Asian Journal of Accounting and Governance **8**: 1–6 (2017) Special Issue ISSN 2180-3838
(https://doi.org/10.17576/AJAG-2017-08SI-01)

The Implementation of Cloud Accounting in Public Sector

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ABSTRACT

Past studies on cloud services revealed that there are several challenges faced by the organization in using cloud accounting. The main objective of this study is to understand the implementation of cloud accounting as the latest technology in Accounting Information Systems (AIS) in public sector. This study employs an interpretive case study for a better understanding of cloud accounting application in AIS. Data collection was conducted by interviewing a total number of seventeen directors and deputy directors who are directly involved in the implementation of cloud accounting in the public sector. By using system implementation framework, this study found that in the implementation of cloud accounting, challenges are associated with system specification which include system integration, security and privacy. Other challenges are associated to the roll out strategy and data migration. Theoretically, this study contributes to Information System Implementation framework in the context of new technologies implementation in public sector accounting. Practically, these findings increase the understanding and knowledge of accountants as a result, increase efficiency by providing accurate information to decision makers.

Keywords: Cloud Accounting, Accounting Services, System Specification, Implementation Management, Public Sector

INTRODUCTION

The development of cloud computing brings new evolution in accounting information system; cloud accounting. Cloud accounting in the context of this study is defined as a service using cloud accounting software available to users and can be accessed from anywhere and does not require any hardware and accounting s. Cloud accounting introduced new method in offering accounting services to clients. This article focuses on the implementation of cloud accounting in public sector. Many countries have already implemented cloud services such as the United States, Canada, United Kingdom, Norway, Sweden, Denmark, South Korea, Japan, Taiwan, Singapore, Australia and New Zealand (Ratten 2015; Wyld 2010). In Malaysia, the implementation of cloud in the public sector is a national project and part of the Malaysia Economic Transformation pelan (MAMPU 2011). Malaysia Public Sector ICT Strategic Plan has outlined the implementation of cloud services to ensure optimum use of ICT investments and services are efficient and effective. Accordingly, the public sector is an important sector because clients are citizens of a country (MAMPU 2011).

Previous studies have discussed the implementation of cloud accounting but have not discuss issues and challenges facing the implementation of cloud accounting especially in public sector (Armbrust et al. 2010; Christauskas & Miseviciene 2012). This study aims to understand the challenges faced in the implementation of cloud accounting in public sector and ways to overcome the challenges. To achieve this aim, questions that arise and require clarification is to determine: 1) What are the challenges faced in the implementation of cloud accounting in the public sector? 2) How does public sector overcome those challenges? This study uses a framework of system implementation (Aman & Kasimin 2011) in the context public sector in Malaysia to provide empirical understanding of cloud accounting implementation. This article is organized as follows. Next sections provide literature review, theoretical framework, methodology, findings and conclusion.

LITERATURE REVIEW

The development of cloud computing technology brings new evolution in the information technology industry. With the use of this technology software can be offered as a service (Armbrust et al. 2010). This change impacts on accounting information system as accounting services can be provided to more users regardless of user's location and can be offered at a more affordable price. With today's information technology sophistication, accounting services can be offered easily and quickly. Cloud accounting was introduced in tandem with the changing of today's information technology that led to cloud services. It is a new way of offering accounting services to consumers. Cloud accounting uses cloud technology, where all information technology software and hardware are in different locations with users. The existence of accounting services that use cloud technology has led to changes in existing accounting service offering methods.

The emergence of cloud services provides a new way for the provision of accounting services. Accounting services providers especially accounting firms are considering technologies such as cloud accounting to provide their services (Christauskas & Miseviciene 2012).

Current trend shows that accounting software companies such as UBS, WAVE, QuickBooks have transformed their accounting software to cloud-based accounting software. For example, QuickBooks Online accounting software offers on-line with a low monthly fee to use the service after a month. Accounting outsourcing companies are moving towards the implementation of cloud accounting in the accounting services they provide (Aman & Mohamed 2012). Accounting services are delivered via the cloud in two ways. First, companies can use cloud to sell their accounting software which can save the cost of installation (Christauskas & Miseviciene 2012). Customers only need to upgrade the accounting software through the cloud. Second, companies provide accounting services using cloud-based accounting software and clients use it from different locations (Berman et al. 2012; Laudon & Laudon 2011; Low et. al. 2011) depending on their preferred cloud infrastructure such as private, public, community and hybrid cloud. To date, the implementation of cloud accounting in the public sector is limited, for example the US Department of State through the National Interior Business Center (NBC), the United States. The department has two data centers and operates computing tasks including payroll, human resources and includes dozens of federal agencies. Cloud computing in the public sector has been well received in countries such as the United States, United Kingdom, China, Thailand and New Zealand but most of the services offered are administrative, health and education functions (Gosnell 2017; Wyld 2010). In Malaysia, only a fraction of accounting data is transmitted over public cloud. For example, Accountant General of Malaysia has introduced a web-based system salaries eStatement (web) where 1.2 million government officers can now print their own salaries. The system can be accessed through the website of the Department of Labor. However, the system is relatively static because it merely serves as a storage database payslip. This is an example of the implementation of cloud accounting services, the government should consider the potential savings, capacity and operational security, reliability and privacy (Wyld 2010). Nevertheless, there are some obstacles in the use of cloud services such as business continuity, loading data, acquisition costs and uncertainties of service performance (Armbrust et al. 2010). The accountants should have a fundamental understanding of information technology and keep abreast of new technologies and that can be used to ensure business continuity and competitive (Peter & Quinn 2016).

THEORETICAL FRAMEWORK

Croom and Brandon-Jones (2007) use a framework to understand the implementation of information systems by focusing on system specification and implementation management. The same framework is also used and extended by Aman and Kasimin (2011). Aman and Kasimin (2011) study the challenges in implementing eProcurement system in Malaysia. Following this, Aman and Mohamed (2012) use the framework to understand the implementation of cloud accounting in offshore accounting outsourcing. Aman and Mohamed (2012) found that issues in system specification are related to differences of systems and data management used by clients, while challenges in implementation management are related to security aspects. Findings also show the important of antivirus, firewall and authorized user as well as a Service Level Agreement to enhance trust on the secured transactions and performance of the service providers. This study will use the framework by Aman and Kasimin (2011) as it is useful in providing asystematic guidance to understand the challenges in the implementation of cloud accounting in public sector.

According to Croom and Brandon Jones (2007), system specification has two key themes which is data management and software integration. (Aman & Kasimin 2011) highlights that software integration issues on the e-procurement involve the legal and administration policy and lack of IT infrastructure in the rural areas. Eight factors that effects adoption of cloud computing by high-tech firm that is relative advantage, complexity, compatibility, top management support, firm size, technology readiness, competitive pressure and trading partner pressure (Low, Chen & Wu 2011). Different companies built different custom application in the cloud and how it affected the companies operation in security integration area. In addition, security and privacy is a major concern in cloud services (Khalil et al. 2014; Uchenna et al. 2015; Zissis & Lekkas 2012). Implementation management refers to the process of e-procurement system delivery and the roll out strategy (Croom & Brandon Jones 2007). Aman and Kasimin (2011) explain that system implementation using outsourcing approach may contribute to additional challenge such as service fees imposed by the contactor. IT skills are other important challenges in ensuring the success of the system implementation (Cleary & Quinn 2016). Despite that, system security, trust and identification of security threats are also crucial (Vanessa 2015; Zissis & Lekkas 2012).

METHODOLOGY

In this study, we use qualitative interpretive case study approach (Walsham 2006) of cloud accounting in public sector. This study focuses on a case study of Malaysian Government, specifically in Accountant General (AG) Department. The Accountant General of Malaysia was chosen as a case study to understand the implementation of cloud accounting system known as 1Government Financial Management Accounting System (1GFMAS).

Data collection methods include interviews, document reviews and observations. A total of 15 hours interviews was conducted. Respondents consisted of officials from the two departments of Accountant General Department and Division of Information Technology Management. Researchers have identified and interviewed a total of sixteen people comprised of a director, eight Deputy

Director, five Senior Principal Assistant Director and two Senior Assistant Director. In addition, there are fourteen senior Accountants and two senior Technical Officer. All respondents have work experiences between ten to twenty years in the Accountant General of Malaysia. During the interviews, questions were asked on their education background, working experience and how they join the companies. Questions also covered on the understanding of business and operation process of the selected department, software integration, system security and technology challenges. All interviews were taped and transcribed.

For analysis, researchers took the coding of transcripts independently and then cross-checked for final coding. The initial data coding was conducted by highlighting important and relevant piece of the data that could contribute to the understanding of the study. Based on the themes generated from the frameworks, the initial coding template was developed. This initial template was then applied in subsequent data analysis and modified when significant themes emerge along the way. It was then used to the whole data set as a guide in interpreting the data as well as in writing up the research findings.

CASE STUDY BACKGROUND

Department A in Ministry XYZ (*real name is disguised for privacy purposes*) is selected as a case study to understand more in depth the implementation and management of change in the context of the latest technology i.e. cloud accounting. The department has a role to play in ensuring that basic accounting changes from cash adjusted to accrual accounting are implemented. The Accrual Accounting Implementation Team (PPPA) and Information Technology Management Division (BPTM) are responsible for developing and implementing the 1GFMAS system for the Federal Government.

A new accrual-based accounting system has been developed and it is known as 1GFMAS. The 1GFMAS system is developed using accrual basis and has a database in the government data center. It is accessible from any place as shown in Figure 1. This system uses SAP software and its implementation uses private cloud. Based on Figure 1software and hardware are placed in government data centers. It is connected to the user through a private cloud known as 1GovNet. This private cloud is the property of the Government of Malaysia. 1GovNet is shared by various ministries to ensure optimum network usage by users in the public sector.

1GFMAS users will make access from their respective ministries to government data centers using computers without downloading applications to their respective computers. All transactions made are stored in government data centers. As such, accounting offices do not need to maintain hardware and software in their respective offices.

FINDINGS AND DISCUSSION

SYSTEM SPECIFICATION

Finding shows that the challenges associated with system specification include system integration, security and privacy.

System integration is challenging especially when there are number of external systems with different system platform (Croom & Brandon-Jones 2007). The external systems include system of revenue collection, asset management and banking. The findings of the study found that in the integration of systems, the number of legacy systems that had different system platforms was a major challenge in the implementation of 1GFMAS. External systems are divided into two categories, namely, the system developed by the ministry / department / agency. Both systems are integrated with the 1GFMAS system. There are ten government agency systems that need to be integrated with the 1GFMAS system, such as revenue collection systems, bulk agencies, project monitoring systems, Asset Management System and Management System. The director describes the challenges, "... in terms of integration, our challenge is to standardize the scope of

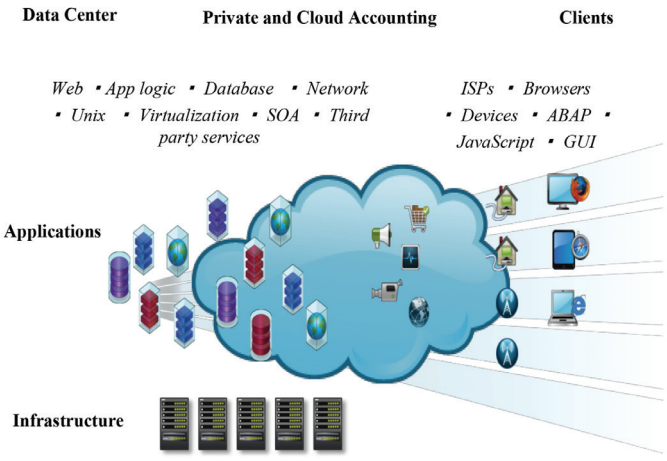

FIGURE 1. 1GFMAS

integration with many external systems so that it can be parallel"

Dialogue with various ministries and agencies was found useful to overcome such challenges. The use of Public Sector Data Dictionary (DDSA) and a uniform coding system enabled the integration of various systems. In addressing the challenges of system integration, the public sector data dictionary (DDSA) is used to ensure the smooth integration. Public sector data dictionary is a standard format and is administered by an agency under the Prime Minister's Department who is responsible for modernizing the Government's administrative system. The Director of Information Technology Management Division explains, "... for the integration of each system, we use the standard Internal Data Dictionary (IDD)"

In addition to the implementation of standard data dictionaries, discussions and dialogues are also held with the parties involved with system integration. Things discussed include system requirements, the advantages and limitations of existing systems. The Deputy Director of PPPA recognizes the importance of discussions and dialogues as a way to address the problem of system integration. "... we have two parties involved, we have a discussion ... we look at our ability and consider different aspect. This finding is in line with the recommendations of the study by Angeles and Nath (2007) on use of standard codes for various product in ERP.

In addition, security and privacy was a major concern especially when the storage and processing of data was not in the same location that might contribute to theft of financial data and damage to the hardware. According to Senior Assistant Director, BPTM, if the hardware is damaged, it is difficult to identify the hardware that needs to be changed. Similarly, if the database is shared with other people, "The private cloud may have some constraints. For example, if the machine was damaged, how would we change it? In addition, in terms of security, we do not know the level of securities because it is a new technology. Other users may be able to view our data at any time due to shared resource sharing. Our database and other user databases will share a hardware ... Therefore, we are not sure of our data security".

Furthermore, the request and processing of data that are used and given to others are not clear. There were three respondents who raised the issue of data control rights. They expressed concern about data security because in cloud services, data was placed on servers and on databases owned by third parties who provided cloud services. As such, it is anxious that confidential government accounting data and information may be stolen or accessed by unethical persons. In addition, respondents also informed about the integrity of accounting data if cloud accounting was implemented. They also questioned the degree of data control and data leakage. This was stated by the Deputy Director of the Policy and Standards Unit, PPPA,"... there is an issue in terms of integrity of accounting data. The other person who controls our data ... "Other respondents also expressed concern about the absence of control over accounting data, it means that (accounting) the cloud is managed by others, as if for others we manage to have our accounting system. So we have no control there if anything happens"

As indicated by Pearson (2009) and Vanessa (2015), security and privacy often became challenges for cloud services as data is stored and processed at different location to that of the user's location as cloud service provider is responsible for part of their work (Zissis & Lekkas 2012; Gritzalis & Liu 2013; Khalil et al. 2014). In order to overcome challenges in security and privacy, all hardware and software are kept in private cloud at the Government Data Center with ownership rights over the hardware, software and networks. The 1GFMAS system uses a private cloud network of 1GovNet. This network has four layers of security where users outside have to go through three layers of security to access the application, but once there is a layer restricted to user access only. This is to ensure the safety of the hardware and applications from being infringed by outsiders and unregistered users. To ensure data is protected from encroachment, encryption technology is used when data transfer from the database to the user and from the user to the database. This was told by the Deputy Technical Director, "... all data must be encrypted and decrypt ... when moved ... now we use an electronic transfer (EFT), then we will use secure file transfer protocol (SFTP)..." Principal Technical Assistant Senior Director, Accrual Accounting Implementation Team also added, "A secure connection is a security feature of this system. ... a secure connection means encrypted from one corner to another. Therefore, users can not see."

IMPLEMENTATION MANAGEMENT

Findings of this study show that the implementation roll out strategy of 1GFMAS for cloud accounting services is done simultaneously nationwide. Simultaneous implementation could contribute to risks related to performance control such as bottleneck issues especially when many users trying to access to similar data at the same time (Armbrust et al. 2010). Bottleneck issues may lead to failure to pay suppliers on time. According to Deputy Director of Applications, Accrual Accounting Implementation Team more than four thousands divisions use the 1GFMAS system and the number does not include users, "... now more than 4 thousand divisions will use this 1GFMAS and it does not include users in each division …" In order to overcome such issues, legacy system was used in parallel to the implementation of 1GFMAS. This is confirmed by Deputy Director of Applications, "The infrastructure in the 36 Accounting Offices will not be disturbed until the 1GFMAS system stabilizes".

In addition, migration of data from various legacy systems to new cloud accounting system; 1GFMAS could contribute to risks related to accuracy and validity of the financial statements produced for the Federal Government of Malaysia. According to Senior Principal Assistant Director, a detailed and thorough study is carried out

TABLE 1. Summary of Findings

	Challenges	Overcoming Challenges
System Specification	System Integration – various systems with different platform	Data dictionary, standardized coding
	Security and Privacy	Use private cloud
Implementation Management	Implementation strategy – short implementation period, simultaneous implementation	Parallel implementation
	Data management – data transition from different system platform to cloud based	Third party verification

prior to the data transfer process. We need to differentiate the data for each division and data from the accounting office. Principal Assistant Director of the Application, Accreditation Accounting Executing Team states, "... This migration is a big task, where we have to make sure all data is transferred so that a complete and correct financial statement can be issued... the transfer of the amount of data the asset is complicated and is a big task... because there are too many assets and... we find many divisions do not record their assets. These need to be updated ... it's challenges in data transfer"

In order to overcome such challenges, third party team was appointed to verify data transfer. The team comprised of three auditors from the ministry, auditor and consultant. This is acknowledged by Senior Assistant Director, Data Management and Assets Unit, Accrual Accounting Implementation Team, "...I think if all parties working together in the audit including the National audit, the PWC and the Department of Accountants of the State itself together, the risk can be reduced."

Table 1 provides summary of the challenges and how to overcome them in the implementation of cloud accounting is divided into system specifications and performance management. The main challenge facing the specification cloud accounting system is the lack of integration of the system (different platforms different legacy systems), legal procedures and administration, information technology (small size of network, minimal hardware capabilities and old software version), security and privacy.

IMPLICATIONS AND CONCLUSION

In short, the challenges inherent in the implementation of cloud accounting are concerned with system specification and implementation management. Challenges in system specification include system integration, security and privacy. In order to overcome such challenges, data dictionary, standardized cording and private cloud are implemented. On the other hand, challenges in implementation management include implementation strategy and migration of data management. These challenges are overcome by parallel implementation and third party verification.

Theoretically, the findings of this study improve the framework of Aman and Kasimin (2011) Using this framework, the challenges faced in the implementation of cloud accounting particularly in public sector can be better understood by classifying those challenges from the perspective of system implementation. The study extends literatures in accounting information system especially on technology enablement in public sector with the use of cloud accounting. The use of cloud accounting can raise the level of accountability and transparency in the preparation of financial statements in public sector (Setter 1996).

Practically, this study provides a better understanding on the implementation of cloud accounting in the public sector. For example, in order to ensure the success of cloud accounting in the public sector, high-capacity information technology infrastructure must be developed. Security and privacy can be achieved through private cloud and copyright to the software and network.

This study is limited to system specification and implementation management of cloud accounting in public sector. Future studies may look into details aspect of human and environmental issues that might influences the implementation of cloud accounting in public sector.

ACKNOWLEDGEMENT

This study was supported by UKM Research Grant Scheme (GUP-2017-48).

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