

Review of determinants influencing effectiveness of accounting information system

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Abstract: This research was conducted to review studies relating to effectiveness of the accounting information system (AIS) and the impacting factors. Secondary data was collected from previous studies relevant to the topic. We employed the desk-review method to synthesize the studies grouping as (i) accounting information system; (ii) the effectiveness of the AIS; (iii) determinants impacting the effectiveness of AIS. The results indicate gaps that (i) evaluate the effectiveness of the AIS in different directions but there has been no specific study on evaluating the effectiveness of the AIS in a specific industry; (ii) there is no study on the effectiveness of the AIS with analytical unit being an individual who uses the AIS for a particular industry; (iii) no studies have suggested impact factors such as firm size, time of operation on the effectiveness of the accounting information system and the impacting determinants.

Keywords: Accounting information system, effectiveness, determinants

I. Introduction

Accounting Information System (AIS) was a subsystem of Management Information System (MIS) in enterprises. An AIS is a system of data collection and processing procedure that creates the required accounting information for internal and external users (Nancy et al., 2009). The main function of the AIS was to assign quantitative values of past, present and future economic events through its computerized accounting system that generated financial statements (Onalapo&Odetayo, 2012). Kharuddin et al. (2010) considered the AIS as a support system in planning and controlling activities by providing reliable and relevant information for the decision-making process of the administrators. Currently, information technology (IT) has had a great influence on society and human life in many different ways. In particular, the AIS is always associated with IT applications. Accounting information systems (AISs) were applications of computers and technology in the accounting process to create financial and accounting information (Pierre et al., 2013). AISs were designed to support accounting functions including data collecting, storing and reporting (Belfo&Trigo, 2013; Pierre et al., 2013; Salehi et al., 2010). As a determining factor for the organization's sustainable competitive advantage (Ali et al., 2012; Kharuddin et al., 2010), AISs played an important role in documenting economic activities of the organization (Tóth, 2012); provided useful information for management decision-making (Pierre et al., 2013; Kharuddin et al., 2010); and supported the organization in maintaining and aligning its strategy (Ramazani&Allhyari, 2013).

There have been several researches on AISs, the effectiveness of AISs and affecting determinants in the world. This is a topic that researchers around the world have been interested in due to the fact that (i) there is an increasing demand for high quality accounting information of decision makers; (ii) firms have invested huge resources in IT to ensure AISs to be effective; and (iii) the effectiveness of AISs was measured in various ways (Chalu, 2012). Researches on information system and AISs in enterprise have appeared since the 1960s of the 20th century (Firmin, 1966). Overtime, more and more specific studies on information system and AISs (Choe, 1996; Thong et al., 1996; Ismail, 2009; Petter et al., 2013). In the context of Vietnam, studies on the information system began to appear in 2007, followed by the AISs. Although, both in the world and in Vietnam, there have been many topics about AISs, but researches have shown that there is no similarity in research results in different contexts. Therefore, the topic of this study will give an overview of the researches on AISs, the effectiveness of AISs, the determinants impacting the effectiveness of the AISs and their influence is extremely necessary to directing research results in this field in the future.

II. Literature review

2.1. Accounting information systems in enterprises

The study of AISs in the world appeared in the 1960s of the 20th century. In 1966, Firmin (1966) mentioned the issue of accounting systems as management information systems. From 1970 to 1980, researchers began analyzing the impact of AIS characteristics on organizational performance; analyzing and designing AISs to serve the purpose of providing information for decision making processes (Gordon, 1976; Gordon et al., 1978); analyzing the AISs from the user's perspectives (Marshall, 1972).

From 1980 to 1999, studies on AISs during this period focused on data verification, responsibility for managing information systems and making decisions (Poston & Grabski, 2000); the influence of user's determinants (such as user participation, user involvement, user attitude, etc.) on the development of AISs (Barki & Hartwick, 1994; Choe, 1996; Choe 1998); the relationship between the development of AISs and investment decisions (Mitchell et al., 1997) controlling short-term issues such as costs and cash flows (Ismail, 2009). In the 1990s, the Enterprise Resource Planning (ERP) system was widely deployed in multinational corporations in the world. During this period, researches combining information systems and AISs began to appear through the study of ERP. Most of the early studies on ERP were basically descriptive studies: the critical success determinants when implementing ERP systems, the organizational impact of ERP systems, the economic impact of ERP systems... (Grabski et al., 2011). The theoretical trend in AISs in these years was mainly based on the theory of computer science, the theory of organization and the theory of psychology. By 1995 the theory of AISs had started to anchor on both economic and statistical theories. Research methods of AISs in this period were mainly model building, survey/ archival, field and case studies and case studies, experimental studies (Poston & Grabski, 2000).

In the period of 2000-2009, the study of AISs focused mainly on topics related to the organization and management of information systems, auditing and internal control, and supporting tools for decision-making, artificial intelligence (Ferguson & Seow, 2011, Sajady et al, 2008). Theoretical trends also have a clear shift from computer science theory to economic and statistic theories to motivate AISs. Theory of cognitive and economic psychology accounts for nearly half of the studies on AISs (Ferguson & Seow, 2011). During this period empirical and archival research methods continued to be employed by researchers. Since 2010 upto now, the development of science and technology, especially the birth of the Fourth Industrial Revolution, has greatly affected the application of information technology in AISs. Over this time, research trends have focused on developing new research models, studies on ERP and AISs (Chalu, 2012; Belfo & Trigo, 2013; Ferguson & Seow, 2011). Theoretical trend has still been computer science theory but the theory of behavior, economics, cognitive psychology has become more popular.

In the context of Vietnam, studies on AISs have been since 2007 (Pham, 2007; Tran Phuoc, 2007) but academic researches on the effectiveness of AISs have been limited. The studies mainly use different approaches to AISs, including: access to the accounting subjects, accounting cycle, the accounting organization and so on (Nguyen, 2012; Ho, 2013; Dang, 2016). In recent years, the research trends have been to identify the elements that make up AISs (To, 2017); access to AISs on the computerization conditions (Vu, 2017); factors and influence of these factors on the success of AISs, quality of AISs (Nguyen, 2018). The overview shows that research topics on AISs in Vietnam approach in many different directions, most commonly in the direction of completing and organizing AISs at an enterprise unit and only a few studies have individual analytical units who use AISs.

After conducting overview of the research on AISs in enterprises, the authors realized that researches on AISs have received the attention of researchers around the world including Vietnam; research on AISs have many different topics; theoretical trends applied in the study of AISs include the theory of information systems, computer science and behavioral theory, economic theory and statistics.

2.2. Effectiveness of accounting information system

There have been several researches on the effectiveness of AISs in the world. Since the 70s of the 20th century, researchers have changed the direction of research from focusing on efficiency measurement criteria into effectiveness assessments (Myers et al., 1997). The effectiveness of the AISs was measured according to various aspects such as qualitative and quantitative; technical, personal or human, organizational and environmental, tangible and intangible, financial and non-financial perspectives. Previous studies on information systems suggested that the effectiveness of an information system was the user's satisfaction of the used information or the users' system perception about whether the level of the available information system met their demands or not (Ives et al., 1983; Marshall, 1972; Barki & Hartwick, 1994). In DeLone & McLean's Information Systems Success model (1992), effectiveness was understood as a part of success - the effectiveness of success. The effectiveness of an information system was shown in its ability to accomplish the goals of the information system itself (Hamilton & Chervany, 1981); to achieve the organizational goals

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(Raymond, 1990), to support executive's decision-making tasks (Gordon et al., 1978; Pierre et al., 2013; Kharuddin et al., 2010; Thong & Yap, 1996; Sajady et al., 2008), which could add value to organization, produce positive changes in user's behaviors and improve productivity (Gatian, 1994).

Since the 1980s and 1990s of the last century, scientists have studied the success of information systems from different approaches. Accessing to DeLone & McLean's Information Systems Success in terms of users' awareness and behavior, Davis (1989) built technology acceptance model (TAM), based on the theory of reasoned action of Fishbein & Ajzen (1975), with three important components: perceived usefulness, perceived ease of use and attitude toward using. This model explained behavioural action to use the system in relation to system acceptance. Users had beliefs in the system (ease of use and usefulness) that affected their attitude towards system using, and when system users thought the system was easy to use then they could perceive the usefulness of the system. TAM was revised and added new ideas to the model: behavioral intention to use (Venkatesh & Davis, 1996) which perceived the usefulness and intended use (Venkatesh & Davis, 2000).

In 1992, DeLone & McLean was based on the research framework proposed by Shannon & Weaver (1949) and Mason (1978) to build the first Information Systems Success model with six criteria including system quality, information quality, use, user satisfaction, personal impact and organizational impact. This is the researchers' most commonly-used model in measuring the success and effectiveness of a system.

Thong & Yap (1996) in the study of the effectiveness of information systems through the user satisfaction approach showed a number of principles when using the user satisfaction as a scale for the effectiveness measurement of the information systems. Firstly, researchers need to make explicit their chosen theories of assessing user satisfaction as a measure of the effectiveness of the system in their researches. Secondly, researchers need to make underlying assumptions about measuring the effectiveness of the information systems in their researches. The selected respondents to answer the survey must match the research objectives including system users, managers or staff in charge of information systems management. Thirdly, it is necessary to develop new user satisfaction instruments being psychometrically-sound and basing on theories that are better than the currently-criticized ones. Fourthly, the evaluation of the effectiveness of the information systems will require various assessment approaches including both subjective and objective measures. The evaluation of the information system effectiveness in this study was based on an objective assessment of the behavior of the system users.

By 1995, Pitt et al. (1995) inherited Information Systems Success model of McLean & DeLone (1992) and proposed additional adjustment of service quality criteria to reflect the role of information system in providing services to system users. In particular, service quality criteria included tangibles (i.e. physical facilities, equipment, and appearance of personnel), reliability and accuracy of service; responsiveness; assurance, and empathy (i.e. customer care policy) (Pitt et al., 1995). In their study, Pitt et al. mentioned that the user support from the departments of information systems management was an important factor of system user satisfaction.

Following the research of Pitt et al. (1995), Myers et al. (1997) added the work group impact to the model, considering that the work group impact was as important as an intermediate variable in the relationship between the individual and organization. This is reasonable because in order to achieve the successful information systems, it is required to have efforts from not only an individual or a functional division but also the efforts of the whole group of individuals and functional divisions.

However, Seddon (1997) suggested that it should be cautious to take service quality criteria into consideration because the information system was not one of the applications of information technology. At the same time, Seddon (1997) proposed an extended information systems success model based on DeLone & McLean's (1992) with two new components of system use behaviors (including expectations about the future benefits of system use and the decision to use the system) and the behavioral consequences (i.e. system quality and information quality, perceived usefulness, user satisfaction, net benefits to society). In his research, Seddon (1997) argued that the use criterion in DeLone & McLean's information systems success model was necessary but not suitable in the case that the use of information systems was compulsory.

DeLone & McLean (2003) disagreed with the argument of Seddon (1997), argued that due to the complexity and multidimensional use of the system, the voluntary use of the system can be considered. Normally, the system could create online reports to send directly to the managers, but if the manager required to print the reports in hard copy for archiving and using for reporting process then the inefficient use of the system may cause redundancy of tasks and made the system ineffective. In addition, the use of the system may also depend on management levels. The senior management using levels could be measured by the number of applications of the system serving the decision-making process while junior management ones could be measured by their satisfaction with the system. Therefore, the model of Seddon (1997) might have missed the multi-dimensionality of DeLone & McLean's. In addition, the information

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systems success model of DeLone& McLean (2003) was updated with the “Intention to Use criterion”, which showed the attitude of users, and retained the current “Use” one, which showed the user behavior.

Gable et al. (2003) developed the information systems success model of DeLone& McLean (1992) and Myers et al (1997) in the context of ERP in the public sector. In this study, Gable et al. (2003) found that satisfaction was a measure of success, not an aspect of success. Accordingly, satisfaction included personal impact, organizational impact, system quality and information quality. Although this model was only tested in the public sector, it might still be suitable for assessing the success of the ERP system in the private sector.

In the circumstance of Vietnam, research on the effectiveness of AISs have been limited. Vu (2017) used Balanced Score Card (BSC) to evaluate the effectiveness of integrated AISs in ERP environment. Based on the background theory of the effectiveness of information system, BSC theory of Kaplan and Norton (1992), model of DeLone and McLean (1992), the author uses qualitative and quantitative research methods that show that businesses often evaluate AISs after implementing AISs from 6 to 12 months. This evaluation has greatly supported the development of businesses, improved business capacity and contributed to market responsiveness. However, this study only assesses the effectiveness of an enterprise management unit, not considering the impact of ERP system quality and users of AISs.

Nguyen (2018) with a doctoral thesis on the determinants affecting the success of AISs in Vietnamese firms, based on the background theories: Technology acceptance model of Davis (1989), Information systems success model of DeLone& McLean (1992, 2003), the measurement model of the success of corporate governance system of Gable et al. (2003), the model of determinants affecting the success of Petter et al. (2013) to propose theoretical models with 11 research hypotheses. The qualitative and quantitative methods used by the author have shown that the measurement results of the success of AISs in Vietnamese enterprises have 82.8% positively affecting accountants, 90.9% positively affect the quality of information and 91.9 % positively affect the quality of the system.

From the research overview of the effectiveness of AISs in the world and in Vietnam, the authors found that the effectiveness of AISs is approached in different ways such as the satisfaction of system user, technology acceptance model, information systems success model and so on. In our research, we are based on information systems success model of DeLone& McLean (1992, 2003) as a basis for measuring the effectiveness of AISs, because according to DeLone& McLean (1992), effectiveness is understood as part of success, efficiency of success.

2.3. Determinants influencing effectiveness of accounting information system

Since an AIS is a subsystem of the management information system, besides reviewing the research on the determinants that impacted AIS effectiveness, the author also conducted an overview of studies on those of information systems, information technology and ERP. Moreover, measuring AIS effectiveness mentioned in the previous contents was equivalent to measuring the effectiveness of the information systems, thus finding the determining factors on effective systems, information quality, system quality, user satisfaction, deployment and operation of systems, and success of systems, etc was also considered.

Choe (1996), with the study on the relationship between the implementation of AISs, found out the influencing factors and the development levels of AISs by using qualitative and quantitative research methods, in which data was collected through a survey questionnaire of 450 AIS users from 107 subordinate units such as general accounting, finance, tax and cost accounting. The research results showed that the system user was one of the determinants affecting the successful use of the ERP system. The system users were responsible for operating the AIS, including the process of inputting data, processing data and generating output information (Al-Hiyari et al., 2013). User participation was the key to the success of information systems development (Barki&Hartwick, 1994). Therefore, system users had an important role, contributing to the effectiveness of the system. Choe (1996) argued that system user experience was measured by a number of working years showing the ability of information system staff, i.e. the experienced system users could use the system better. Wiechetek (2012) and Toth (2012) also agreed and showed that system users' experience played an important role in the implementation and operation of AISs. In addition, the analysis results showed a positive correlation between the support of senior managers and the performance of AISs.

Thong et al. (1996) studied on managerial support, external expert support and information systems implementation in small enterprises. The authors argued that in order to effectively implement the information systems, although top management support was an essential element, it was not as crucial as the expertise of the system consultant and supplier. By an empirical study on the importance of the management support and the expertise of external experts on the systems in 114 small businesses in Singapore, the authors tested the research model using the Partial least squares (PLS) method, which showed that in the implementation of an information system, the support of managers had a positive impact on the effectiveness of the systems; however, the expertise of external experts was even more important especially in small-sized enterprises with limited resources.

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Byrd & Turner (2000), with the study on measuring the flexibility of accounting information system infrastructure, believed that the development and improvement of infrastructure is a top priority in overall management of information technology systems. In addition, Byrd & Turner (2000) has affirmed that the flexibility of information systems was positively related to reducing costs and creating competitive advantages for organizations. They believed that system flexibility was one of the key components that could enable information technology to handle changes in the business environment. In line with this view, Wiechetek (2012) argued that the infrastructure and flexibility of information systems was effective for information systems implementation. If a system was developed and implemented but did not fit the organization's characteristics then it would produce such organizational issues as compulsory changes of organizational policies and procedures to match the new system or to eliminate the new system (Thong et al., 1996).

Based on the theoretical model of Thong et al. (1996), De Guinea et al. (2005) conducted a test in the Canadian context and added the model of Thong et al. (1996) a dependent variable of intention of system expansion. With a sample of 105 users at small-sized businesses in a small town of western Canada, the results showed that both manager support and system vendor support were required for the effectiveness of the information system in small Canadian businesses. Despite being conducted in two different contexts, both studies showed that management support was an independent variable of an effective information system, and the effectiveness of the information systems included: user satisfaction, organizational impact, overall information system effectiveness. However, there were a number of differences between the two research results. While De Guinea et al. (2005) demonstrated that there was a relationship between manager support and user satisfaction, Thong et al. (1996) illustrated that this relationship was not significant. The reason for this difference was that Thong et al. (1996) only conducted the survey with manager respondents. The research in Canada did not show any positive relationships between an effective consultant and an effective information system, which was in contrast to the results in Singapore. From the study of De Guinea et al (2005), there were differences in research results in two different contexts and different survey respondents.

Ismail (2009) examined the factors affecting the effectiveness of the implementation of accounting information systems in Malaysia, basing on Attawell's technology diffusion theory (1992) and Wernerfelt's organization theory (1995) to build a research model and conduct surveys of managers of small and medium-sized businesses in Malaysia. By using SPSS software to analyze data and the Likert scale from 1 to 5, the research results showed that there was a positive relationship between managers' accounting knowledge, vendors' effectiveness and accounting firms' effectiveness and effectiveness of the accounting information systems; No significant relationship was found between the sophistication of AISs, manager participation in AIS implementation, Manager AIS knowledge, effective consultants, government agencies and AIS effectiveness. Therefore, in contrast to the study of De Guinea et al (2005), Ismail (2009) argued that there was no significant relationship between consultants and AIS effectiveness in small and medium-sized enterprises. The reason for this argument, according to Ismail (2009), could be the development of information technology and systems that provided user-friendly and easy-to-use features during the operation of the system.

Ifinedo (2008) conducted a survey in two Nordic countries and used SEM method to analyze the data. The results showed that three potential determinants, including business vision, top management support, external expertise, had a positive influence on the ERP success, in which the external expertise was emphasized as the most important factor. The research results also found that a large investment in information technology had a positive impact on the organization and it was a must to know how to make the information system useful for achieving the organizational goals.

Doom et al. (2010) identified 13 determinants contributing to the success of ERP implementation in Belgian SMEs, which could be listed as follows: senior management support, vision, strategic goals and business plan, user involvement, focus on user requirements, internal communication, business culture, relationships with suppliers, project approaches, external consultants, training process, planning, project team management and project team compositions. Accordingly, Doom et al. (2010) stated that in addition to organizational factors, managers, external consultants, the focus on system users and internal organizations should also be scrutinized for a successful ERP system implementation.

Toth (2012) stated that the capacity of a system user was one of the most important elements of an AIS. The capacity of a system user consisted of professional competence, communication ability and experience (Aziz et al, 2012). Sharing and processing information between accountants and others in the same AIS was essential (Daoud&Triki, 2013). In addition to communication capacity, system users were required to have information technology skills because nowadays all organizations have applied information technology in their operations; mastering technology skills could help system users make effective use of information technology applications, especially providing high quality information for decision making (Sajady et al., 2008). Previously, system users only focused on accomplishing the assigned task without understanding how the technology supported and handled their work, but in current era of technology development, system users, especially accountants, in addition to their professional knowledge, are required to understand the ways of the information system tools they are using (Tam, 2011). They are not only responsible for providing information as

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required but also need to know how to interpret and explain the provided information as well, thus it is necessary for them to understand the operation of the information system (Daoud&Triki, 2013).

Petter et al. (2013) with the study of independent variables affecting the success of information systems suggested that although DeLone& McLean's information systems success model since its inception in 1992 has marked a development in knowledge about the success of information systems, since then there has not been a comprehensive study of variables affecting the success of information systems yet. The author studied more than 600 articles, focusing on the results of 140 studies to identify 43 independent variables that affected the success of the information system and rearranging it into five groups, listed as: task characteristics, user characteristics, social characteristics, project characteristics and organizational characteristics. After that, the authors identified 15 success determinants that always affected the success of the information system as following: enjoyment, trust, user expectations, extrinsic motivation, infrastructure, task interdependence, task difficulty, attitudes toward technology, organizational role, user involvement, relationship with the system developer, domain external knowledge, management support, management processes, and organizational competence. The study also drew conclusions about the impact of each factor on the success scale of an information system: System quality, information quality, service quality, intention to use, use, user satisfaction and net benefits (i.e. organizational impact and individual impact). However, the limitations of the research were that it just considered the direct impact of independent determinants on the success of information systems, so there might be indirect effects or interactions among the determinants of information systems success. Another limitation of the research was that it merely showed the influencing factors but the level of the influence of these factors on the success of the information system. Moreover, the research only made a compilation of independent determinants influencing the success of information system in a general context yet different research contexts.

Lutfi et al. (2016) investigated the influence of technological, organizational and environmental determinants on the AIS in Jordan's small and medium-sized enterprises, which conducted data collection from the survey questionnaire of 187 small and medium-sized enterprises in Jordan. Research results showed that the group of organizational factors (including organizational readiness, owner/ manager commitment) had a positive impact on AIS usage. The study showed that the level of management participation and their understanding of the importance of AISs could increase the ability to use AISs in enterprises. In addition, the research also indicated that management support is an important factor in deciding the use of AISs. Hence, it could be seen that the factor of managerial support is important in relation to the effectiveness of AISs.

In Vietnam, studies on determinants influencing the effectiveness of AISs are limited. Nguyen Huu Hoang Tho (2012) with the study of the determinants affecting the successful implementation of ERP in Vietnam, based on the information system success model of DeLone& McLean (2003) showed the impact of training factors, system quality and information quality on successful ERP implementation. In particular, training factors have the greatest impact. The research also showed that the attitude of using ERP affects the net benefits of enterprises, but the limitations of this study were that the non-representative, non-generic samples were selected in Vietnam.

Nguyen (2018) employed qualitative and quantitative methods in his research. The results showed that independent variables including user and project characteristics indirectly affect success of AISs, through intermediaries that are a perception of usefulness, ease of use and use of technology. In addition, the management's support has not only had a direct impact on but also indirectly affected the success of AISs. This shows that the importance of the management's support will increase perception of usefulness of information system and impact on the success of AISs.

An overview of research on the determinants influencing the effectiveness of AISs shows that there have been many studies in the world. Each study has proposed different influencing determinants, using different background theoretical bases to build a research model, testing the relationship between the factors and the effectiveness of AISs by different methods. The selection of research contexts also gave different results in each study, showing that selecting the context and subjects of the survey is also an important task in the research. In addition, the review of studies also shows the direct and indirect impact of factors on the effectiveness of AISs. In the context of Vietnam, studies are mainly based on the context of enterprise, there have been no researches on influencing determinants in a particular firm.

III. Conclusion

This research is conducted to review AISs, the effectiveness of AISs and the determinants influencing the effectiveness of AISs by using the desk-review method. We have reviewed articles in scientific journals, scientific conferences, doctoral theses etc. in the world and in Vietnam to analyze the theoretical background and research methods that are used. The research results show that the researches on the effectiveness of AISs are topic of interest to researchers. However, the evaluation of the effectiveness of AISs is still in different directions, there has been no study on the effectiveness of AISs in an specific industry. In addition, the studies on the determinants influencing the effectiveness of AISs in the world are based on the views of managers and users of the system. In Vietnam, studies mostly focused on assessing the quality of

AISs, organizing the AISs, improving the AISs at the analytical unit being an organization. Research on the effectiveness of AISs with analytical unit as an individual user of the AISs for a specific industry is not available. Studies on the subjects of determinants affecting the quality and success of the AISs have not considered the impact of determinants on the effectiveness of AISs such as: firm size, business time etc. Therefore, future studies in Vietnam should continue to conduct test on determinants affecting the effectiveness of AISs in particular industry, add new determinants based on interview and survey methods.

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