Factors Influence Cloud Computing Assimilation and the Effect to IT Operational Effectiveness in Public Sector

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Abstract

The role of IT innovation has changed from conventional cost reduction and efficiency improvement to enhancement of public sector agency's flexibility and adaptation to changing environment. However, a comprehensive literature review reveals that there is a lack of study of which reasons persuade the public sector to implement information technology (IT) innovation, as well as which factor and how affect the level of IT sophistication in this assimilation process and the effect to the operational effectiveness. Based on Diffusion Innovation Theory (DOI), and Technology-Organizational-Environmental framework (TOE), nine determinant are proposed to influence cloud computing assimilation. A measurement scale is developed by adopting from prior empirical studies and the context of cloud-based resources and services implementation in the Malaysian public sector were tested and evaluated using survey data from a sample of 169 agencies. Our empirical analyses lead to several key findings; Technological factor is significantly affects the relationship to cloud-based services and resources Initiation and Implementation by the agencies in the Malaysian public sector. Organizational factors significantly affects cloud-based services and resources initiation, but not significantly support the relationship to its implementation. However, Environmental factors significantly affects cloud-based services and resources implementation, but not significantly support the relationship to its initiation. Initiation to cloud-based services and resources by the agencies in the Malaysian public sector is not significantly support its implementation. The Implementation of cloud-based services and resources by the agencies in the Malaysian public sector significantly affect IT operational effectiveness. This study originally applies technology adoption decision process approach to on cloud-based services and resources assimilation and examines the impacts on cloud-based services and resources implementation in

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the Malaysian public sector, offering a theoretical extension of the mechanism underlying cloud-based services and resources assimilation.

Keywords*: Diffusion Innovation Theory, Technology-Organizational-Environmental framework, public sector, cloud computing*

1. Introduction

In Malaysia, public sector agencies implementation towards cloud computing services and resources is still low compared to developed country such as United State of America, United Kingdom, Japan and Australia due to technological complexity, security and lack of IT personnel innovativeness towards new IT innovation (Sallehudin et al., 2015). The decision to procure various types of cloud computing services and resources for public sector agencies may require a tangible long-term obligation as the risk of failure is too high to be ignored and unproven their effectiveness once implemented. Despite of this likelihood of failure, an investment for implementation of cloud computing services and resources for public sector agencies which typically complemented with a lot of money, time and effort is still valuable to enhance the electronic government (e-government) and connected government initiatives (Zhang & Chen, 2010). Despite of the tangible and intangible benefits of cloud computing, the recent tendency for Malaysia cloud computing service vendor and provider's in handling the public sector market is still a big shady area. For instance, IBM Malaysia and Microsoft Malaysia as one of the top cloud computing service vendor, has not rallied the mark with the majority public sector agencies in Malaysia that it was targeting even though for cloud computing services and resources solution for less than RM50,000.00 for organizations has been introduced as a strategy to make improve their IT operational (MAMPU, 2011). Hence, this further explains the dissimilarity factors among agencies that affect the cloud computing services and resources implementation in Malaysia. Consequently, it is necessary for the Malaysian public sector to understand the critical factors of IT implementation (MAMPU, 2011). This gap will be filled by answering this research questions:

1) What factors influence cloud computing services and resources assimilation in the Malaysian public sector?
2) How cloud computing services and resources implementation contributes to IT operational effectiveness performance in the Malaysian public sector?

Based on those research questions, the objective of this paper is to discuss and identify the significant factors which affect the implementation of cloud computing services and resources in the Malaysian public sector by using a Diffusion of Innovation (DOI) theory and Technology-Organizational-Environment Framework (TOE) framework and its effect on agencies' IT operational effectiveness. This framework has been extensively used as the theoretical framework for explaining the adoption, implementation and assimilation of various types IT innovation in Information system (IS) discipline (Low et al., 2011; Thong, 1999; Yan Xin at al., 2014). The remainder of this paper is organized into six sections. In the following section reviews of the theoretical background that relevant to the research question is assessed and hypotheses are formulated. Following that, research design describes the detailed research approach, the collection of data via quantitative survey, as well as the analysis approach taken. Then, data analysis and results section presents the descriptive statistics and non-parametric tests we have employed for analysis. Finally, the article ends with discussion and followed with the conclusions that relates these findings to our overall research question as well as suggests next research steps.

Figure 3: Research Model and Result

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2. Theoretical Background

The ongoing concentration and investigation in Information system (IS) discipline to the adoption of IT innovations research work has been a valuable practice in generating an important findings and insights for the ICT innovation adoption. The key points of most prior studies are related with identification factors of ICT innovation in terms of adoption, acceptance and adapting to technology. Different of theoretical models has been generated from these studies and conducted to examine the Malaysian public sector's implementation of ICT innovation in agency. The theory that will be reviewed in this paper is DOI theory and TOE framework.

2.1 Diffusion of Innovation Theory

Diffusion of innovation (DOI) theory derives from the exertion of Rogers (1995) and is frequently used to explain technology innovation especially ICT acceptance and adoption studies. The DOI theory is also widely used to find adoption predictors of IT diffusion in organizations (Islam et al., 2013). Rogers (1995) emphasized that the impact of technological characteristics, namely relative advantage, compatibility, complexity, trialability, and observability on potential adopters. The technological characteristics focus on the primary objective features of the technology itself (cloud computing technology), rather than the subjective features in the mind of the decision maker in the Malaysian public sector such as the organizational and environmental factors. Therefore, this study have conceptualized the innovation attributes relationship with the cloud computing services and resources assimilation in the Malaysian public sector together with organizational and environmental characteristics which is explained in the following section.

2.2 The Technology-Organizational-Environment Framework

Another technological adoption model, which has also been the basis of many IT adoption studies on organizational level, is the TOE framework by Tornatzky and Fleischer (1990). The TOE framework is an organizational level model which explains three different contextual attributes of a firm that influence adoption decision. These three elements are technological, organizational and environmental contexts. The technology context describes technologies or innovation characteristics that are used by the organization and the technologies available in the market relevant to the firm. Prior study conceptualized DOI technological attribute as a characteristics for technological context in TOE (Alaraifi, 2012). Organizational context refers to the characteristics and resources of the firm, such as size of the organization and volume of slack resources. Finally, the environmental context describes the structure of the industry and the conditions surrounding the organization in which it conducts its business. The TOE model posits that attribute from the three contexts influence innovation adoption in organizations.

2.2.1 Technological Context

The technological innovation represents the technology characteristics. This study defines the technological innovation factor as the cloud computing service and resource characteristics that might determine the likelihood of its implementation by the Malaysian public sector and might stimulate Malaysian public sector to adopt it. Both the DOI theory and TOE model of IS innovation emphasize on the importance of the innovation factor to the adoption of innovation. Therefore, the

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four characteristics of the innovation by Rogers (1995) namely; relative advantage, complexity, compatibility, and trialability, is the technological innovation characteristics of the cloud computing service and resource that determine its assimilation by the Malaysian public sector. In addition to these DOI characteristic, this study associate new variable namely perceived risks which is suggested by Pavlou (2003) and Wyld (2010) as the technological innovation characteristics of the cloud computing that determine its adoption by the Malaysian public sector. The intention to focus on implication and impact of perceived risk factor in this study is because of the dark side of cloud computing (Buyya et al., 2009). In public sector particularly in the Malaysian public sector, security and confidentiality of data is the main focus for any new IT innovation implementation. Compromise to IT security breach will be a big issues in the public sector. Altogether, all of these determinants variable represents the technology characteristics in this study. Therefore, we posit the following hypotheses:

H1a: Technological factors affect the initiation of cloud computing service and resource by the Malaysian public sector.

H1b: Technological factors affect the implementation of cloud computing service and resource by the Malaysian public sector.

2.2.2 Organizational Context

Organizational context conceptualized as a factors or characteristics of organization such as top management support, and organizational readiness that are considered to be organizational factors that influence the organization to implement the innovation. Factors in the organization context seem to be the primary focus of many study in organization behavioral to implement the innovation (Premkumar, 2003; Ramdani et al., 2013).

According to Premkumar (2003), top management support found to be the best predictors for organization to implement the IT innovation. In organization, top management level can stimulate change by reinforcing the value of organizational vision and mission for organization (Thong, 1999). Top management also providing a support by enable the financial costs and other resources such as enough man power for new IT innovation to take place. Prior study found that top management support to be a critical factor for organization to implement new technologies (Lian et al., 2014; Lin, 2013; Premkumar, 2003; Ramdani et al., 2013). Therefore, the decision making level in the Malaysian public sector is very likely to be a mandate, absolute power and support is vital for the cloud computing service and resources to take place.

Organizational readiness is defined as the prior IT infrastructure, experience and other availability resources needed by organization for new IT innovation to take place (Low et al., 2011). Organizational readiness has used in previous study on IS domain (Aziz & Mohd. Yusof, 2012; Lian et al., 2014; Ramdani et al., 2013). The availability of sufficient network infrastructure is a mandatory requirement for cloud computing implementation because its only can be access via the Internet. Hence, agency must be ready with computer networking infrastructure prior to cloud computing implementation. IT personnel in the public sector agency also must be knowledgeable and have enough skill sets about the cloud computing concept and operational to support the implementation. Altogether, all of these two determinants variable represents the organizational characteristics in this study. Therefore, we posit the following hypotheses:

H2a: Organizational factors affect the initiation of cloud computing service and resource by the Malaysian public sector.

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H2b: Organizational factors affect the implementation of cloud computing service and resource by the Malaysian public sector.

2.2.3 Environmental Context

Environmental context conceptualized as a factors or characteristics from the outside the organization. These characteristics can be threat or opportunity and strength to the organization to implement new IT innovation. In the public sector, government regulatory and external IS support from other parties such as vendors are considered to be environmental factors that influence cloud computing resources and services implementation.

In TOE literature, there is a little study about government regulation or regulatory environment (Oliveira & Martins, 2011). For the context of this study, government regulation is defined as directive or circulars from government to organization either as a mandate or voluntary to fulfill the directive and the availability of the pilot agency for others to be refer to (Sallehudin et al., 2015). For instance, directive for IT in the Malaysian public sector is circulated by central authority named Malaysian Administrative Modernization and Management Planning Unit (MAMPU). In other circumstances, agency also can adopt and implement any of new IT innovation to take place by their own effort without directive from MAMPU, but they must provide a sufficient project justification for approval by MAMPU and Economic Planning Unit (EPU) in Prime Minister Department (MAMPU, 2010). However, the implementation of new IT innovation with directive order and recommendation from MAMPU will be definitely to receive support from government in terms of human resource, management and financial for new IT innovation to take place (Dzazali & Zolait, 2012; Sallehudin et al., 2015).

The external IS support refers to the existence of the external support for the implementation and usage of the new IT innovation (Premkumar and Roberts, 1999). Premkumar and Roberts, (1999) shows that external IS support has a positive relationship with the IT innovation. Janssen et. al. (2007) in their study on exploring relationships of shared service arrangements in local government also conceptualized that intention to implement shared service will be higher when there is the less appropriate resources are available within a firm, the more the firm will seek to overcome this lack of resources by calling upon external expertise. However, study by Ramdani et al. (2009) found an insignificant influence between the external IS support and the adoption of customer relationship management systems (CRM). The Malaysian public sector agencies those plans to implement cloud computing on those services that are focusing on managing the external suppliers to delivering cloud computing services will be the motivated. These can be true especially agencies with limited in-house service delivery will more favor to outsource IT services to external providers. Thus, all this will provide direct support for ne IT innovation implementation in the Malaysian public sector.
H3a: Environmental factors affect the initiation of cloud computing service and resource by the Malaysian public sector.
H3b: Environmental factors affect the implementation of cloud computing service and resource by the Malaysian public sector.

2.3 Cloud computing assimilation

The initiation stage referred as an awareness and evaluation of organization to implement the new IT innovation. According to Zhu et al., (2006), initiation stage stated as evaluating the potential benefits of new IT innovation that can be improve the organization's performance. In the context

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of this study, Tsaravas & Themistocleous (2011) and Wyld (2010) elaborate a lot of cloud computing potential benefits for public sector and would be an evaluation point for its implementation. Therefore, the potential benefits of cloud computing offered for agency such as cost reduction, elasticity, scalability, energy efficient, massive storage capacity, easily implemented, and accessibility and mobility (Tsaravas & Themistocleous, 2011) is a significant benefits for agency to implement cloud computing service and resources (Sallehudin et al., 2015). Hence, the initiation to cloud computing service and resources leads to the implementation stage in the Malaysian public sector. Thus;

H4: Cloud computing service and resource initiation affect the implementation of cloud computing service and resource by the Malaysian public sector

Following initiation stage is the stage of implementation. Consistent with the IS domain adoption literature by (Ghobakhloo et al., 2011; Yan Xin et al., 2014; Zhu et al., 2006), we conceptualized the implementation of cloud computing service and resource by the Malaysian public sector as the utilization frequency of various types of cloud-based resources and services. Frequency of usage is commonly used by prior IS adoption study (Ghobakhloo et al., 2011). Therefore, the frequency of cloud-based resources and services utilized by agency such as email, data center, databases, file sharing and storage, cloud-based antivirus service, data recovery center, cloud-based desktop, web hosting, online collaboration or conferencing, virtual machine, testing and development services and office productivity suite is suitable indicator to reflecting the level of implementation of cloud computing service and resource by the Malaysian public sector. For instance, the implementation any of these cloud computing service and resource by the Malaysian public sector leads to providing IT efficiency (Buyya et al., 2009; Wyld, 2010). As a result, the implementation of any cloud computing service and resource by the Malaysian public sector may enhance the quality of public service delivery and leading to increased productivity at the agency. Thus, the following hypothesis incorporate our expectations:

H5: Cloud computing service and resource implementation by the Malaysian public sector affect the IT operational efficiency

3. Research Methodology

3.1 Sample

The study population comprises Chief Information Officers (CIO), Heads of IT Departments, IT Managers, and IT personnel who are currently working in the Malaysian public sectors. The selected sampling frame for this study consists of 730 in various ministries, departments, and agencies across the country. Survey questionnaire with the return envelope was distributed to the sample of this study via national postage services in January 2015. Off total 500 questionnaires distributed, 226 questionnaires were collected and 169 were valid for data analysis. The percentage of the respondents according to their types of agency is 80% from federal agencies, 63% from federal statutory agencies, 18.7% from state agencies, 43% from state statutory agencies and 40% from local authorities.

3.2 Measures

All the items' measures were obtained from previous researches whose validity and reliability have been demonstrated. TOE construct comprised 48 items, which included relative advantage (8 items), compatibility (4 items), complexity (5 items), trialability (6 items), perceived risks (5 items),

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top management support (4 items), organizational readiness (6 items), external IS support (5 items) and government regulatory (5 items). All items were adapted from previous researcher (e.g: Aziz & Mohd. Yusof, 2012; Featherman & Pavlou, 2003; Lian et al., 2014; Moore & Benbasat, 1991; Pan & Jang, 2008; Premkumar & Roberts, 1999) and rephrased to match with this study context. Five-point Likert scales ranging from "1=strongly disagree" to "5 = strongly agree" were used. The initiation of cloud computing service and resource was measured through five items from Tsaravas & Themistocleous (2011). The implementation of cloud of cloud computing service and resource was measured through summated of 13 items from Tsaravas & Themistocleous (2011) and Mell & Grance (2011). Three measures items for IT operational effectiveness were used to assess the value of cloud computing service and resource in increasing productivity, reducing operation cost and improving customer service quality adapted from Mell & Grance (2011) and Ramamurthy et al. (1999)

4. Data Analysis and Results

All TOE construct are modelled as first order reflective because they are seen as functions of their associated second order latent construct (Lowry & Gaskin, 2014). The methodology to measure the research model for this research is structural equation modelling (SEM) of the data analysis. This approach has many advantages over other methods, such as multiple regression. Using a SEM approach, a partial least squares (PLS) method were selected. Partial least squares (PLS) is a popular Structural Equation Modelling (SEM) technique to conduct data analysis. SmartPLS M3 2.0 (Ringle et al., 2005) was chosen because it is more suitable to handle relatively small sample sizes (Hair et al., 2014), in comparison to co-variance based SEM techniques like AMOS and LISREL.

Confirmatory factor analysis was conducted to measure the reliability and unidimensionality of the items. As suggested by Hair et al. (2010) we used the factor loadings, composite reliability (CR) and average variance extracted (AVE) to assess convergence validity. The loadings for all items exceeded the recommended value of 0.5 (Hair et al., 2010) except for 1 item from organizational readiness and two items from perceived risk which below than recommended value and dropped out for further analysis. Other item-construct factor loadings were high and significant, ranging from 0.579 to 0.917, which provides evidence of adequate convergent validity. CR values, which depict the degree to which the construct indicators indicate the latent construct ranged from 0.778 to 0.965 which exceeded the recommended value of 0.7 (Hair et al., 2010). The AVE, which reflects the overall amount of variance in the indicators accounted for by the latent construct, were in the range of 0.522 and 0.776 which exceeded the recommended value of 0.5 (Hair et al., 2010). This suggested that there was adequate convergent validity in all measures. Discriminant validity is supported when the square root of the average variance extracted for each construct is highest for its assigned construct (Fornell & Lacker, 1981). The evidence of discriminant validity between the dimensions was provided by the comparison of the square root of the AVE with the correlations among constructs. Results revealed that correlations for each construct is less than the square root of average variance extracted by the indicators measuring that construct indicating adequate discriminant validity. In total, the measurement model demonstrated adequate convergent validity and discriminant validity.

Finally, the causal relationships among constructs are tested through the structural model. The R^2, the path coefficient and t-value analysis can indicate how the data support a hypothesized model (Chin, 1998). To run this analysis, statistical significance was assessed by t-tests based on a bootstrap procedure with 1,000 bootstrapping. This study begin our interpretation with the

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hypothesized factors. As shown in Table 1, five out of the eight hypotheses were supported. Technology context ($\beta = 0.436$, $\rho < 0.01$) and Organizational context ($\beta = 0.409$, $\rho < 0.01$) are positively significant to the initiation of cloud computing service and resources by the Malaysian public sector. In contrast, Environmental context ($\beta = -0.138$, $\rho > 0.1$) are not significant to the initiation of cloud computing service and resources by the Malaysian public sector. The R-squared was 0.294, which indicates that the factors variables explain 29.4% of the variance of awareness and evaluating the benefits of cloud computing service and resources by the Malaysian public sector.

Technology context ($\beta = 0.345$, $\rho < 0.01$) and Environmental context ($\beta = 0.281$, $\rho < 0.01$) are positively significant to the implementation of cloud computing service and resources by the Malaysian public sector. In contrast, Organizational context ($\beta = -0.088$, $\rho > 0.1$) are not significant to the implementation of cloud computing service and resources by the Malaysian public sector. In addition, the initiation of cloud computing service and resources ($\beta = -0.030$, $\rho > 0.1$) by the Malaysian public sector also found not significant to its implementation stage. The R-squared was 0.225, which indicates that the factors variables explain 22.5% of the variance of the utilization, use and implement of cloud computing service and resources by the Malaysian public sector. Result also shows that the extent of implementation of cloud computing service and resources by the Malaysian public sector is positively related to the operational efficiency ($\beta = 1.84$, $\rho < 0.05$). The R-squared was 0.035, which indicates that the implementation of cloud computing service and resources by the Malaysian public sector only explain 3.5% of the variance of the operational efficiency.

Table 1: Summary of the Structural Model

	Path	β	t-value	p-value	Decision
H1a	Technology -> Initiation	0.436	5.015***	0.000	Supported
H1b	Technology -> Implementation	0.345	3.458***	0.001	Supported
H2a	Organizational -> Initiation	0.276	2.110**	0.036	Supported
H2b	Organizational -> Implementation	-0.088	0.989	0.324	Not Supported
H3a	Environmental -> Initiation	-0.138	1.465	0.145	Not Supported
H3b	Environmental -> Implementation	0.281	2.985***	0.003	Supported
H4	Initiation -> Implementation	-0.030	0.375	0.708	Not Supported
H5	Implementation -> Operational Efficiency	0.184	2.404**	0.017	Supported

***p<0.01; **p<0.05; * p<0.1

5. Discussion

Hypotheses H1a and H1b posit that technological context has a positive impact on agencies' assimilation of cloud computing services and resources. Except for the perceived risk, all DOI variables (relative advantage, compatibility, complexity and trialability) have been found to be significant technological factors in determining cloud computing services and resources assimilation in the Malaysian public sector. This result is consistent with previous study that looking at the adoption of other types IT innovation in IS domain (Alam et al., 2011; Ghobakhloo et al., 2011; Ramdani et al., 2013) whose conclude that organization tend to implement the new IT innovation when they clearly believe that it will derive the advantage on that technology,

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compatible with existing IT process in organization, the new technology not complicated and have sufficient trial and experiment prior to the new technology to take place. These findings may help us to understand that the Malaysian public sector may favor to implementation of the public or government cloud infrastructure which is the deployment model that guarantees the data and information security, integrity, privacy and confidentiality (Wyld, 2010; Zheng et al., 2012).

Hypotheses H2a and H2b proposes that organizational context is associated with the assimilation of cloud computing services and resources by the Malaysian public sector. Surprisingly, organizational context is only support for the initiation stage (H2a) and not significant to the implementation stage (H2b) of cloud computing services and resources. Two of the important determinants of organizational context is top management support and organizational readiness also found the same result. Even though the findings revealed that the awareness and evaluating the benefits of the cloud computing services and resources was confirmed, but the implementation stage results is contrast with previous study that found organizational factors has positive impact on organizations' implementation of IT innovation (Lian et al., 2014; Lin, 2013; Premkumar, 2003; Ramdani et al., 2013). Another important inconsistent finding was the study by Yan Xin et al. (2014) found that top management support has significant to the implementation of IT innovation but organizational readiness found to be not significant. Thus, we consider that further research is required to discover the nature of this relationship.

Hypotheses H3a and H3b that represent environment context factors however found to be contrary to the hypotheses H2a and H2b. Two of the important determinants of environmental context in this study is government regulation and external IS support also found the same result which is only significant to cloud computing services and resources implementation stage. This finding is in line with previous literature (e.g: Alshamaila & Papagiannidis, 2013; Maclennan & Belle, 2014), which consider that government regulation is a mandatory for agency to implement new IT innovation together with support from vendors and other organizations.

Next, H4 posit that the awareness and evaluation of the benefits of cloud computing services and resources to agency related to the implementation. However, result revealed that the initiation stage did not find support to the implementation stage. This study draw dissimilar finding from the previous study that found the initiation stage has significant to the implementation stage (Ghobakhloo et al., 2011; Sallehudin et al., 2015; Zhu et al., 2006). The agency that aware with the benefits of cloud computing such as cost reduction, elasticity, scalability, energy efficient, massive storage capacity, easily implemented, and accessibility and mobility but these benefits is insufficient to influence the agency to proceed with the implementation stage.

Finally, H5 suggest that the extent of implementation of cloud computing services and resources is related to operational effectiveness. Result indicate a positive relationship between these two constructs. This finding is in line with previous literature (Buyya et al., 2009; Wyld, 2010; Yi, 2009), which indicates that the extent of implementation computing services and resources offer new opportunities to gain operational effectiveness in the Malaysian public sector. However, the variance for opportunities to gain operational effectiveness in this study is only 3.5% explained by the agencies that implement and utilized cloud-based service and resources. Therefore, we consider that additional research is required to explore the nature of this relationship using resource-based view dimension that is not covered in this study.

6. Conclusions, Limitation and Future Research

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The model described the factors variables in this study explain 29.4% of the variance for awareness and evaluating the benefits of cloud computing service and resources by the Malaysian public sector. The model also indicates that the factors variables explain 22.5% of the variance of the utilization, use and implement of cloud computing service and resources by the Malaysian public sector. Moreover, model indicates that the implementation of cloud computing service and resources by the Malaysian public sector only explain 3.5% of the variance of the operational efficiency.

The most obvious finding in this study is the relationship between initiations stage not significant to implementation stage. These finding suggest that future study may incorporate new dimension of factor such as human factors for future analysis. As argued by Premkumar (2003), individual factors play crucial roles for successful of the implementation new IT innovation such as attitude, knowledge and skill. The second major finding was that the relationship between the implementation stage and operational effectiveness. These relationship was found significant but the variance is low. This can be conclude that the implementation of cloud-based service and resource is not directly influence to operational effectiveness. In this sense, the agency that implement and utilized the cloud-based service and resource may increase their resource capability before get advantage to their operational effectiveness. Through this perspective, the result of this study suggest that resource capability mediate the relationship between implementation and operational effectiveness.

Although this study provides insightful results, there are some limitations that need to be considered when examining the results. First, the present study was conducted in context of the Malaysian public sector. In future research, a sampling frame that combines both public sector and private sector from other countries could be used in order to provide a more international perspective on the subject. Second, the nature of this study is cross-sectional mode. Therefore, future research proposed to include a longitudinal study to increase the ability of making causal inferences. Third, future research should confirm this finding and look into other possible mediator relationship between implementation and operational effectiveness in order to have a more comprehensive understanding of the subject.

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