

Pham Quang Huy; Vu Kien Phuc

## Article

The impact of public sector scorecard adoption on the effectiveness of accounting information systems towards the sustainable performance in public sector

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\*Corresponding author: Pham Quang Huy, School of Accounting, University of Economics Ho Chi Minh City, Vietnam.  
E-mail: [pquanghuy@ueh.edu.vn](mailto:pquanghuy@ueh.edu.vn)

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## ACCOUNTING, CORPORATE GOVERNANCE & BUSINESS ETHICS | RESEARCH ARTICLE

# The impact of public sector scorecard adoption on the effectiveness of accounting information systems towards the sustainable performance in public sector

Pham Quang Huy<sup>1\*</sup> and Vu Kien Phuc<sup>1,2</sup>

**Abstract:** The effectiveness of accounting information system (AIS) in public sector organization (PSO) is well recognized to play an important part in obtaining sustainable performance (SP). Nevertheless, the effectiveness of AIS cannot achieve the SP on its own due to the rapid changing in the global economic world. Accordingly, there is an increasing demand on a framework of evaluation which is considered to be appropriate with the characteristics of PSO to orientate, manage, and assess operations of AIS toward attaining SP. Thus, this study is undertaken with the aim at exploring the relationship between the impact of public sector scorecard (PSS) implementations and effectiveness of AIS toward SP enhancement with evidence gathered from 883 PSOs' accountants in Mekong Delta region. Data analyzed by the Structural Equation Modeling (SEM) highlight that PSS adoption has a significant impact on the effectiveness of AIS. It also provides a reliable basis for the association between the effectiveness of AIS and SP. Although the topic of research is still immature, these findings are predicted to serve as a catalyst for scholars, practitioners, and policy-makers to inquire and adopt because of its potential benefits in PSOs' operations.

**Subjects:** Government & Non-Profit Accounting; Management Accounting; Public & Nonprofit Management

### ABOUT THE AUTHOR

The research objects that are public sector organization are too complicated to follow for doing survey and take the figures for preparing papers because the data of these entities is so significant with special fields in any countries. Authors followed to accountants of their organizations for getting opinions to make research with real data. Moreover, the research in public sector in any counties have also had a little paper, especially the developing countries. Therefore, authors have tried to find out the previous articles for proving all statements of our papers.

### PUBLIC INTEREST STATEMENT

The operating results of any organization are so important for making decision in the entity's strategy in the next period of business. Most scientists have just focused on the scope of companies. However, the public sector organizations are the significant subjects for conducting research about their performance, especially in the context of development of the Fourth Industrial Revolution. The public organizations in any country have always been accounted for high percentage value of social value. The application for PSS would assist the management to be able to look back the past events and give the solution in the future. Moreover, it would help them to enhance the sustainable development through applying PSS model in the system of accounting information.

**Keywords:** accounting information system; public sector scorecard; public sector organization; sustainable performance

## 1. Introduction

Accounting information system (AIS) is acknowledged as an effective tool to deal with the exterior and interior changes (Shagari, Abdullah, & Saat, 2017) through processing data and transaction to generating useful information for planning, controlling, and operating the organizational activities (Romney, Steinbart, & Cushing, 1997) as well as facilitating and gaining organizational performance (Saganuwan, Ismail, & Ahmad, 2013). This issue has directed the scholars' attention on AIS effectiveness since such useful accounting information will contribute to the organizational efficiency improvement and accountability accomplishment (Mellempvik, Monsen, & Olson, 1988).

The dynamic business environment (Nylén, 2007) in conjunction with the claim on integrating sustainability as a part of organizational strategy (Epstein, 2008) as well as environmental impact assessment and disclosure (Ofoegbu, Odoemelam, & Okafor, 2018) have caused to pressures on public sector organizations (PSOs) to make assurance for the generation of an organization that generates efficiency and effectiveness in satisfaction the citizens' demands (Adi, Martani, Pamungkas, & Simanjuntak, 2016). In response to these changings, these PSOs have been seeking for new approaches of intensifying their financial management practices, including reviewing and adjusting their AIS (Paulsson, 2006). Nevertheless, difficulties would arise in the application of AIS in many organizations (Choe, 1996) and PSOs are not the exception. Specifically, a large body of empirical studies has shown that designing and implementing effective AIS in the PSOs still remains a process with a dearth of effectiveness (Paulsson, 2006).

In this issue, there has been a raising demand on seeking for better approach to enhance the effectiveness of AIS (Carlin, 2005). Nonetheless, the success in application of AIS can hardly achieve without effective and strategic management. In other words, the successful integration of AIS will depend largely on how well the performance management is efficiently established to support for its operation since management will create a highly importance for the efficiency of information system (Shagari et al., 2017) as well as the effectiveness of AIS.

Surprisingly, Balanced Scorecard has been implemented for a long time with the purpose of managing organizational operations among the PSOs regardless of a number of difficulties arising from the divergent characteristics between public and private sector (Linna, Pekkola, Ukko, & Melkas, 2010). In recognition of these aforementioned, we set up on valuable insights offered to indicate that the impact of public sector scorecard (PSS) application has gained the effectiveness of AIS toward sustainable performance (SP) in PSO as PSS is homologated as an effective management framework for this type of organization (Moullin, 2017).

Our contribution to this literature is conducted in both the theoretical and practical aspects. In terms of theoretical facet, this study generates a novel management framework for PSOs' AIS evaluation from the view of effectiveness. Besides, it also contributes to a better understanding and practices on how to establish AIS's management in an effective way toward SP achievement through providing accurate analysis and directions for building measurement indicators. Regard to the practical aspect, it replenishes empirical results on the impact of PSS adoption on the effectiveness of AIS which is perceived by PSOs' users. Moreover, these findings lead to the call for broader investigation on the PSS application in PSOs's operation in other areas in the world due to the need for future stronger attempts. To that end, our paper attempts are targeted at addressing the following formulated research questions:

**RQ1.** To what extent does the PSS adoption have an impact on effectiveness of AIS?

**RQ2.** To what extent does the effectiveness of AIS have an impact on SP?

With the exception of the information mentioned in the introduction, this research proceeds in seven parts as follows. A brief overview about the conceptual inputs covers in the second section. Theoretical framework is provided in the Third section. This is followed by a discussion of Empirical Literature Review and Hypotheses Development in the Fourth section. The Fifth section places an emphasis on Research Design. The result analysis is then reported in the next section. The final section ends with concluding remark including implication for both academy and practice and direction for future research.

## **2. PSS adoption, AIS, and SP in public sector**

### **2.1. Public sector scorecard**

With the target at integrating service improvement and performance management framework applied in the public and third sectors, PSS, which has been established by Moullin (2017), functions through three stages including strategy mapping, service improvement, and measurement and evaluation.

#### *2.1.1. Strategy mapping*

Mapping strategy in the PSS framework is simply concentrated on the linkage between outcome, process, and capability components (Moullin, 2009). A draft strategy map is launched after completing a series of interactive workshops with senior managers, staff, service users, and other stakeholders on some issues like the expected outcomes-strategic, service user, stakeholder and financial outcomes, capability outputs identification, and so on. A risk-management workshop will then take place in order to define risk factors and complemented into draft strategy map. The processes by which risks are taken into consideration of decreasing and deleting are implemented and added into the strategy map together with the risk-management culture.

#### *2.1.2. Service improvement*

Service improvement is the stage in which workshop participants will be fostered to make a discussion on evidence or data available to create the backdrop for appropriated tool such as process maps, systems thinking, and lean management to be supplemented. Moreover, capability outputs accomplishment in the strategy map will occur in the next workshop which gives the attention to supporting staff, a culture of improvement, innovation, and learning instead of a blame culture.

#### *2.1.3. Measurement and evaluation*

This phase has begun a discussion among workshop participants to determining possible performance measures for each component of the strategy map in which all potential measures will be looked on and screening to it. Performance measures applied in can be qualitative instead of concentrated on only quantitative indicator. Besides, analyzing and learning from performance measures also supply a better understanding on the performance of the organization as it not only creates the opportunities to pinpoint cause and effect but also gives useful support for addressing related matters.

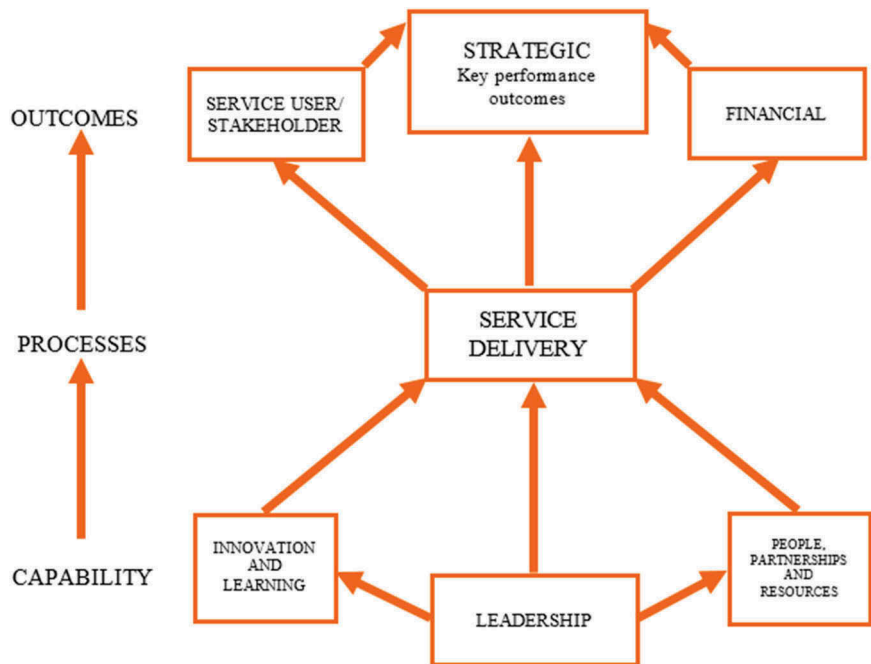
#### *2.1.4. Completing the cycle*

Performance information is finally employed to modify the strategy map, ascertain further service renovations, and promote better performance measures. However, this cycle still carries on owing to frequent changes in strategy as well as the linkage between performance measures and changing strategy among public and third sector organizations (Johnston & Pongatichat, 2008).

Furthermore, PSS is established with the differences in the number of perspectives in comparison with BSC. The left side of the framework accentuated by procedures started by processes to outcomes and capacity. Meanwhile, divergent components of PSS are presented in detail. Outcomes comprise the key performance outcomes such as organization objectives to accomplish

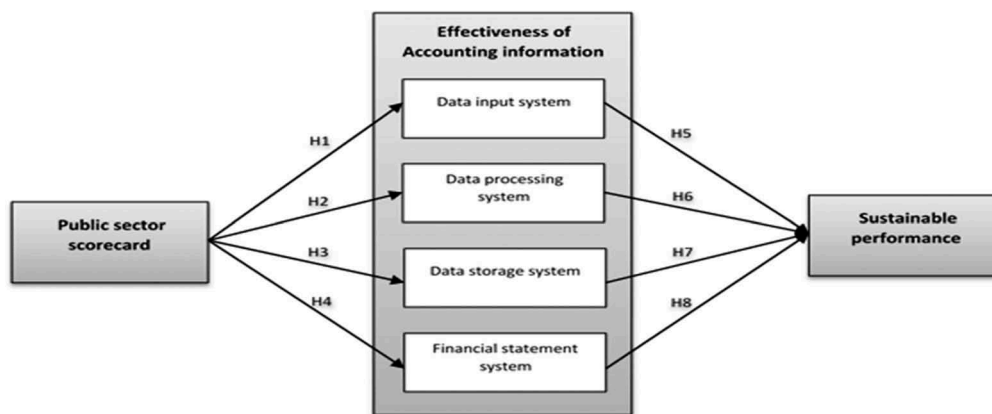
**Figure 1. Public sector scorecard.**

(Source: Moullin, 2017)



**Figure 2. Proposed causal model.**

(Source: Researchers' elaboration, 2019)



or the results which are expected by users and other key stakeholders, along with financial outcomes, namely, breaking-even, guaranteed funding, and providing value for money. On the contrary, service delivery which covers with only processes element since its main concern is actual experience of users and stakeholders in lieu of planned service and policies. In addition, capability consists of necessary operation to give the support for all the staff and processes in generating the demanded outcomes and outputs.

## 2.2. Accounting information system

Numerous definitions have been made on AIS (Esmeray, 2016). AIS is functioned as a system to collect, process, categorize, and create information under report (Salehi & Abdipour, 2011). Meanwhile, Romney, Steinbart, Mula, McNamara, and Tonkin (2013) argue that AIS is a system to gather, record, stock, and process the accounting data for supplying information to make decisions.

The effectiveness of AIS can be analyzed on three aspects, namely information scope, timeliness, and aggregation (Neogy, 2014). According to information scope, financial and non-financial

information, internal and external information plays a significant role in predicting future events. While timeliness quality mentioned about the capacity of meeting the information requirement through offering systematic reports to external and internal users, aggregation of information places an emphasis on gathering and summarizing information within a period of time (Sajady, Dastgir, & Hashem, 2008). On the other hand, the effectiveness of AIS can be assessed as added value of benefits (Corner, 1989), management information supplying to support for decision-making (Flynn, 1992) in conjunction with conducting numerous main functions, namely, gathering, maintaining, managing, controlling data, and creating information (Wilkinson, 1993).

Overall, AIS is the combination in harmony of data input system, data processing system, data storage system, and financial statement system to enhance the performance of accounting work to generate useful information for decision-making. The effectiveness of AIS can be achieved only if each component can perform effectively.

### **2.3. Sustainable performance**

The concept of sustainable development was first posed in the early 1970s and clearly defined in the Brundtland report in 1987. Thus, sustainable development is specified as the development that meets the present demand and generates no impact on the potential demand in the future. In addition, sustainability is also identified as “the integration of the environmental, social, and economic systems to improve the quality of life within earth’s carrying, regenerating and assimilating capacity”, according to the perspective of Adetunji, Price, Fleming, and Kemp (2003). Although there are various aspects on the number and type of sustainability dimensions, it is broadly acknowledged that the sustainability is covered with three dimensions consisting of environmental, social, and economic features. Therefore, organizational SP will focus on environmental, social, and economic performance. While environmental performance bears heavily on the utilization of efficient and cleaner sustainable energy resources and economic performance mainly concentrated on the basis of economic growth with high environmental protection and quality of life improvement (Abdul-Rashid, Sakundarini, Raja Ghazilla, & Thurasamy, 2017), social performance deals with the actual organizational accomplishment in quality of life improvement and maintenance with dispensing environmental facets (Yusuf et al., 2013).

## **3. Theoretical framework**

### **3.1. Goal-setting theory**

Goal-setting theory was first discovered by Locke (1968) and was well-appraised organizational behaviorists (Miner, 2003). In particular, higher performance will be accomplished with difficult and specific goals instead of vague do your best goals (Locke & Latham, 2002). There are five successful determinants of goal-driven performance which are consisted of goal commitment, goal importance, a set of tactics, individual’s self-efficacy as well as feedback and task complexity (Locke & Latham, 2002). Of these, goal commitment which performs as the most vital component is significantly influenced by goal importance. Accordingly, goal importance is likely to be increased through a set of tactics comprising public pronouncements, organizational vision-goal linkage, goal assignment, involving in goal-setting and monetary encouragement. On the other hand, people whose self-beliefs and confidence place on their capacities strongly will embody stronger engagement to difficult goals. Additionally, the combination of goals and feedback will lead to higher performance rather than from goals or feedback separately (Locke & Latham, 2002). Furthermore, Neubert and Dyck (2016) have made a contribution to the development of goal setting through setting up another approach of this theory upon the sustainable perspective. Accordingly, apart from obtaining the productivity and efficiency, the labors tend to work for relationship satisfaction, community enhancement, social justice promotion, and ecological well-being (Giacalone, 2004). Additionally, this sustainable approach also focuses on determining desired outcomes through encouraging numerous stakeholders whose benefits are influenced by the setting-goals (Phillips, Freeman, & Wicks, 2003). Notwithstanding primary individual task performance concentration, the goal-setting theory has been also put into application at several levels of the organization (Locke &

Latham, 1990). Therefore, goal setting is presumed as a potentially powerful tool for gaining the effectiveness of the entities (Terpstra & Rozell, 1994).

#### **4. Empirical literature review and hypotheses development**

##### **4.1. Empirical literature review**

###### *4.1.1. The association between AIS and performance management*

AIS is set up with the further purpose to undertake the responsibilities of managing the organizational strategy (Gerdin & Greve, 2004) and is highlighted to be an important mechanism for efficient management, monitoring activities of the organization and facilitating managerial decision-making (Hanifi & Taleei, 2015) to gain the competitiveness of the organization (Ghorbel, 2017). Moreover, AIS has indicated its effectiveness in enhancement of the alignment between the organizational strategy and the system under the uncertain condition (Jawabreh & Alrabei, 2012). As such, AIS design is concluded to have a close relationship with organizational strategy and performance (Grande, Estebanez, & Colomina, 2010). AIS is also asserted to play a proactive part in business management (Muhindo, Mzuza, & Zhou, 2014) through analyzing the effect of AIS on the performance of the interaction between specific types of strategies and diverse design of AIS (Bouwens & Abernethy, 2000). As proclaimed by Ismail and King (2005), there is a positive relationship between AIS alignment and strategy and performance measures. On the contrary, the association between AIS and management functions is uncovered in the research undertaken by Jawabreh and Alrabei (2012).

###### *4.1.2. The association between AIS and organizational performance*

Indeed, AIS have been well-recognized to be capable of increasing the overall performance, profitability, and operations efficiency of the organization with the IAS' s support (Sajady et al., 2008). As such, several studies have employed scope, timeliness, and aggregation to explore the impact of AIS effectiveness (Mollanazari & Abdolkarimi, 2012). To illustrate this point, Soudani (2012) argues the AISs' role in improving the organization's performance in numerous countries. Correspondingly, the association between AIS and overall performance that is attested in financial institutions and non-governmental organization (Fowzia & Nasrin, 2011) also reveals to be positive and significant. Furthermore, AIS is proved to perform effectively in declining the costs of medical services in the Hospital of King Abdullah University (El-Dalabeeh & Al-Shbiel, 2012). Conversely, as stated by Onaolapo and Odetayo (2012), there is lack of evidence to illustrate the relationship between the effectiveness of AIS and organizational performance.

##### **4.2. Hypotheses development**

Management provides a considerable support for the efficiency of information system (Shagari et al., 2017). As stated by Hongjiang (2010), the success of the systems is also subordinate to the quality of the information in an AIS owing to its process of financial transactions and non-financial transactions and support for decision-making in term of coordination and control of organizational operations (Mollanazari & Abdolkarimi, 2012). In the manner of significant dependence on the support of physical components, human and financial resources in the process of information production and communication in combination with the fruitful advance in technology has unfolded the capacities of creating and utilizing accounting information under a strategic viewpoint (El Louadi, 1998) and led to the demand making use of numerous resources and the balance between the cost and the benefit attained in the process of producing and collecting information. Therefore, accounting literature suggests that strategic success should take the outcome of AISs' design into consideration (Langfield-Smith, 1997). In other words, without the strategic management, planning, and controlling of the AISs' operation, the employment of AIS will fail to meet the demand of providing support for organizational operation process. In other words, the effectiveness of AIS depends significantly on how well the management performance is efficiently put in place in order to facilitate its components' operation. Thus, the hypotheses that guided this research are developed as follows:



**H1.** *The PSS adoption has a positive and significant effect on the effectiveness of Data input system*

**H2.** *The PSS adoption has a positive and significant effect on the effectiveness of Data processing system*

**H3.** *The PSS adoption has a positive and significant effect on the effectiveness of Data storage system.*

**H4.** *The PSS adoption has a positive and significant effect on the effectiveness of Financial statement system.*

The emergence of sustainability in organizational strategy has caused to the requirement on a significant change in the organizations' performance in relation to the economic, social, and environmental (triple) bottom lines (Elkington, 1998). Nonetheless, managing sustainability holistically is challenging which demands for a suitable management framework integrated with environmental, social, and economic business performance (Schaltegger & Wagner, 2006). Under this circumstance, information systems, especially AIS, are well aware of directly influencing the management (Essex & Magal, 1998). Indeed, AIS is considered as leverage to generate the support for the effectiveness and efficiency of organizational operations as well as managerial operations (Gelinas, Dull, & Wheeler, 2012) through providing all levels of management with timely and reasonably accurate information to effect on performance management. Simultaneously, AIS can generate helpful information for shareholders to make decisions on investment (Sori, 2009). Importantly, AIS also has a significant impact not only on the behavior and performance management but also on across departments, organizations, and countries around the world. AIS can incredibly improve financial performance and non-financial performance through giving added value for users in terms of the provision of financial information for planning, controlling, as well as decision-making (Romney & Steinbart, 2009), especially, the sustainable development goal. Hence, the hypotheses that guided this research are considered as follows:

**H5.** *Effectiveness of Data input system has a positive and significant effect on SP.*

**H6.** *Effectiveness of Data processing system has a positive and significant effect on SP.*

**H7.** *Effectiveness of Data storage system has a positive and significant effect on SP.*

**H8.** *Effectiveness of Financial statement system has a positive and significant effect on SP.*

## **5. Research design**

### **5.1. Design, population, and sample**

The double translation protocol was employed to make preparation for the survey questionnaire (Hsu, Tan, Zailani, & Jayaraman, 2013). Accordingly, the English version was first established and was translated into Vietnamese version. The final Vietnamese version would be completed after a consensus between the two translators. Besides, the researchers also recommended for reviews of practitioners and academics so that the questionnaire could obtain the validity (Cook & Campbell, 1979). Eventually, the back-translation version was conducted to compare with the original English version by the other two experts and to verify equivalency between translated questionnaire and the original translation (Paegelow, 2008).

In light of the aforementioned objectives, the mixed methods approach was employed in this research. The qualitative method was conducted before implementing the quantitative approach in order to grasp the context of the research at the highest possible richness degree (Corbin & Strauss, 1990). Accordingly, in-depth semi-structured interviews were selected to enhance the insights on this type of topic (DiCicco-Bloom & Crabtree, 2006) since the data quality would be improved with full and accurate answers of interviewees (Diefenbach, 2009). The semi-structured interviews were performed with particular qualified and experienced persons to collect useful information for the modification of the questionnaires so that the validity, accurateness, and clearness could be attained. These selected expertise consisted of research scholars at the universities, practitioners working as functional managers in the Department of Education and Training; Department of Finance. The five-point Likert-type scale ranging from “strongly disagree” to strongly agree’ was employed for all the measurements in the questionnaires because this type of scale could lead to the strengthening of the response rate as well as response quality (Dawes, 2008).

PSOs located in Mekong Delta region were selected to be the context for gathering data for the current research in line of the primary role of this area in economic development, investment, and trade cooperation with several parts in the world. This study targeted at accountants working in the PSOs in Mekong Delta region as the survey participants due to not only the key role of functioning AIS but also the involvement in performance measurement as a consultant for the leader of the organization in planning, managing, and controlling the strategies (Lilian Chan, 2004). The surveys were begun with explanation of the concept and providing some essential guidance and examples to help the respondents to be able to apprehend and feel confident in completing the questionnaires on this type of subject. Additionally, with the purpose of measuring reliability and validity of the questionnaire, a pilot study was first conducted before the main survey took place.

#### *5.1.1. Pilot sample*

A pilot test was recommended to be carried out for evaluating the quality of the measures and the feasibility of the research (Dillman, 1978). Accordingly, a random sample of 200 accountants established from the target population was requested to enroll in this test. Simultaneously, the Cronbach’s  $\alpha$  value was applied to test the degree of internal consistency of each construct (Dunn, Baguley, & Brunnsden, 2013) and expected to be at 0.7 or more to demonstrate appropriate levels of reliability (Hair, Ringle, & Sarstedt, 2011). The Cronbach’s  $\alpha$  value in this pilot test (above 0.7) indicated that the questionnaire always filled with reliable and consistent answers. In other words, the variables and dimensions of this study covered with acceptable reliabilities.

#### *5.1.2. Main sample*

As proposed by Hair, Anderson, Tatham, and Black (2008), with the SEM statistical analysis technique application, the measurement model would need at least either 5 samples for a parameter or 15 respondents for each indicator to be estimated. Besides, the samples of 200 or beyond could meet the goodness of fit (Hair, Anderson, Tatham, & Black, 2010). The theoretical model covered with 47 parameters and 8 indicators; hence, the amount of 235 respondents was supposed to meet these demands. The two non-probabilistic methods including snowball sampling and convenience sampling technique were employed in this study. The survey lasted for four months, from August 2019 to November 2019. After eliminating invalid responses, the final total number of valid surveys received was 883 with a response rate of 83.76%.

### **5.2. Measures and the questionnaire**

#### *5.2.1. Public sector scorecard*

Since PSS has still been new in management framework literature to make use of among PSOs, the measurement scales of PSS application for effectiveness of AIS based largely on the way by which existing model mentioned from Moullin (2017) has been established in combination with several

adaptations from previous scholars in the field of AIS. The modifications based on experts' advice were also implemented to ensure their consistency with the context of the research.

Thus, the outcomes of the AIS were the first matter to be addressed. The key outcomes of AIS implied on the characteristics which the AIS could attain when it was in use, namely, usability, adaptability, flexibility, reliability, efficiency, effectiveness, security, and accessibility (Rocha, Correia, Wilson, & Stroetmann, 2013). Additionally, AIS application was accounted for improving the financial performance such as decreasing in expenses (Bruno, Iacoviello, & Lazzini, 2015) and increasing the revenues (Dahlgard & Ciavolino, 2007), simultaneously, creating the satisfaction for the organizational service user and stakeholder with information content, output format and timeliness (Fong & Ho, 2014) for their effective decision-making.

Regarding process of AIS, the outputs of AIS must attain several key features, namely, regular provision, timeliness, and predictive power creation (Alsarayreh, Jawabreh, Jaradat, & Alamro, 2011).

However, those processes and outcomes of AIS were still in need of the sufficient support from the internal partnerships and resources, and leaders to succeed in operations. Besides, analyzing and learning from performance measures were also the other issues which were worth paying attention as they would provide the useful understanding on how effectively the AIS performs and timely solutions could be found from those findings.

Therefore, a set of 25 items were modified from the works of Rocha et al. (2013); Bruno et al. (2015); Dahlgard and Ciavolino (2007); Fong and Ho (2014); Alsarayreh et al. (2011); Fengyi, Olivia, and Sheng (2005); Al-Hattami and Kabra (2019); McLeod and George (2007); Nevis, DiBella, and Gould (1995); Abu Khadra and Rawabdeh (2006); and Wang and Ahmed (2004) to measure the key performance outcome, financial, service user/stakeholder, service delivery, people, partnerships, and resources, leadership, innovation, and learning domains.

### 5.2.2. Effectiveness of AIS

In the current study, AIS was considered to be constituted by the four components including Data input system, Data processing system, Data storage system, and Financial statement system. As such, the POSs' AIS could achieve the effectiveness only when each of its component performed in the effective way. Therefore, Data input system items were obtained from Uyar, Gungormus, and Kuzey (2017). Data processing system criteria were adapted from Romney and Steinbart (2006) and Sori (2009). Data storage system items were measured based on the contributions of Sajady et al. (2008). Financial statement system criteria were created from those propounded by Sori (2009) and Uyar et al. (2017).

### 5.2.3. Sustainable performance

The instrument of SP contained three dimensions including economic performance, social performance, and environment performance. The measurement scales for economic performance were modified from the work Urban and Naidoo (2012); Wang, Subramanian, Gunasekaran, Abdulrahman, and Liu (2015); and Perlin, Gomes, Kneipp, and Motke (2018). The criteria applied to evaluate social performance were inherited from the work of Jaaron and Backhouse (2018), and items employed to measure environment performance were taken from the contributions of Amrina and Vilsa (2015) and Wang et al. (2015).

## 6. Empirical results and discussion

### 6.1. Demographic profile of the sample

Among all surveyed respondents, the opinions about researching issue are answered by 221 men (25.03%) and 662 women (74.97%). The age of groups was distributed with 6.68% of "below 25", 33.18% of "25-35", 43.37% of "35-45", and 16.76% of "above 45". Of the respondents, 7.36% reported to have college degree, 59.23% reported to get undergraduate education, and 33.41%

**Table 1. Results summary of measurement models**

Model construct	Items	Factor loadings	Discriminant validity	Source
<i>Public Sector Scorecard application</i>				
Key performance outcome <b>AVE</b> = 0.503 <b>CR</b> = 0.890 <b>Cronbach's Alpha</b> = 0.889				
<b>KPO1</b>	AIS obtains the usability	0.735	Yes	Rocha et al. (2013)
<b>KPO2</b>	AIS obtains the adaptability	0.654		
<b>KPO3</b>	AIS obtains the flexibility	0.717		
<b>KPO4</b>	AIS obtains the reliability	0.674		
<b>KPO5</b>	AIS obtains the efficiency	0.637		
<b>KPO6</b>	AIS obtains the effectiveness	0.764		
<b>KPO7</b>	AIS obtains the security	0.767		
<b>KPO8</b>	AIS obtains the accessibility	0.722		
Financial <b>AVE</b> = 0.746 <b>CR</b> = 0.854 <b>Cronbach's Alpha</b> = 0.849				
<b>FIN1</b>	The use of AIS leads to the reduction in expenses	0.872	Yes	Bruno et al. (2015)
<b>FIN2</b>	The organizational revenue has increased during the last three years	0.848		
Service user/stakeholder <b>AVE</b> = 0.668 <b>CR</b> = 0.858 <b>Cronbach's Alpha</b> = 0.852				
<b>SUS1</b>	Satisfaction with information content	0.783		Fong and Ho (2014)
<b>SUS1</b>	Satisfaction with output format	0.830		
<b>SUS3</b>	Satisfaction with timeliness	0.844		
Service delivery <b>AVE</b> = 0.650 <b>CR</b> = 0.848 <b>Cronbach's Alpha</b> = 0.848				
<b>SED1</b>	Outputs of AIS are supplied to all levels on request together with regular basis	0.805	Yes	Alsarayreh et al. (2011)
<b>SED2</b>	Outputs of AIS are supplied to all levels on time	0.807		
<b>SED3</b>	AIS offers quantitative information with predictive power	0.810		
People, partnerships and resources <b>AVE</b> = 0.702 <b>CR</b> = 0.876 <b>Cronbach's Alpha</b> = 0.875				

(Continued)

**Table 1. (Continued)**

Model construct	Items	Factor loadings	Discriminant validity	Source
<b>PPR1</b>	The use of AIS facilitates effective integration between departments in the organization.	0.807	Yes	Fengyi et al. (2005)
<b>PPR2</b>	The organizational AIS supports in the establishing of HR policies, processes, and procedures	0.891		Al-Hattami and Kabra (2019)
<b>PPR3</b>	The organizational AIS supports to rationalize decisions on employee performance evaluation	0.815		
Leadership <b>AVE</b> = 0.703 <b>CR</b> = 0.876 <b>Cronbach's Alpha</b> = 0.875				
<b>LED1</b>	Establishing policies that guarantees the goals of information system are in accordance with the organizational goals	0.832	Yes	Raymond and Schell (2007)
<b>LED2</b>	Providing financial support for information systems demands	0.877		
<b>LED3</b>	Resolving conflicts in the information systems implementation	0.805		
Innovation and Learning <b>AVE</b> = 0.624 <b>CR</b> = 0.833 <b>Cronbach's Alpha</b> = 0.829				
<b>IAL1</b>	Information gathering practices in the exterior and interior environment	0.795	Yes	Nevis et al. (1995)
<b>IAL2</b>	Learning and information sharing	0.795		Abu Khadra and Rawabdeh (2006)
<b>IAL3</b>	Associating strategic orientation with innovative behavior and process	0.789		Wang and Ahmed (2004)
<i>Effectiveness of Accounting Information Systems</i>				
Data input system <b>AVE</b> = 0.656 <b>CR</b> = 0.851 <b>Cronbach's Alpha</b> = 0.847				

(Continued)

**Table 1. (Continued)**

Model construct	Items	Factor loadings	Discriminant validity	Source
<b>INP1</b>	Policies and procedures on how to record the accounting transactions are established in the organization.	0.730	Yes	Uyar et al. (2017)
<b>INP2</b>	The accountants who record the transactions and verify them are not always the same	0.871		
<b>INP3</b>	The documents are always signed by the preparers and receivers of those documents.	0.827		
Data processing system <b>AVE</b> = 0.577 <b>CR</b> = 0.804 <b>Cronbach's Alpha</b> = 0.803				
<b>PRO1</b>	Data processing has capable of making a difference in a decision by helping managers to make predictions about the outcomes of past, present, and future events to evaluate financial performance in organization.	0.715	Yes	Romney and Steinbart (2006)
<b>PRO2</b>	Data processing caused the improvement of the quality of the financial reports and facilitated the process of the organizational transactions	0.738		
<b>PRO3</b>	The automated data collection speeds up the process to overcome human weaknesses in data processing	0.828		Sori (2009)
Data storage system <b>AVE</b> = 0.675 <b>CR</b> = 0.806 <b>Cronbach's Alpha</b> = 0.805				
<b>STO1</b>	The data storage contributes to the integrity of the financial reporting process	0.799	Yes	Sajody et al. (2008)
<b>STO2</b>	The data storage performs sufficiently to accurately and fairly reflect company asset	0.844		
Financial statement system <b>AVE</b> = 0.669 <b>CR</b> = 0.859 <b>Cronbach's Alpha</b> = 0.858				

(Continued)

**Table 1. (Continued)**

Model construct	Items	Factor loadings	Discriminant validity	Source
<b>STA1</b>	The automated data collection speeds up the process to generate financial statements	0.780	Yes	Sori (2009)
<b>STA2</b>	At the end of the year, financial analysis reports are prepared and utilized in decision-making process	0.832		Uyar et al. (2017)
<b>STA3</b>	Management makes use of the information on financial reports in performance evaluation.	0.840		
Sustainable performance				
Economic performance <b>AVE</b> = 0.638 <b>CR</b> = 0.874 <b>Cronbach's Alpha</b> = 0.871				
<b>ECO1</b>	Enhancement in the direct economic value generated and distributed in the community	0.788	Yes	Perlin et al. (2018)
<b>ECO2</b>	Enhancement in the involvement of those concerned in the decision-making on issues that concern them.	0.683		
<b>ECO3</b>	The financial learning of the organization	0.928		Urban and Naidoo (2012)
<b>ECO4</b>	Operational cost decreasing through saving resources in short-term business operations	0.777		Wang et al. (2015)
Social performance <b>AVE</b> = 0.576 <b>CR</b> = 0.842 <b>Cronbach's Alpha</b> = 0.835				
<b>SOC1</b>	Gaining customer loyalty	0.683	Yes	Jaaron and Backhouse (2018)
<b>SOC2</b>	Gaining employee retention	0.668		
<b>SOC3</b>	Gaining employee motivation	0.909		
<b>SOC4</b>	Gaining departmental collaboration	0.750		
Environment performance <b>AVE</b> = 0.677 <b>CR</b> = 0.863 <b>Cronbach's Alpha</b> = 0.861				
<b>ENV1</b>	Employees work in healthy and safe environment	0.860	Yes	Wang et al. (2015)
<b>ENV2</b>	Employees' satisfaction and inclusion	0.781		Amrina and Vilisi (2015)
<b>ENV3</b>	Employees are facilitated to attain education and skill development	0.828		
Processed primary data, 2019.				

were classified for postgraduate education. In terms of year of experience, 183 respondents (20.72%) belonged to “5–10” group, 263 respondents (29.78%) were in “10–15” group, 370 respondents (41.90%) were in the “Above 15” group, and the remaining 67 (7.59%) were classified as “Below 5”. With regard to the respondent in the type of organization, the sample included 681 public non-income generating agencies (77.12%) and 202 public administrative (22.88%).

### **6.2. Confirmatory phase: large-scale study**

The measurement model must be evaluated in order to set up how the latent constructs were relevant to their observed variables through evaluating the reliability, convergent validity, and discriminant validity of the latent constructs before conducting assessment of SEM model (Hair et al., 2010). Accordingly, the value of above 0.7 was recommended for the value of Cronbach’s alpha of all latent constructs and composite reliability (Nunnally & Bernstein, 1994). Additionally, factor loadings of more than 0.65 (Hair, Black, Babin, Anderson, & Tatham, 2006) and AVE of more than 0.5 for all the latent constructs (Fornell & Larcker, 1981) were the criteria in the reliability and convergent validity assessment in the measurement model. Apparently, the results depicted in Table 1 met the demanded threshold.

As proposed by Fornell and Larcker (1981), each construct should be proved to be represented for a separate construct through discriminant validity assessment. Accordingly, AVE for each construct should attain the value which is higher than its shared variance in comparison with any other construct or diagonal factor loadings of each item must be considerably greater than the cross-loadings of items of other constructs in corresponding rows and columns (Bhattacharjee & Sanford, 2006). The result in Table 2 emphasized the measurement model obtained the discriminant validity.

### **6.3. Result of the SEM**

Once the results of structural model depicted in Figure 3 including Chi-square/df (1.688) lied in the range of 1.0 to 2.0 (Hair et al., 2010), RMSEA (0.028), GFI (0.923), TLI (0.961) and CFI (0.963) attained the fit indices (Hu & Bentler, 1999), the causal relationships of constructs were examined obviously.

Properties of the causal paths consisting of the path’s beta coefficients ( $\beta$ ) and their p-value are reported in Table 3. Overall, PSS was substantiated to have significant impact on PRO ( $\beta = 0.175$ ;  $p = 0.000$ ), STA ( $\beta = 0.120$ ;  $p = 0.000$ ), STO ( $\beta = 0.108$ ;  $p = 0.001$ ), as well as INP ( $\beta = 0.090$ ;  $p = 0.000$ ). In terms of the linkage between effectiveness of AIS and SP, the three highest levels of impact were STA ( $\beta = 1.363$ ;  $p = 0.002$ ), PRO ( $\beta = 0.920$ ;  $p = 0.007$ ), and INP ( $\beta = 0.910$ ;  $p = 0.015$ ). Meanwhile, the component which had less substantial effect on SP was STO ( $\beta = 0.636$ ;  $p = 0.037$ ). Thus, H1–H8 were supported.

#### **6.3.1. The relationship between PSS application and the effectiveness of AIS**

Presently, the business environment is dynamic; therefore, AIS should respond to the dynamics of the changing environment (Kwarteng & Aveh, 2018). The characteristics of PSS are considered essential to increase the effectiveness of AIS, resulting in SP. The PSS comprises incorporating strategy mapping, service improvement, and measurement and evaluation (Moullin, 2017). Meanwhile, AIS consists of data input system, data processing system, data storage system, and financial statement system. Based on the structural relationship model, the results illustrate that PSS application has significant positive effects on the effectiveness of AIS. These results confirm that PSS can be viewed as a logical as well as more appropriate management framework for success within AIS implementations. First, PSS practices have significant positive impact on data processing system and financial statement system. This is because data processing system is actually the pivotal process as it reflects the main contents or results that are in need to be achieved through generating useful information for organizational accounting operations. Apparently, this process utilizes skills and resources to primarily focus on examining the accuracy and rationality of documents and figures; systematizing, synthesizing, and analyzing data and



**Table 2. Results of discriminant validity**

	KPO	ECO	SOC	LED	PPR	ENV	SUS	STA	INP	SED	IAL	PRO	FIN	STO
KPO	<b>1</b>													
ECO	0.023	<b>1</b>												
SOC	0.078	0.338	<b>1</b>											
LED	0.076	-0.052	0.037	<b>1</b>										
PPR	0.113	0.065	0.026	0.025	<b>1</b>									
ENV	0.064	-0.026	0.060	0.146	-0.007	<b>1</b>								
SUS	0.065	0.176	0.095	0.019	0.074	-0.003	<b>1</b>							
STA	0.114	0.093	0.164	0.110	0.096	0.059	0.124	<b>1</b>						
INP	0.135	0.122	0.101	0.023	0.051	0.118	0.072	0.151	<b>1</b>					
SED	0.080	-0.053	0.016	0.270	0.017	0.161	0.108	0.188	0.140	<b>1</b>				
IAL	0.075	-0.042	0.037	0.261	0.010	0.133	0.039	0.077	0.032	0.242	<b>1</b>			
PRO	0.146	0.060	0.152	0.123	0.086	0.226	0.148	0.114	0.114	0.227	0.110	<b>1</b>		
FIN	0.020	0.229	0.143	0.006	0.120	0.014	0.222	0.213	0.084	0.073	0.078	0.093	<b>1</b>	
STO	0.005	0.075	0.097	0.237	0.095	0.108	0.012	0.034	0.031	0.073	0.055	0.140	0.055	<b>1</b>

Processed primary data, 2019.

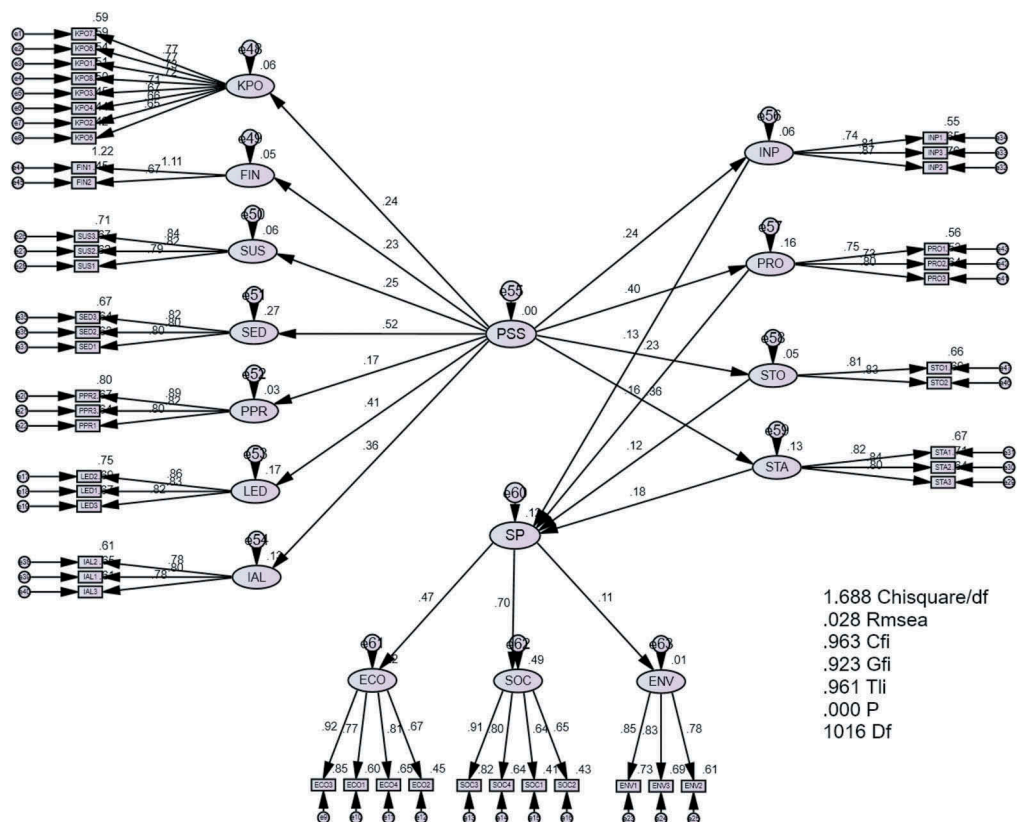
documents; correcting data and documents so that the nature of the events and transactions can be presented truly and fairly. Additionally, processing data also directly attends to the financial statements preparing process in order to provide the available good quality of information on the past and present activities. These information will be useful for making economic decision and preparing future plan. A high-quality financial reporting organization typically attains the potential to reduce problems related to moral hazard (Jung, Lee, & Weber, 2014), thereby, encourage stakeholders to keep on investing positively in the entities. Second, PSS practices are associated with data storage system which is an important and indispensable process in the organizational accounting operation due to the effective control management, capacity of information accessibility enhancement, cost and time savings for internal and external users. Finally, PSS dimensions are related to data input system. However, these influences were proved to be less than that of the three other processes regardless of its role in identifying the needs of information, seeking the sources of information, and implementing the set of information in accordance with the setting goal. In other words, there is a tendency on paying less attention to input data system among PSOs in Mekong Delta region.

**6.3.2. The relationship between the effectiveness of AIS and sustainable performance**

Based on the findings of the current research, it is claimed that the financial statement system has a significant positive effect on SP. It is not surprising that the linkage between data processing systems and SP is supported, as AIS is a collection of interrelated activities, documents, and technologies designed to gather, process data, and report information to meet the demand of internal and external users. On the other hand, these results give the evidence that data processing system is also valuable process for achieving SP through helping managers to overcome human weaknesses in conducting accounting works (Sori, 2009) and make predictions about the outcomes of past, present, and future events to evaluate financial performance, and improve the quality of the financial reports and facilitate the process

**Figure 3. Research model results.**

Processed primary data, 2019.



**Table 3. Structural coefficients ( $\beta$ ) of the proposed model**

Hypothesis	Relationship	Estimate	S.E.	C.R.	P	Inference
H1	INP $\leftarrow$ PSS	0.090	0.026	3.489	0.000	Supported
H2	PRO $\leftarrow$ PSS	0.175	0.042	4.130	0.000	Supported
H3	STO $\leftarrow$ PSS	0.108	0.033	3.232	0.001	Supported
H4	STA $\leftarrow$ PSS	0.120	0.030	4.036	0.000	Supported
H5	SP $\leftarrow$ INP	0.910	0.375	2.429	0.015	Supported
H6	SP $\leftarrow$ PRO	0.920	0.339	2.710	0.007	Supported
H7	SP $\leftarrow$ STO	0.636	0.305	2.085	0.037	Supported
H8	SP $\leftarrow$ STA	1.363	0.445	3.067	0.002	Supported

Processed primary data, 2019.

of the organizational transactions (Romney & Steinbart, 2006). Besides, a positive association between SP and data input system was confirmed. Because this is the system is well-established with sufficient data collection together with legal document preparation, it should be capable of generating useful inputs to facilitate the functions of all other processes. Regarding data storage system, the results provide empirical validation that SP can be influenced by data storage system. These findings emphasize that PSOs that have greater involvement in designing and implementing this system will be able to save operational cost and time, conduct environment protection, as well as generate a variety of benefit for stakeholders.

## 7. Summary and conclusion

### 7.1. Conclusion

Based a theoretical point of view, the current research aims to explore whether PSS implementations are associated with the effectiveness of AIS in enhancement SP with evidence gathered from PSOs in Mekong Delta region. The results of the study provide a reliable basis for the link between PSS implementation and the effectiveness of AIS in PSOs. Accordingly, each of AISs' components plays a vital role in promoting environment performance, social performance, and economic performance to ensure the enhancement in overall organizational SP. In this regard, the researchers' experiences propose some implications that need to be further taken into consideration.

### 7.2. Implication

The outcome of this research has drawn some implications for the academic community. The adapted management framework demonstrated in this study completely accounts for its potential benefits that meet the demand of public management. Owing to the combination of prior scholars' perspectives on the operational features of AIS, PSS framework, and further detailed empirical enquiries, this paper has built up a management framework for the effectiveness of AIS. Accordingly, the framework can be considered as a fruitful comprehensive embarkation point for scholars exploring on public administration field to obtain a more expansive and inclusive research framework. The analysis of this research could be further explored the perspective on consistent with a set of characteristics that can lead to the AIS's effectiveness . Moreover, this study has made a significant contribution to the theoretical development focusing on the relationship between AIS effectiveness and SP, especially, in the three dimensions, namely, social performances as well as economic and environmental benefits. Nevertheless, due to the diversity of sustainability measurement indexes and frameworks (Gnanaweera & Kunori, 2018), SP is required to deal with various dimensionalities and levels for its measurement (Van Marrewijk & Werre, 2003); thus, researchers are directed to seek for new and better approaches to address these issues (Searcy, 2012).

The findings of this result have disclosed several implications for practitioners as well. First, these findings offer an insight into insinuation about the importance of PSS application and utilization on the effectiveness of AIS in SP, thereby equipping the leaders with support to establish, implement, and maintain the strategic management framework in PSOs. Therefore, close communications and relations with stakeholders are crucial issues for conducting to succeed in PSS application. Additionally, this application also directs the leaders' attention to gain the cooperation among the employees as well as putting up the good two-way relationship between the superior and subordinates. Second, PSOs are on demand of putting several targeted training in place which would increase the degree of understanding on numerous matters in term of financial and accounting issues as well as performance measurement and management practices to undertake complicate responsibilities to make their contributions to AIS effectiveness such as performance data collection and reporting related to AIS's operations. Beyond, leaders are encouraged to increase their abilities and competencies through continuous learning and the training needed for specific responsibilities. Third, investing and potential resourcing toward implementation of PSS contributing to the effectiveness of AIS also necessitates to provide adequate and timely support for each stage of AISs' operation. On the other hands, the PSS adoption into management the performance of AIS can only be accomplished on when policy-makers obtain the insight comprehension about PSS concept as well as implementation to promulgate

mechanisms related to the standardized PSS adoption for the overall complex set of POSs' operations, thereby, succeed in encourage all the PSO to adopt with the highest willingness and cooperation. Furthermore, governance and social responsibility are considered the main issues to be integrated into accounting education in numerous universities in the world (Camilleri, 2016; Franklin, 2016); therefore, educational institutions should take these main points into consideration in elaborating the training program.

### 7.3. Limitations and extensions for further research

In light of the academic and practical application, inherent limitations in this research are on demand of addressing to generate a complete picture depicting the impact of PSS adoption and utilization on the effectiveness of AIS toward the SP. First, the respondents of this study were limited to a particular area in the country, Mekong Delta region. Hence, the findings cannot be extrapolated entirely to the PSOs throughout Vietnam and multiple countries around the world. On the other hand, due to the limitation in target population, future works are directed to reinforce the achieved findings through broadening the scope of exploration and generalizing this study's sample to the respondents of other positions of the organization. Second, the result of this study depends merely on the belief of the interviewees in a specific period of time in which the research is conducted (Remenyi, Williams, Money, & Swartz, 1998); further research may, therefore, evaluate the implementation of performance management after several years later. Third, because of cross-sectional data applied in this study, summarizations suffer from causal extrapolations and common bias. Thus, long-term study is requested to provide greater definitive summarization. Fourth, regardless of detailed insight creation (Covaleski, Hoque, & Gooneratne, 2013), one single theory utilization can lead to the limitation in offering the comprehensive understanding of the complicated issues relevant to performance management, SP as well as AIS. In this way, multiple theoretical approaches are confirmed to fulfill in future work. Finally, the adoption of PSS has not yet taken place in the PSO in Vietnam also prevented the measurement of its influences. However, it still raises an expectation that current findings can encourage other scholars and practitioners to carry on investigating the inaccessibility maintaining in this study.

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#### Author details

Pham Quang Huy<sup>1</sup>  
E-mail: [pquanghuy@ueh.edu.vn](mailto:pquanghuy@ueh.edu.vn)  
Vu Kien Phuc<sup>1,2</sup>  
E-mail: [vkphuc2017@gmail.com](mailto:vkphuc2017@gmail.com)

<sup>1</sup> School of Accounting, Scientific Field: Accounting, University of Economics Ho Chi Minh City, Vietnam.

<sup>2</sup> Faculty of Accounting, Scientific Field: Accounting, Vinhlong College of Economics and Finance.

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