CLOUD COMPUTING PRACTICES AND PERCEIVED BENEFITS BY SMES IN MALAYSIA: SOME EMPIRICAL EVIDENCE

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ABSTRACT: The trend of cloud computing adoption is on the rise globally as it offers an attractive option of IT acquisition to organizations. Although similar benefits of cloud services can be gained by SMEs as the larger counterparts, it was reported that cloud computing adoption is still low among SMEs. A similar situation is observed for SMEs in Malaysia despite several initiatives launched by the government. Additionally, not much empirical studies have been conducted in a comprehensive manner to provide insights on the status and practices of cloud adoption among SMEs in Malaysia. Hence, this study is an attempt to fill this gap. Using survey method, a total of 387 responses were used for the descriptive analysis. The findings indicate that most Malaysia small businesses in both service and manufacturing sectors have substantial experience with basic cloud services and adopt similar practices like SMEs in the developed nations. The implication of the findings is that Malaysia SMEs are catching up with the global trend of utilizing cloud computing to improve the competitiveness of their business.

KEY WORDS: *Cloud computing, small and medium-sized enterprises (SMEs), Cloud services, descriptive analysis, Malaysia*

1. INTRODUCTION

Cloud computing represents a fundamental change in the way information technology (IT) services are deployed by organizations. The promise of cloud computing is to deliver all the functionality of IT services at a dramatically reduced upfront costs of computing. Additionally, cloud computing offers almost immediate access to computing resources and makes it easier for enterprises to scale their services according to client demand.

Gartner forecasted the worldwide public cloud services market to grow 17.5 percent in 2019 to a total of $214.3 billion, up from $182.4 billion in 2018 (Gartner, 2019). The fastest-growing market segment will be cloud system infrastructure services, or infrastructure as a service (IaaS), followed by cloud application infrastructure services or platform as a service (PaaS).

Small and medium-sized enterprises (SMEs) are particularly attracted to the use of cloud computing based on the promised benefits. SMEs are traditionally very cautious in using IT due to their constraint of resources and expertise. Cloud computing lowers the cost of entry for SMEs trying to benefit from advanced computer applications which were previously available only to the larger businesses.

Cloud computing also represents a huge opportunity to many third-world countries that have been so far left behind in the IT revolution to get access to IT services through the cloud platform provided by cloud computing providers. However, as highlighted by Adam and Musah (2015), cloud computing use among businesses, particularly the SMEs, in developing countries are under-studied.

In Malaysia, a similar trend is observed—that cloud services are beginning to gain popularity among not only large corporations but also the SMEs. Although the potential of cloud computing is evident, and much of extant literature has been conducted on cloud computing adoption, empirical studies on how Malaysia SMEs are utilizing cloud computing are still lacking. In fact, most past studies only look at a certain region or sector, but do not provide a multi-sector view on the phenomenon.

The purpose of this paper is to share findings of an empirical study conducted on cloud computing use among SMEs in Malaysia covering various sectors. The findings are based on the descriptive analysis which cover SMEs experience and practices with cloud services, as well as their perceived benefits from cloud computing.

The rest of the paper is organized as follows: the next section presents a review of related literature, followed by the research method, and after that analysis and findings. The paper concludes with discussion and highlights implications and limitations of the study.

2. LITERATURE REVIEW

2.1. Cloud Computing and Its Benefits

Cloud computing represents two major trends in IT, namely, IT efficiency and business agility. IT efficiency refers to the fact that the power of computers is utilized more efficiently through highly scalable hardware and software resources. Business agility means IT can be used as a competitive tool through rapid deployment that responds in real time to user requirements (Kim, 2009).

There are many definitions of cloud computing but perhaps the most widely used definition is from the National Institute of Standards and Technology (NIST) which defines cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell and Grance, 2009). The definition by NIST describes cloud computing as having five essential characteristics, three service models, and four deployment models. The five characteristics are on-demand services, broad network access, resource pooling, rapid elasticity and measured services.

Cloud computing service delivery models are categorized into three, namely, Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). IaaS refers to on-demand provisioning of infrastructural resources such as CPUs, utilities, and enhanced virtualization capabilities. PaaS provides computational resources via a platform upon which applications and services can be developed and hosted. SaaS, referred to as service or application clouds, offers implementations of specific business functions and business processes that are provided with cloud capabilities (Chang, Walters and Wills, 2013).

The four types of clouds or deployment models are public cloud, private cloud, hybrid cloud and community cloud. Public cloud refers to cloud services provided in public domains such as Amazon EC2 and S3. This option provides organizations with cost and time saving however security issue is the main concern. Private cloud refers to cloud services deployed within the organization; thus, data and accessibility is for the internal users. Hybrid cloud involves partly private and partly public cloud as a solution. Community cloud is the latest type where it contains characteristics from each of the previous types. It is a model built by a community or groups of organizations that have shared interests such as a specific requirement or a common mission (Chang, Walters and Wills, 2013).

Cloud computing promises a myriad of benefits that can be delivered based on the on-demand pricing, less IT overhead, lower investment costs on hardware and software, more efficient use of computing systems in existing data centers and easier scale-up of the applications and services (Marston et al., 2011). In the context of SMEs, Carcary et al. (2014) categorized cloud computing benefits into the following: (i) Cost reduction; (ii) increased scalability and agility/adaptability; (iii) improved resource utilization; (iv) mobility and collaboration; and (v) business continuity and disaster recovery capabilities. One of the objectives of this research is to gauge on the perceived benefits of cloud computing by Malaysia SMEs.

2.2. Cloud Computing in Malaysia

Cloud computing is a disruptive technology that has a range of benefits and value in various aspects of a business. Asia Cloud Computing Association (ACCA) Readiness Index 2018 evaluates 14 Asian countries across Asia Pacific (APAC) on ten parameters to indicate how prepared they are in adopting cloud computing. The parameters cover areas like cloud infrastructure, cloud security, cloud regulation and cloud governance. ACCA ranked Malaysia as 8th position for 2018, the same position as the previous year (ACCA, 2018). This indicates that cloud computing adoption among Malaysia businesses is still not encouraging, compared to countries like Singapore and Hong Kong. According to the report, Malaysia performed very well on cloud security and government regulatory parameters but not so well on cloud infrastructure and cloud governance parameters.

In general, cloud computing utilization in Malaysia is not mature yet, but it is growing at a rapid pace. The transformation to acceptance, adoption and deployment of cloud computing has become an important trend and is expected to grow from US$43 million in year 2012 to US$900 million by year 2020 (Kumar, 2013).

Recognizing the importance of cloud computing, the Malaysian government has supported the use of cloud computing in both the public and private sector. According to the National ICT Roadmap 2012, Malaysia ICT focus areas include

wireless intelligence, everywhere connectivity, e-services, security and platforms, big data and analytic and cloud computing. As a result, cloud computing has started to be used in multi domains including public sector, education, healthcare, business, tourism, transportation and scientific computing (Abolfazli et al., 2015). In October 2017, the government through MDEC, has announced the 'Cloud First' strategy to enable the delivery of cloud-based public services as well as to drive the private sector adoption of cloud technologies (Open Gov Asia, 2017).

Past researches on cloud computing adoption in Malaysia have looked from the perspective of the clients and focused on identifying factors that inhibit adoption. For example, Karkonasasi, et al. (2016) identified cost saving, top management support, competitive pressure, and trading partner pressure that have encouraged cloud adoption among Malaysia organizations. While this represent cloud adoption in general, the following section will look at cloud computing in the context of SMEs.

2.3. Cloud Computing and SMEs in Malaysia

SMEs generally lag behind the larger counterparts when it comes to technology adoption which is a common situation in many countries around the globe. The main reasons include the limited managerial abilities and resources faced by SMEs which make it a challenging task for innovation adoption. In terms of cloud computing adoption, according to Gallighan and Mansor (2011), a survey by Microsoft in 2011 revealed that although 62 percent of large companies in Asia have eagerly embraced cloud services, 68 percent of SMEs were lagging behind these larger enterprises and had no plan to adopt cloud services.

As part of the initiative to promote the use of cloud computing among SMEs in the country, the Malaysia government, through the Malaysia Digital Corporation (MDeC), under the Digital Malaysia initiative, has launched a program to promote cloud computing awareness among SMEs in Malaysia. The program also attempts to match SMEs with cloud computing providers. Nevertheless, not many SMEs participated in the program.

In the context of SMEs, the study of Tarmidi et al. (2014) explored the level of awareness and adoption among SMEs in Malaysia focusing on accounting companies. The study revealed that two thirds of the respondents are not aware of cloud computing; among those which adopted, the cloud services used are limited only to Google Apps engine and Dropbox.

Related to factors that influence adoption, Hassan et.al (2017) conducted a survey on SME managers and based on 132 responses used for the analysis, it was found that IT resources and external pressure are significant determinants for cloud computing adoption. Perceived benefits and top management support were found not significant by the study. Another study by Ming et al. (2018), on the other hand, found cost saving, top management support and technology readiness as the factors affecting cloud adoption among SMEs in Sabah. Other factors like relative advantage, competitive pressure, and external support are found not significant. In conclusion, based on these studies, factors that influence cloud computing adoption among Malaysia SMEs are not conclusive which signify that more studies are needed in this area.

3. RESEARCH METHODOLOGY

In view of the research purpose, this study adopts a quantitative approach and a survey method is used to collect the data. Survey is deemed as the most appropriate method as responses need to be collected from a large number of SMEs in order to achieve the research objective.

In this case, the official definition of SMEs by the Malaysia government is adopted, following the revised edition announced in 2013. An enterprise is considered an SME based on the annual sales turnover or number of fulltime employees. For the manufacturing sector, an SME refers to a company with sales turnover from RM300,000 to RM50 million or employees from 5 to 200 (SME Corp, 2014). For services and other sectors, on the other hand, an SME refers to a company with sales turnover from RM300,000 to RM20 million or employees from 5 to 75. In this study, all sectors are included.

The sampling frame for the SMEs is obtained from various directories including the Federal Manufacturing Malaysia (FMM) directory, the MSC IT companies' online directories, the SMECorp directory and other published business directories in Malaysia. A total of 1546 addresses were compiled.

The questionnaire was developed based on adaptation of several past instruments; items for cloud benefits, for example, were adapted from Carcary *et. al* (2014). The questionnaire was refined through the process of pre-testing which involve eight experts who independently appraise the questionnaire items. A pilot study was conducted where a total of 35 questionnaires were analyzed. Based on the results, the questionnaire was finalized for the main survey.

Questionnaires were distributed via multi-methods including mail, phone, online and face-to-face. The respondents are owner managers or CEOs or managerial staff of the SMEs. The survey was conducted in a gestation period of three months from July 2018 to October 2018. A total of 411 questionnaires were collected and 24 were discarded as they do not fit in this study. A total of 387 usable responses were used for the analysis which represents a response rate of 25%.

4. ANALYSIS AND FINDINGS

This section presents the findings based on descriptive analysis done on the sample. Descriptive analysis using SPSS v.25 was conducted to gain SMEs' profile, SMEs' experience and practices of cloud computing use, SMEs' perception on cloud computing benefits, and the respondents' profile.

4.1 Profile of SMEs

Since the sample include all types of SMEs, a question was included to find out the type of SME in the sample. Table 1 shows the distribution of types of SMEs.

Table 1: Type of SMEs

Type of company	Frequency	Valid %
Sole proprietorship	58	15.0
Partnership	115	29.7
Limited Company	198	51.2
Subsidiary	16	4.1
Total	387	100.0

Table 1 shows that about half of the sample are Limited Companies, followed by about a third are partnerships. Another 15% represents sole proprietorships. From this finding, we can conclude that the sample mainly consists of non-micro enterprises, as normally, micro enterprises are sole proprietorships.

Many past studies indicate that the type of industry the SME operates in affect the level of competitiveness and hence, will determine whether IT innovation or in this case, cloud services, is needed or not. Hence a question was included to know the breakdown of the type of the industry of the responding SMEs.

Table 2 shows the distribution of SMEs according to their related industry.

Table 2: Type of industry

Related industry	Frequency	Valid %
Manufacturing	117	30.2
Services (IT-based)	124	32.0
Services (Non IT- based)	110	28.4
Other	36	9.3
Total	387	100.0

Based on Table 2, the result indicates that most of the responding SMEs (60%) are in the service-related industry. Only 30% represents the manufacturing industry. Among those in the service industry, about half of them are IT-based. Another half are non IT-based. This breakdown is similar to the finding of Carcary et al. (2014) on Irish SMEs where about half of the sample was in the knowledge-intensive industry which was made up of service enterprises.

To gauge the age of the responding SMEs, a question was asked on the number of years of its establishment. Table 3 shows the distribution of SMEs according to number of years of their establishment.

Table 3: Number of years of establishment

Years of establishment	Frequency	%
1-5 years	144	37.2
6-10 years	129	33.3
11-15 years	51	13.2
more than 15 years	63	16.3
Total	387	100.0

Table 3 shows that about a third of the sample are less than 5 years old; another third are between 6 to 10 years old. In other words, about 70% of the SMEs are less than 10 years old or can be considered as relatively new companies. Only about 16% are more established SMEs of more than 16 years old.

Even though the selection of enterprises was generally based on the SME definitions, we still asked on the number of employees to know the proportion of micro, small or medium-sized enterprises. Table 4 shows the result related to the number of full-time staff.

Table 4: Number of full-time staff

Full-time staff	Frequency	%
Less than 5	59	15.2
5-20	123	31.8
21-50	122	31.5
51-100	54	14.0
101-150	11	2.8
151-200	18	4.7
Total	387	100.0

From Table 4, it appears that only a small proportion of the sample are micro enterprises. About two-third of the sample are companies with the number of full-time staff between 5 to 50, which, following the official definition, are considered as small enterprises. Another 21% are SMEs with more than 51 staff. This breakdown is well aligned to the type of business identified earlier, that is, most of them are not sole proprietorships.

Taking in view of the focus of the study, a question was included to find out the number of IT staff of the SMEs. Table 5 shows the result.

Table 5: Number of IT staff

Number of IT staff	Frequency	%
None	199	51.4
1-5	153	39.5
6-10	27	7.0
More than 10	8	2.1
Total	387	100.0

From Table 5 it appears that about half of the sample SMEs do not have any IT staff. About 40% have only between 1 to 5 IT staff in the company. This is not surprising because it is widely known that SMEs generally do not use IT and they generally lack the financial resource to invest in IT. It is worthy to note that since all the responding SMEs use cloud services, perhaps that also explain to some extent why most of them do not need to hire full-time IT staff; instead they rely on cloud providers.

4.2 Cloud Computing Experience
This section presents the findings related to the SMEs experience and practices of cloud computing implementation. The results answer the main research question of the study, that is, to gain understanding on what types of cloud services, what delivery models, are adopted by most SMEs in Malaysia.

Table 6 shows the distribution of responding SMEs according to their experience levels using cloud computing.

Table 6: Experience in using cloud computing

Experience in using cloud computing	Frequency	%
Less than 1 year	105	27.1
1-2 years	107	27.6
3-4 years	124	32.0
More than 5 years	51	13.2
Total	387	100.0

Table 6 indicates that about a third of the sample have experience of using cloud computing between three to four years. About 27% have cloud experience of less than one year; another 27% have between one to two years of experience. In conclusion, a majority of the SMEs in the sample (73%) have cloud computing experience of at least one year or in other words, most of Malaysia SMEs have substantial experience using cloud services. This perhaps is due to these SMEs following the trend that is happening in other parts of the world.

As discussed in the Literature review section, there are three types of service models, namely SaaS, PaaS and IaaS. Table 7 shows the distribution of cloud service models as adopted by Malaysia SMEs.

Table 7: Types of cloud service models

Types of cloud service models	Frequency	%
Software as a Service (SaaS)	260	67.2
Platform as a Service (PaaS)	85	22.0
Infrastructure as a Service (IaaS)	42	10.9
Total	387	100.0

Results in Table 7 shows SaaS is the most common type of cloud service model adopted by SMEs in the sample, which represents about two-thirds. This is followed with PaaS, 22%, and about 11% adopted IaaS. For a better understanding, cross-tabulation was done on the sample and Table 8 presents the result.

Table 8: Cross Tabulation between Cloud computing service models and Industry types

CC Service model/Industry	SaaS	PaaS	IaaS	Total
Manufacturing	68	34	15	117
Services (IT-based)	90	19	15	124
Services (Non IT-based)	77	25	8	110
Other	25	7	4	36
Total	260	85	42	387

From Table 8, it appears that the industry that has the highest number of SMEs using SaaS is the IT-based service sector, followed by other service-based sector and next is the manufacturing sector. For PaaS, more SMEs in the manufacturing sector adopt it compared to the service sector. For IaaS, not much difference is observed between both sectors. These findings may be explained by referring to the match between the service model and the nature of the industry—since SaaS model is service-oriented, it is most suitable for the service sector.

Next, we would like to know which type of cloud delivery model is most common among the responding SMEs. Table 9 shows the distribution of SMEs according to cloud computing services delivery model.

Table 9: Cloud computing delivery model adoption

Cloud computing delivery model	Frequency	%
Public cloud	178	46.0
Private cloud	142	36.7
Hybrid cloud	67	17.3
Total	387	100.0

Based on result in Table 9, the most common cloud computing delivery model adopted by SMEs in Malaysia is public cloud, where 46% of SMEs in the sample adopted it. This is followed by Private cloud, about a third of the sample, and another 17% adopted the hybrid type.

Next, we want to know more specifically what types of cloud applications used by the SMEs in the sample. Table 10 shows the result.

Table 10: Past or current cloud computing applications subscribed

Cloud computing Applications Used	Frequency	%
Web-based email services	66	17.1
Storage and back up	58	15.0
Enterprises Resources Planning (ERP) System	50	12.9
Web hosting	43	11.1
Business Intelligence and Analytics	38	9.8
Online service software (e.g. Office 365)	38	9.8
Customer Relationship Management (CRM)	24	6.2
Server Rental	23	5.9
Computer networks	21	5.4
Software development and testing tools	13	3.4
Others	13	3.4
Total	387	100.0

From the Table, the most widely used cloud services by Malaysia SMEs are email (17%) and storage and back-up services (15%). Next are Enterprise Resource Planning (ERP) (13%) and web hosting services. The least used cloud services include software development and testing tools, computer networks, server rentals and CRM.

The findings seem to reflect similar practices with SMEs in other parts of the world. For example, Carcary et al.'s (2014) study on Irish SMEs found email as the most widely used cloud services followed by sales and marketing applications.

In this study, a question was included to gauge the reasons for these SMEs to adopt cloud computing. Table 11 shows the distribution of responses for this question.

Table 11: Reasons for using cloud computing

Reasons of using cloud computing	Frequency	%
Save costs	142	36.7
Information sharing	106	27.4
Superior performance over in-house systems	94	24.3
Other	45	11.6
Total	387	100.0

The results from the Table indicate that cost saving is the most common reason for adopting cloud services by Malaysia SMEs, which is represented by about a third of the sample. This is very much aligned to the findings by Carcary et al. (2014) where they found cost reduction as the main benefit gained by SMEs in Ireland. The second most common reason is information sharing, followed by superior performance over in-house systems.

To gain further insights, cross-tabulation was done for reasons for using cloud services and deployment models, and the result is shown in Table 12.

Table 12 Cross-Tabulation between reasons for using cloud computing and Cloud deployment models

Main Reason for using CC/CC Deployment Model	Save cost	Information sharing	Superior performance	Other	Total
Public cloud	75	47	31	25	178
Private cloud	54	45	31	12	142
Hybrid cloud	13	14	32	8	67
Total	142	106	94	45	387

Table 12 shows that for SMEs using public and private cloud models, cost saving seems to be the most important reason, while for hybrid cloud model, superior performance seems to be the most important motivating factor. Another way of looking at the results, to save cost seems to be the most important motivation when using public clouds, which is understandable as these services are provided for free. For private cloud users, the motivations or reasons for using cloud services are split between cost saving, information sharing and superior performance.

4.3 Perceived Benefits of Cloud Computing

Since all SMEs in the sample have adopted cloud computing, we seek to find out what kind of benefits these SMEs perceived they have gained from using cloud services. The list of benefits have been obtained from past literature and encompass strategic, tactical and operational benefits. Respondents may tick more than one type of benefits. Table 13 shows the results which include the mean and standard deviation values.

Table 13: Descriptive results for perceived cloud benefits.

Perceived cloud benefits	Mean	SD
Cloud computing has improved access and connectivity of mobile devices.	4.12	0.741
Cloud computing has transferred the responsibility for business continuity and disaster recovery to the Cloud Service Provider.	4.11	0.745
Cloud computing has enabled the testing of new ideas and applications with minimum support from IT staff.	4.11	0.753
Cloud computing has improved collaboration with suppliers and customers.	4.07	0.749
Cloud computing has helped to manage operational costs.	3.92	0.839
Cloud computing has reduced the risk of our IT infrastructure of becoming obsolete.	3.87	0.993
Cloud computing has reduced our capital costs.	3.85	0.888
Cloud computing has reduced the time spent on IT maintenance.	3.84	0.985
Cloud computing has reduced the time to develop, test, and implement new services.	3.76	1.005
Cloud computing has improved collaboration among employees.	3.72	0.961
Cloud computing has allowed us to focus on our core business.	3.70	0.878
Cloud computing has reduced the need for more IT staff.	3.12	0.728
Cloud computing has enabled us to upscale/downscale IT capacity.	2.92	1.330

From Table 12, it appears that the top three cloud benefits as perceived by SMEs in the sample are *improved access and connectivity of mobile devices*, *the responsibility for business continuity and disaster recovery has transferred to cloud providers, and cloud computing has enabled the testing of new ideas and*

applications with minimum support from IT staff. Interestingly, perceived benefit that received the least score is related to scaling of IT capacity.

The literature seems to imply that the most common benefit cited is capital cost reduction (Carcary et al., 2014). However, Carcary et al.'s sample is mainly micro enterprises whereas this sample comprised mostly small businesses. Perhaps this explains the difference in the findings between these two studies.

The benefit on mobile connectivity, however, is the same for both studies. This implies that both Malaysia and Irish SMEs perceived that by adopting cloud services, their access and connectivity of mobiles devices are improved.

4.4 Profile of Respondents

In order to know the background of the respondents, several questions on demographic factors were included, such as gender, age, level of education, designation and level of IT knowledge.

Table 14: Demographics of the Respondents

	Frequency	Percentage
Role:		
Director/CEO/Owner	186	48.1
IT Manager	64	16.5
Other Manager	81	20.9
Other	56	14.5
Gender:		
Male	233	60.2
Female	154	39.8
Age group:		
Less than 20	29	7.5
21-30	100	25.8
31-40	174	45.0
41-50	59	15.2
Above 50	25	6.5
Highest educational qualification:		
Secondary School	60	15.5
College/Matriculation/Polytechnic	178	46.0
University	149	38.5
IT knowledge rating:		
None at all	35	9.0
Minimal	141	36.4
Knowledgeable	159	41.1
Very knowledgeable	52	13.4

From Table 14, almost all respondents are managers or owners of the SMEs in the sample, which is very much the target of the study. About half of them hold the highest level of company leadership. The respondents are mostly male with only 40% of them are female. In terms of age group, most of these managers are relatively young with about 78% of them less than 40 years old. In relation to educational qualification, a majority of them are either college or university graduates. Considering the age group and their educational background, perhaps it is safe to conclude that the respondents generally represent the educated and technology-aware managers.

In addition, referring to their perceived IT knowledge, about half of them consider themselves as 'knowledgeable' or 'very knowleadgeable', which again not surprising considering their educational background. Most of tertiary educational programmes today include some level of IT knowledge as part of the curriculum.

5. DISCUSSION AND CONCLUSION

The main purpose of this study is to understand the practices of Malaysia SMEs in using cloud computing services in various sectors. Using a survey to achieve the objectives, the findings provide interesting insights.

Generally the profile of the SMEs in this study are small businesses in Malaysia where they are either partnerships or limited companies and mostly representing the service sector, particularly the IT-based service sector. This profile of 'small' SMEs rather than micro businesses is similar to the sample used by Salim et al. (2015) in their study on cloud ERP adoption. The finding indicates that most SMEs in Malaysia today have quite substantial experience in using cloud services which perhaps explain the rather high level of uptake of cloud solution and use of quite advanced cloud applications. Alshamaila et al. (2013) found prior experience as among important factors that influence SME cloud services adoption in north- east of England. In the case of cloud computing, familiarity with technologies such as virtualization, cluster computing or utility computing can have a direct influence upon user perceptions regarding cloud computing services.

The findings of this study show several common practices among Malaysia SMEs on cloud adoption. Most of SMEs, which are in the small category, use SaaS service model compared to PaaS or IaaS. SaaS is a model of service that allows the users to rent IT solutions provided by a third party and to use them as if they were purchased and developed by the users. This is the layer nearest to the end-user and represents the simplest type, hence it is easiest for SMEs to decide to migrate to this cloud solution. This finding is similar to the study of Hsu et al. (2014) on cloud adoption by Taiwanese firms which comprised mostly SMEs. They found SaaS adoption is the highest, followed by PaaS and IaaS. Compared to SaaS, PaaS and IaaS are more complex in nature and require specialized IT expertise which most SMEs do not have, hence explains why they are not widely adopted by SMEs.

Regarding the type of clouds used by Malaysia SMEs, it seems both public and private clouds are widely used although there is slightly more SMEs adopting public clouds. Public clouds refer to service providers who provide free services to the users, however, users will have no fine-grained control over the network, data and security setting. Private networks on the other hand provide more control at the expense of having to let go on the benefits of no upfront capital cost. This finding is in contrast to Hsu et al.'s (2014) study where a majority of their sample chose private cloud over private or hybrid cloud. Since their study include big companies, it showed that their respondents are more concerned with maintaining control of their crucial business-related data over upfront costs. SMEs, however, are more cost-conscious, hence they would prefer to use public clouds than private clouds.

The other finding is related to cloud computing applications. Similar to SMEs in other parts of the world, the most common cloud application used by Malaysia SMEs is webmail. This is not surprising as Google mail is the most popular webmail

today. Carcary et al.'s (2014) study on Irish SMEs also found email as the most widely used cloud services followed by sales and marketing applications. The next widely used cloud services among Malaysia SMEs are storage and backups, ERP system and Web hosting. The popular use of cloud ERP is similar to Salim, Sedera et al.'s (2015) observation that made them decide to focus their study on SME adoption of cloud ERP. They defined cloud ERP as commercial software packages that enable the integration of business processes and transaction-oriented data throughout the organization using a model that enables ubiquitous, convenient, on-demand network access within minimal management effort or service provider reaction. Additionally, the finding of this study indicates that Malaysia SMEs are ready to use quite advanced type of cloud solutions besides the email.

Finally, the finding related to benefits of cloud services reveals that most Malaysia SMEs perceived that improved access and connectivity of mobile devices, transfer of responsibility of disaster recovery and business continuity to cloud provider and able to test new ideas and applications without the help of IT staff are the most important. It is interesting to note that these benefits are not directly cost-related which is a contrast to the findings of Carcary et al.'s study where they found cost reduction as the main perceived benefit by SMEs managers in Ireland. However, Carcary et al.'s sample are mainly 'micro' SMEs, whereas the sample of this study are 'small' SMEs. Micro SMEs are much more constrained with financial resource, therefore they would be very concerned with cost savings. In fact, the findings of this study is similar to Kim, Jang & Yang's study (2017) which found SMEs in Korea gained product and service quality improvement as well as business process improvement by adopting SaaS, which implies that SME managers in this case are very well aware of the wide-ranging benefits that can be potentially gained by adopting cloud computing.

The findings have provided empirical evidence on the profile of SMEs using cloud services as well as some specific cloud services decisions that are used to support their businesses. There are several implications of the findings from this study. Firstly, to cloud service providers, the findings can assist them in understanding how SMEs in Malaysia are currently utilizing cloud computing solution and help them to improve the services provided to this segment of their market. The decisions related to cloud services use among SMEs managers are not the same as compared to the larger counterparts as SMEs face different challenges. Secondly, the findings of this study can assist the policy makers particularly the authorities which are involved with assisting SMEs to implement better intervention programs to promote cloud computing among SMEs in the country. Thirdly, to SME owners and managers who are yet to use cloud services the findings can serve as guides for them to embark on this journey.

Despite some limitations of the study such as small sample size, seeking only quantitative data, and no inferential statistics used for the analysis, the findings nevertheless have provided better understanding on how SMEs in Malaysia are using cloud services. Future works can be extended to examine the impacts of cloud services use on SME performance or use qualitative approach to gain deeper insights on the how and why they deploy cloud services in a certain way.

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