

THE EFFECTS OF IS RESOURCES ON AIS CAPABILITIES AND PERFORMANCE OF MALAYSIAN CO-OPERATIVES

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Abstract: *Accounting information systems (AIS) capabilities are essential because of their ability to process business data into useful and timely information according to users' requirements. Indeed, empirical evidences suggested that the use of AIS has positive impact on firm performance. However, factors that contribute to AIS capabilities and consequently improve co-operative's performance were not adequately explained. As such, this paper draws on the resource-based view (RBV) to examine the factors that influence AIS capabilities and performance of Malaysian co-operatives. Using a quantitative approach, questionnaires are used to collect data from 115 co-operative managers across Malaysia. Partial Least Square-Structural Equation Modelling is used to analyse the data. The study found that IS technical skills, and planning and change management are significant factors that influence AIS capabilities. Theoretically, the study contributes to knowledge by providing an understanding of the roles of IS resources in AIS capabilities building. Also, the study provides support for the importance of IS resources in AIS capabilities building and improving performance. Practically, the study provides guidelines for co-operatives' stakeholders, particularly management, in planning and managing their IS resources.*

Keywords: *Accounting Information Systems, Information Systems Resources, AIS Capabilities, Co-operative*

Introduction

Cooperatives have been recognized as a significant mechanism for growth and development by social philosophers and economists all around the world. (Othman & Kari, 2008). This seems to be true since cooperatives have now been founded in the majority of the world's countries, including both developing and developed ones. Co-operatives now have more than one billion members globally (ICA, 2013). This indirectly demonstrates global communities' support and trust in the cooperative movement. Co-operatives are recognised as major business entities in Malaysia because of their contribution to the economy. Co-operatives, with over seven million members across the country (MCSC, 2013), might play a vital role in realising the national agenda of becoming a high-income country.

Despite having a large number of members, co-operatives in Malaysia, in particular, are underperforming. The Malaysia Co-operative Society Commission's (MCSC) data from 2010 to 2019 demonstrate this. Statistics suggest that the turnover of co-operatives has been decreasing since 2015. From a peak of RM34.95 billion in 2014, the sum has plummeted to RM24.65 billion in 2019 (SKM, 2020), a decline of more than RM10 billion. In this regard, each co-operative faces a difficult job in enhancing its performance. One alternative is to include AIS into their day-to-day operations. Indeed, a lot of studies have demonstrated that AIS use improves organisational performance (Ahmad & Al-Shbiel, 2019; Ali, Bakar, & Omar, 2016; Alnajjar, 2017; Ismail, Ali, & Rashid, 2017; Kharuddin, Ashhari, & Nassir, 2010; Urus, Hasim, Nazri, & Mat, 2020).

AIS are computer-based systems that record and convert financial data (i.e. daily transactions) into relevant information for decision making (Nicolaou, 2000). AIS with appropriate capabilities would be able to deliver relevant and timely information to management in order for them to make informed business decisions. Indeed, organizations can increase their overall performance by having quality information (Ali et al., 2016; Susanto & Meiryani, 2018). Having said that, business organisations are today functioning in a dynamic and highly competitive market that necessitates more accounting information on an ad hoc basis, in a timely way, and with varying degrees of detail (Prasad & Green, 2015). Having enough AIS capabilities will undoubtedly assist the organisation in effectively and efficiently recording and processing financial data (i.e. accounting events and activities) into meaningful information. AIS capabilities relate to AIS's ability to meet users' information needs for decision-making (Boulianne, 2007).

The literature on information systems (IS) has revealed that research in the AIS field are substantial. However, limited researches have been conducted to investigate the determinants impacting AIS capabilities (Karimi, Somers, and Bhattacharjee (2007) and Prasad and Green (2015) are notable exceptions). Furthermore, the majority of these research focused on small and medium-sized enterprises (SMEs) and public listed companies. Lack of studies were conducted in a cooperative setting. That said, this study examines the factors that influence AIS capabilities and co-operative performance using the Resource-Based View (RBV) theory. This paper contributes to the IS research literature by exploring the roles of IS resources in capability-building of AIS. Having said that, this study advances IS research in the domain of co-operatives. Since most of previous studies in IS/AIS were conducted among SMEs and listed companies, this paper aims to fill the gap by exploring the AIS implementation within co-operatives environment in Malaysia.

The paper starts with a review of previous studies on IS/AIS capabilities. It then addresses RBV theory and its application to the relationship between IS resources and AIS capabilities. Following that, the research model and hypotheses are suggested. The methodology is then described, including the survey instrument, unit of analysis, respondents, data collection procedure, and measures in detail. The technique used to analyse the data, as well as the results and their interpretations, are then explained. This study concludes with the conclusion, limitations, and future research suggestions.

Literature Review

The literature review is separated into three sections: co-operative performance, AIS usage and performance, AIS capabilities and performance and Resource Based View Theory.

Co-operative Performance

There are two types of proxies commonly employed to evaluate co-operatives' performance namely, objective and subjective measures (Rasit & Ibrahim, 2018). The objective measures usually used actual financial data provided in the business financial statement or other related reports. Alternatively, the subjective measure which is based on the management perception is also commonly employed as a proxy of firm performance. Considering the fact that the financial statements of co-operatives in Malaysia are not publicly available, this study employs subjective measures to examine the impact of IS constructs on co-operatives performance as proposed by Ravichandran and Lertwongsatien (2005). The measures evaluate two aspects of performance namely, market-based and operating performance.

AIS Usage and Performance

There are a number of studies evidence that AIS usage provides a significant impact on organisation's performance. For instance, Alnajjar (2017) investigated the impact of accounting information systems on performance management and organizational performance among 74 SMEs in the United Arab Emirates. The study found that AIS significantly impact the performance management and organizational performance of the SMEs. In recent study, Ahmad and Al-Shbiel (2019) examined the relationship between AIS and organization performance in Jordan. Similar to earlier studies, they found that AIS have a significant effect on organization performance.

In the Malaysian environment, Ismail et al. (2017) compared the performance between adopters and non-adopters of AIS among 382 SMEs. They found that overall performance of the AIS adopter's firm was higher than the non-adopter's firm. Meanwhile, in public sector environment, Zakaria, Ilias, and Wahab (2017) conducted a survey among Malaysian public sector agencies to assess the impact of AIS on the users' tasks efficiency. They found that AIS usage has significant impact on efficiency on tasks related to budgeting, financial reporting, auditing and financial controlling in the agencies. All these studies have shown that AIS usage have significant impact on firm performance. Unfortunately, most of these studies were concentrating on establishing the link between AIS usage and organisation's performance. Little attention was given in explaining the key drivers that create AIS capabilities which subsequently improve firm performance.

AIS Capabilities and Performance

There were limited studies investigating the effects of AIS capabilities on firm's performance. For instance, Karimi et al. (2007) examined the effect of IS resources namely knowledge, relationship and infrastructure on ERP capabilities and its complementary effects on business process outcomes. In another study, Prasad and Green (2015) used dynamic capabilities framework to investigate the link between organisational competencies (i.e. flexible AIS, business intelligence system, and technical Information Technology (IT) skills of accounting professionals) and AIS dynamic capability. In a different but related study that is worth to mention, Nias Ahmad, Smith, Ismail, Djajadikerta, and Roni (2016), partly examined the effect of computerised AIS capability on SMEs performance within Malaysia environment. In

summary, all these studies suggested that AIS capabilities have a significant effect on organisation's performance.

The Resource Based View Theory

The RBV is based on a strategic management approach, and it is used to analyse the origins of a firm's long-term competitive advantage (Barney, 1991). Although firms are recognised to have a variety of resources, not all of them have the potential to provide a sustained competitive advantage. According to the RBV, a resource must have four characteristics in order to be a potential source of competitive advantage (Barney, 1991). These characteristics are valuable, rare, imperfectly imitable, and non-replaceable (VRIN). When a resource can aid an organization in planning and implementing plans to improve its effectiveness and efficiency, it is considered valuable. When a resource is limited and unavailable to other competing firms, it is deemed rare. Meanwhile, a resource that is imperfectly imitable while other competitive organizations are unable to obtain it. For example, a valuable resource is owned by only one company. A non-substitutable resource, on the other hand, is one that is difficult to replicate and exchange for other options. Firms with valuable and scarce resources may gain a competitive advantage in the short term. Firms must be able to protect their resources against replication, transfer, or substitute in order to maintain a long-term competitive edge (Wade & Hulland, 2004).

In general, resources relate to all of a business's assets, capabilities, procedures, firm traits, information, and expertise that are effective in detecting and responding to market opportunities and threats (Barney, 1991; Wade & Hulland, 2004). IS resources refer to the mix of IT assets and IT competencies in the context of IS (Aral & Weill, 2007).

Research Model and Hypotheses

This section describes each of the research hypotheses illustrated in the research conceptual framework in Figure 1.

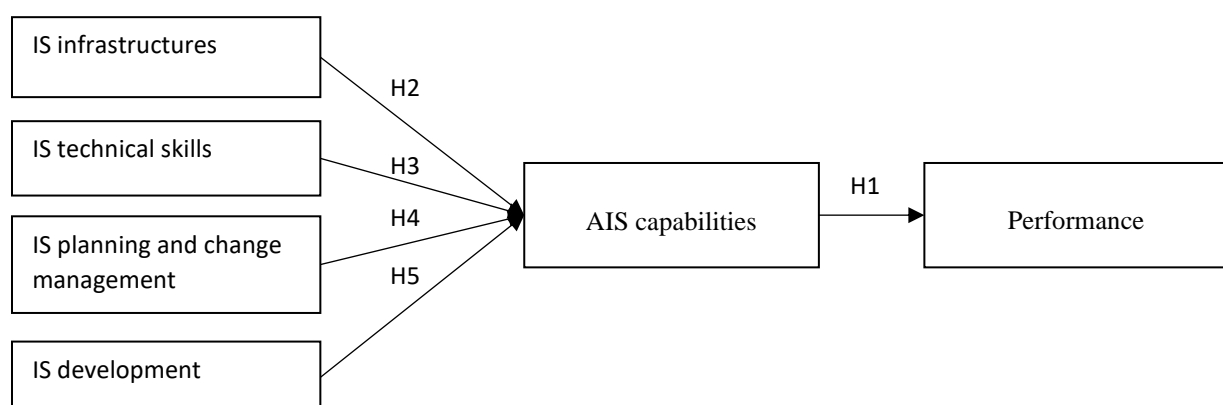


Figure 1: Research Model

AIS Capabilities and Performance

This study posits that AIS capabilities has positive effect on co-operative performance. This is due to the fact that AIS with sufficient capabilities are able to provide valuable information. In achieving business strategic objectives and improving business performance, managers utilise accounting and other information to make decision (Prasad & Green, 2015). Such information can be made available only if AIS in the particular businesses have the capability to capture

and process business according to information requirements of the management (Ismail & King, 2005a).

Previous studies discovered that AIS capabilities have positive impact on performance either at firm or process level. For instance, Prasad and Green (2015) found that building dynamic AIS capabilities has a positive effect on firm performance. Similarly, Karimi et al. (2007), in a study of a specific AIS (i.e. ERP), found that there is a significant relationship between ERP capabilities and business process performance. Based on the above argument, it is reasonable to expect positive relationships between AIS capabilities and co-operative's performance.

H1: AIS capabilities has a positive relationship with co-operative's performance

IS Infrastructures and AIS Capabilities

IS infrastructures refer to co-operatives' shared IS assets that include hardware, software, databases, networks, and data centres (Karimi et al., 2007). They are vital in developing and building IS capabilities by assisting implementation, simplifying system integration and reducing cost of system maintenance (Ravichandran & Lertwongsatien, 2005). Empirical evidences have shown that IS infrastructures were positively influence IS capabilities (Gu & Jung, 2013; Ravichandran & Lertwongsatien, 2005).

This study postulates that IS infrastructures of co-operatives would have significant influence in AIS capabilities-building. This is because co-operatives with sufficient IS infrastructures are able to deploy AIS effectively. By having such IS infrastructures, AIS are able to capture and process data into information efficiently. Then, the information can be disseminated securely and efficiently using reliable network infrastructure. Hence, it is appropriate to anticipate that IS infrastructures of co-operatives have a positive effect on AIS capabilities.

H2: IS infrastructure of a co-operative has a positive relationship with AIS capabilities.

IS Technical Skills and AIS Capabilities

IS technical skills refer to co-operative's IS staffs technical and managerial IT skills (Bharadwaj, 2000; Chen, 2012; Wade & Hulland, 2004). These skills comprise technological competencies in new technologies (i.e. hardware and software), programming and systems development (Bharadwaj 2000). IS or AIS activities in particular are generally considered knowledge-intensive and requiring specific technical skills (Ravichandran & Lertwongsatien, 2005). This is because the persons in charge of AIS are responsible to ensure that the AIS continue to be relevant to the surrounding real-world environment. This role requires them to engage with the AIS and determine ways to reorganize the AIS so that it is able to meet the business transaction input, processing, output, and reporting requirements (Prasad & Green, 2015). Persons with such skills are well-informed on the current technology and capable to utilise and manage the knowledge. These technical skills are sophisticated and complex which are difficult to replicate (Wade & Hulland, 2004). In fact, several studies have found a significant effect of IS technical skills on IS capabilities (Gu & Jung, 2013; Ravichandran & Lertwongsatien, 2005) and firm performance (Bharadwaj, 2000). Therefore, it is reasonable to expect that co-operatives' IS staff with sufficient IS technical skills are expected to positively influence AIS capabilities.

H3: IS technical skills of a co-operative have a positive relationship with AIS capabilities.

IS Planning and Change Management and AIS Capabilities

IS planning and change management in this study refer to the capability of co-operatives to plan, manages, and utilise suitable IT infrastructure through the changes process. Such capabilities are essential for co-operatives in dealing with a rapid change of IT. With a proper IS planning, co-operatives are able to anticipate relevant changes due to the advancement in IT and the opportunities generated by emerging technologies. Key aspects of this resource include the ability to anticipate future changes and growth, to choose platforms (including hardware, network, and software standards) that can accommodate this change, and to effectively manage the resulting technology change and growth (Wade & Hulland, 2004). Moreover, prior studies found that IS planning and change management capabilities have positive effects on organizational agility (Lu & Ramamurthy, 2011) and IT support for core competencies (Ravichandran & Lertwongsatien, 2005). Therefore, this study postulates that IS planning and change management of co-operatives have positive effect on AIS capabilities.

H4: IS planning and change management of a co-operative have a positive relationship with AIS capabilities.

IS Development and AIS Capabilities

IS development, in this study, refers to the co-operative's ability to anticipate, assess and utilise new technology to support and enhance business objectives. In the context of co-operatives, staffs with such capabilities (i.e. experience in managing systems development) are able to provide constructive input and feedback on the development of AIS. They can act as the link between systems users and developer in ensuring the new AIS fulfils user requirements. In addition, the ability to anticipate, assess and utilise new technology would assist management in acquiring technology that suits the requirements of respective co-operatives. Furthermore, IS development capability are found to has a significant effect on IT support for core competencies and organization agility (see i.e. Lu & Ramamurthy, 2011). Therefore, it is reasonable to expect that IS development of a co-operative has a positive relationship with AIS capabilities.

H5: IS development of a co-operative has a positive relationship with AIS capabilities.

Methodology

This study is a quantitative study, where a cross-sectional survey questionnaire was used for data collection. Quantitative data are primarily used for hypotheses testing.

Pretesting Survey Instrument

Prior to data collection, the questionnaire was refined via experts' reviews and pre-testing. This stage involved six academicians with IS/AIS background. In addition to reviewing the content and the scope of the questionnaire, pre-testing was carried out to determine the strengths and weaknesses of the questionnaire in terms of question format, wording and order.

Unit of Analysis

The unit of analysis was the organization, namely co-operatives in Malaysia. According to the statistics of the MCSC, there are 12,769 co-operatives registered with MCSC in 2015 (SKM, 2016). Out of this number, 262 co-operatives are from large cluster, 557 are from medium cluster, whereas 1,317 and 10,633 are from small and micro clusters respectively. It is important to note that this study is targeting co-operatives that have implemented AIS in their

day-to-day operation. In this sense, micro cluster co-operatives totalling to 10,633 are excluded from the population. They are relatively very small with less capital. The possibility that they do not use AIS in their business operation is very high. All in all, the total of 2,136 co-operatives is the final population of the study comprising of large, medium and small cluster co-operatives.

Participants

The respondents for the survey are managers from the selected co-operatives. They were considered to be the key persons that can most likely provide information, since they are directly involved in daily activities of the co-operative (Harun & Mahmood, 2012). Nonetheless, in the absence of managers, eligible respondents who involved in daily activities of the co-operative were allowed to take part in the survey.

Data Collection Procedure

A simple random sampling technique was utilised in this study to ensure equal probability for each co-operative from the population to be selected (Sekaran, 2006). A total of 1000 co-operatives across Malaysia were randomly selected from the sampling frame of 2,136 registered co-operatives. Questionnaires were mailed to managers of respective co-operatives using the respondents' correspondence addresses listed in directory provided by MCSC. The questionnaires were sent together with two cover letters (i.e. one from the researcher and one from the MCSC) and a self-addressed reply-paid return envelope. The respondents were requested to complete and return the questionnaires in the nearest time possible using the attached envelope. After a two-week period, a soft reminder letter was sent to non-responding respondents. As an extra effort to appeal for respondents' voluntary participation, emails were sent to non-responding respondents that have email address listed in the directory of MCSC. Data collection was stopped when the sample size had achieved a sufficient level for statistical analyses. Out of 1000 questionnaires, 161 (16.1%) were returned. However, only 120 responses were usable whereas 41 responses were excluded due to incomplete responses, inappropriate samples or co-operatives claimed to be non-users of AIS. The dataset was then examined for outliers. As a result, 5 responses were removed, leaving 115 final usable responses. The demographic profile of responding co-operatives is presented in Table 1 below.

Table 1: Demographic Profile of Responding Co-operatives

Co-operative Information	Category	No.	Percentage
No. of years established	< 10 years	10	8.7
	11 - 20 years	15	13.0
	21 – 30 years	14	12.2
	31 – 40 years	24	20.9
	41 – 50 years	27	23.5
	> 50 years	25	21.7
Clusters	Small	49	42.6
	Medium	38	33.0
	Big	28	24.3
Business Functions	Banking	4	3.5
	Finance	33	28.7
	Agriculture	6	5.2
	Industrial	10	8.7

Consumer	32	27.8
Construction	1	0.9
Transportation	13	11.3
Services	16	13.9

Measures

All constructs and their indicators were adapted from previously validated measures and developed based on existing literature (see Table 2). The indicators are five-point Likert scales, anchored by “strongly disagree” and “strongly agree”. All constructs were based on reflective multi-item scales.

Table 2: Constructs and Sources

Constructs	Source
Co-operative’s performance	Ravichandran and Lertwongsatien (2005)
AIS capabilities	Ismail and King (2005b)
IS infrastructure	Karimi et al. (2007)
IS planning and change management	Lu and Ramamurthy (2011)
IS technical skills	Chen (2012)
IS development	Lu and Ramamurthy (2011)

Finding and Discussion

Partial Least Squares (PLS) (via SmartPLS version 3.0 software) was used for statistical analysis. PLS is a structural equation modelling (SEM) technique that allows testing and estimating causal relationships among multiple independent and dependent constructs simultaneously (Hair, Risher, Sarstedt, & Ringle, 2019). A two-step approach was used in the analysis: assessment of the measurement model and assessment of the structural model.

Assessment of the Measurement Model

The measurement model refers to the relationship between a construct and its measures. Assessment of the measurement model comprises construct reliability, convergent validity, and discriminant validity (Ringle, Sarstedt, Mitchell, & Gudergan, 2020). Construct reliability is assessed using the composite reliability scores ranging from 0 (indicating completely unreliable) to 1 (indicating perfectly reliable). The constructs are deemed adequate when the composite reliability scores are above the recommended cut-off of .50 (Hair, Hult, Ringle, & Sarstedt, 2017). The composite reliability scores of all constructs exceed .50, and thus, the model is considered reliable.

Convergent validity refers to the extent to which the indicators of a measure correlate. Convergent validity is examined through item loadings where a cut-off value of 0.5 suggests that they measure the same construct (Hair et al., 2017). All items loaded higher than the threshold value of .50. The average variance extracted (AVE) value of each construct loaded higher than the threshold value of .50, as recommended by Fornell and Larcker (1981), hence suggesting convergent validity. All constructs in the model had adequate reliability and convergent validity. None of the items was, therefore, removed from the dataset.

Discriminant validity indicates that the constructs are distinct. The Fornell-Larcker criterion is used to evaluate discriminant validity where the square root of AVE is examined and all the

inter-construct correlations are compared. As shown in Table 3, the square roots of the AVE of each construct are greater than the cross-correlations between them (Fornell & Larcker, 1981), thereby suggesting discriminant validity.

Table 3: Fornell and Larcker Criterion.

	AISC	ISD	ISI	ISPCM	ISTS	PER
AISC	0.807					
ISD	0.407	0.884				
ISI	0.427	0.621	0.879			
ISPCM	0.519	0.627	0.633	0.893		
ISTS	0.567	0.580	0.470	0.634	0.886	
PER	0.663	0.437	0.417	0.519	0.546	0.866

Assessment of the Structural Model

The structural model refers to the relationship between the constructs. Testing the structural model covers path coefficients, hypotheses testing, and variance explained by the independent variables. The hypotheses were tested by examining the path coefficients using a bootstrapping procedure with 5000 resamples, the No Sign Changes option, Bias-Corrected and Accelerated (BCa) bootstrap, two-tailed testing, and the standard settings for the PLS-SEM algorithm and the missing value treatment (Hair et al., 2017).

Table 4: Hypotheses testing.

	Direct Effect (β)	Standard Error	T Statistics	P Values	Significance
AISC -> PER	0.665	0.072	9.270	0.000	***
ISI -> AISC	0.132	0.114	1.156	0.248	NS
ISTS -> AISC	0.451	0.153	2.949	0.003	***
ISPCM -> AISC	0.219	0.110	1.986	0.048	**
ISD -> AISC	-0.066	0.106	0.618	0.537	NS

*** Significance $p < 0.01$ **Significance $p < 0.05$ NS: Not significant

The result of path co-efficient assessment of the direct model is presented in Table 4. Five hypothesized relationships namely H1 – H5 was assessed. The results of the structural model suggest that IS technical skills and IS planning and change management were found to be a significant positive predictor of AIS capabilities (IS Technical Skills \rightarrow AIS Capabilities, $\beta = 0.451$, $p < 0.05$; and IS Planning and Change Management \rightarrow AIS Capabilities, $\beta = 0.219$, $p < 0.01$). Similarly, AIS capabilities significantly positively influenced performance (AIS Capabilities \rightarrow Performance, $\beta = 0.665$, $p < 0.01$). Related to this, it is concluded that three hypotheses namely H1, H3 and H4 are supported.

On the contrary, two relationships were found to be not significant. These include IS Development \rightarrow AIS Capabilities ($\beta = -0.066$, $p = 0.537$), and IS Infrastructure \rightarrow AIS Capabilities ($\beta = 0.132$, $p = 0.248$). Related to this, this study concluded that two hypotheses namely H2 and H5 are rejected. The results further demonstrate that, IS technical skills ($\beta = 0.451$) has the highest influence on AIS Capabilities as compared to IS planning and change management ($\beta = 0.219$).

Conclusion, Limitations, and Future Research

The aim of this research was to investigate the factors that influence AIS capabilities and co-operatives performance in Malaysia. Data were gathered via survey questionnaires from co-operatives across the country. The study proposed four IS resources that are relevant to AIS capabilities building in co-operatives. They include IS infrastructure; IS technical skills; IS planning and change management; and last but not least IS development. Out of four, IS technical skills and IS planning and change management were found to be the critical factors in building AIS capabilities. On the contrary, IS infrastructures and IS development were not significantly associated with AIS capabilities. When it concerns IS infrastructures, the possible reason could be that the type of IS infrastructure used by the co-operatives is generic, less complicated and/or common among co-operatives (Rasit & Ibrahim, 2017). Such infrastructure is common and can easily be imitated which does not fulfil the VRIN criteria of RBV. With regards to IS development, majority of co-operatives are having financial constraints due to limited capital (Othman et al., 2012), therefore little attention is given by the co-operatives on investments of new technologies which indirectly affects the ability of their IS development. This study also found that AIS capabilities are critical factors that contribute to co-operatives' performance.

This study had provided several contributions with regards to theory and practice. Theoretically, the study contributes to knowledge by providing an understanding of IS resources in AIS capabilities building. The study found that only IS resources that are valuable, rare, imperfectly imitable and non-substitutable significantly associated with AIS capabilities. IS technical skills, and IS planning and change management were found to directly influence AIS capabilities. Both resources are unique and difficult to imitate by competitors. Practically, the study provides guidelines for co-operatives' stakeholders, particularly management, in planning and managing their IS resources. The list of IS resources proposed in this study could serve as a checklist for the management to identify the resources they are lacking and subsequently rectify the shortcoming.

The findings of the study should be carefully interpreted particularly when inferring the findings to co-operatives at large. Although this study covers multiple business functions ranging from banking, consumers, and others, relatively small number of samples in each business function might not be a representative for generalising purposes. Despite various efforts to increase the response rate such as mailing reminder and e-mailing of questionnaire, the response rate does not substantially improve. In addition, the researcher did not control variations in the type of AIS used across co-operatives. Indeed, different types of AIS have different qualities. In fact, certain co-operatives may prefer to use a simpler rather than complicated AIS application. Hence, the reason for the type of AIS implementation and its effect on performance may vary between co-operatives. Future research should consider controlling the variations in the type of AIS being used. Furthermore, this study employed self-administered survey with close-ended questions which resulted in limitation of the findings

(Sekaran, 2003). Thus, future research can be conducted using a mixed-method that combines qualitative methods (i.e. interview) and quantitative methods (i.e. survey). In this way, additional method can be used to enhance the validation process of research data (Johnson & Onwuegbuzie, 2011).

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