has also been used in different scales measuring perceived accounting benefits in previous studies (Kanellou & Spathis, 2013; Shang & Seddon, 2002; Spathis & Ananiadis, 2005).

Almost all of the average variance extracted values of all the first-order factors and second-order factors are acceptable because they are higher than 0.50 (Fornell & Larcker, 1981). Only ERP success (0.44) (see Table 5) was less than 0.50. ERP success is a second-order factor, and its composite reliability is higher than 0.60. Therefore, its convergent validity is adequate (Fornell & Larcker, 1981). In addition, the variance inflation factor values for each relationship between variables in the proposed model range between 1.00 and 1.81,

which is well below the cut-off value of 5.0 (Hair et al., 2014), indicating no issues of multicollinearity in this study.

We evaluate the discriminant validity of the measurements following the procedure proposed by Fornell and Larcker (1981). Table 6 demonstrates that the square roots of average variance extracted of all first-order factors range between 0.75 and 0.93, which is well above the corresponding correlations between these variables, thus indicating the discriminant validity of the measurements.

4.2 Assessment of the structural model

To test the proposed model and hypotheses, we evaluate the strength and significance of individual paths concerning the predictive relevance of these individual paths in the proposed model. The indices employed to evaluate the predictive relevance of individual paths are reported in Table 7. These indices are calculated based on 5,000 bootstrapping samplings.

The results of testing the direct relationships are presented in Table 7. Our hypotheses offer adequate explanatory power because the R^2 values for all the predicted variables, effective system use (0.45) and ERP success (0.67), are far greater than the recommended level of 0.10. Specifically, this study finds positive direct effects of PAB on USE ($\beta > 0.67$, $p < 0.001$), of USE on ERP success ($\beta > 0.14$, $p < 0.05$) and of PAB on ERP success ($\beta > 0.72$, $p < 0.001$). Thus, H1, H2 and H3 are strongly supported.

Table 5 Internal consistency and convergent validity of the second-order measurement model.

Second-order factor	First-order factor	Composite reliability ^b	AVE ^a
PAB	PAB_organizational PAB_operational	0.96	0.63
USE	USE_work USE_decision	0.92	0.60
ERP success	IQ, SQ, AP, OP	0.95	0.44

Table 6 Discriminant validity (Fornell–Lacker criterion). Note: The diagonal shows the square root of the average variance extracted of the latent variables and indicates the highest in any column and row

	AP	IQ	OP	PAB_operational	PAB_organizational	SQ	USE_decision	USE_work
AP	0.89							
IQ	0.49	0.83						
OP	0.63	0.48	0.80					
PAB_operational	0.54	0.63	0.47	0.93				
PAB_organizational	0.61	0.69	0.67	0.73	0.80			
SQ	0.45	0.76	0.46	0.60	0.66	0.75		
USE_decision	0.56	0.52	0.49	0.53	0.70	0.45	0.83	
USE_work	0.47	0.39	0.39	0.42	0.56	0.40	0.64	0.88

Table 7 Direct relationships for hypotheses testing (using PLS bootstrapping).

H	Relationship	Std beta	Std error	t-value	Hypothesis testing result	95% CI LL	95% CI UL
H1	PAB -> USE	0.67	0.06	11.51***	Accepted	0.57	0.76
H2	USE -> ERP success	0.14	0.07	1.94*	Accepted	0.03	0.25
H3	PAB -> ERP success	0.72	0.07	11.05***	Accepted	0.61	0.82

Notes: *** $p < 0.001$, * $p < 0.05$; R^2 (USE = 0.447, ERP success = 0.673)

Table 8 Results of direct, indirect and total effects (using consistent PLS bootstrapping).

H	Relationship	Std beta	Std error	[t-value]^	Hypothesis testing result	95% CI LL	95% CI UL
H3	PAB -> ERP success	0.72	0.07	11.05***	Accepted	0.61	0.82
H4	PAB -> USE -> ERP success	0.08	0.01	1.22	Accepted	-0.02	0.18
	Total	0.85	0.04	21.69***		0.78	0.91

Notes: *** $p < 0.001$, * $p < 0.05$; R^2 (USE = 0.447, ERP success = 0.673)

In addition, this study utilises a procedure for mediation analysis using partial least squares – structural equation modelling (PLS-SEM) as proposed by Nitzl (2016) to test further the mediating role of USE on the relationship between PAB and ERP success. Accordingly, consistent PLS bootstrapping is employed to calculate the related indices. Table 8 affirms that USE fully mediates the relationship between PAB and ERP success. Thus, H4 is supported.

5. CONCLUSION

5.1 Theoretical implications

Based on the significance of the statistical tests in the previous section, the proposed model and all of its hypotheses were accepted. These results have some important theoretical implications. First, based on previous studies relating to the accounting benefits perceived to be gained from the use of ERP systems (Kanellou & Spathis, 2013; Spathis, 2006; Spathis & Ananiadis, 2005; Spathis & Constantinides, 2004), this study discovers new outcomes of perceived accounting benefits. That is, the study provides further empirical evidence of the effects of perceived accounting benefits on ERP use as well as on ERP success. Second, the findings from this study provide evidence to support Juran's principle of fitness for use by examining the critical role of accounting experts in enhancing ERP success. Accordingly, based on the perceived accounting benefit (i.e. 'what' is available as a benefit of the system), accounting professionals (i.e. 'who'

uses the system) effectively exploit ERP systems (i.e. 'how' the system is used) to achieve system effectiveness (i.e. 'economic benefits' of the system). Third, this study adds to the limited research on the implementation and post-implementation stages of ERP systems. Specifically, it considers the effectiveness of ERP system use rather than only the extent of ERP system use.

5.2 Managerial implications

Besides the theoretical implications, this study guides firms that use ERP systems on how to design and implement an ERP system to enhance system effectiveness. In addition, the results of our study can assist accounting experts to assess better the accounting benefits that an ERP system may offer. Hypothesis 1 testing result indicates that organisations should achieve a higher level of system use effectiveness by enhancing the perceived accounting benefits of ERP via appropriate training and communication mechanisms. Moreover, ERP consultants should be able to guide companies that are interested in including their accounting processes in an ERP system more efficiently. In addition, the Hypothesis 2 testing results should be of interest and value to practitioners, who can adopt actions related to accounting techniques and procedures to improve effective ERP system use, which in turn, enhances ERP system success. Finally, the results of testing Hypotheses 3 and 4 imply that organisations should recognise that effective system use can be a connecting device to translate people's

perceptions of accounting benefits into ERP success.

5.3 Limitations and future research

Our findings should be considered in light of several study limitations. First, our sample includes 120 respondents, 17.5% of which are enterprises that are in the stage of ERP implementation and 82.5% of which are in the stage of ERP post-implantation. The perceived accounting benefits may change in different stages of the ERP lifecycle, which may influence its effects on ERP system success. Future studies may consider investigating whether a difference exists between the stages of ERP implementation and ERP post-implementation to provide a more comprehensive evaluation of the phenomena investigated here. Second, because of time and budget constraints, the study adopted measurement scales that were originally developed in the context of developed countries. Thus, the scales may not truly reflect the nature of the study's constructs in the context of Vietnam, which is a developing country. This means that the results of the present study may have been affected by potential measurement bias. This problem could have been mitigated if the scales had been more extensively augmented by additional explored items and tested qualitatively before the field survey.

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