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IT adoption by internal auditors in public sector: A conceptual study

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Abstract

This study is initiated by the interest in understanding Information Technology (IT) adoption by government internal auditors. With the tremendous development of IT in public sectors such as e-government that has been developed to support National IT and transformation agenda, the auditors also are expected to equip not only with the knowledge of IT but also with the tools required to work with this situation. The objectives of this study are to investigate the current IT adoption among internal auditors and to identify the factors that influence IT adoption or non-adoption. This study is expected to discover the current IT adoption practices by government internal auditors. The items for the factor that influence the usage or non-usage of IT in performing the audit tasks also will be catalogued and it will then help to design the model of IT adoption and to guide the future study in exploring IT adoption by internal auditors in public sector.

Keywords: Internal auditors; IT adoption; public sector; computerised auditing

1. Introduction

Nowadays, many government applications have been computerised. For example, many e-government applications such as e-services, e-procurement, Generic Office Environment (GOE), Human Resources Management Information System (HRMIS), Project Monitoring System (PMS), Electronic Labour Exchange

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(ELX) and e-syariah have been successfully implemented in Malaysian public sectors including federal ministries, federal departments and statutory bodies, state department and statutory bodies and local government authorities. Furthermore, most of the federal government agencies are using Government Financial and Management Accounting System (GFMAS) while all of the state governments are using the Financial Statement System for the State Government (SPEKS) for the preparation of their financial statement (The Auditor General of Malaysia, 2012). These showed that all of the government data including financial and accounting data are stored electronically. As more of the data that need to be audited has become computerised and paperless, the focus of the audit also should change to computerised detection with the usage of the appropriate IT tools.

The Auditor General of Malaysia (2012) mentioned in his speech, "Another food for thought in public sector auditing is how it can play a role in fighting corruption which is an important government agenda under the Government Transformation Programme (GTP). Under the NKRA for Corruption, government procurement has been identified as a key area to be focused for improvements."

The initiative to establish an internal audit unit (IAU) itself is considered to be one of the actions to prevent fraud and corruption. However, the effectiveness and the efficiency of the IAU will depend on the tools that they used. According to Olasanmi (2013) Computer Assisted Auditing Tools and Techniques (CAATTs) have played a major role in fraud detection. National Audit Department of Malaysia (NAD) stated that they are using CAATTs extensively as the analysis tool which enables the auditors to evaluate thousands or even millions of transactions and to identify anomalies (The Auditor General of Malaysia, 2012).

Various factors influencing the use of IT have been studies by previous researchers. For example, Ahmi and Kent (2013) focused on the use of generalised audit software (GAS) by small and medium sizes audit firms. Study by Rosli, Yeow and Siew (2012) aimed to develop a new paradigm that contributes a comprehensive context of individual, technological, organisational and environmental to examine CAATTs adoption in public accounting firms. Mahzan and Lymer (2008) studied the adoption of CAATTs by internal auditors in the UK. Wehner and Jessup (2005) and Debreceny, Lee, Neo and Toh (2005) studied the factors affecting GAS usage on both internal auditors and external auditors. However, there is no latest research has been found studying in the use of IT among internal auditors in the public sector which will be the focus of this study.

As of today, only one research conducted by Mahzan and Verankutty (2011) found to be studied on IT audit activities of public sector auditors in Malaysia. However, their focus was limited to the IT audit activities rather than the specific model of IT adoption. This study however will specifically focus on designing the model of IT adoption among government internal auditors which is so far; to our knowledge the study of this area is limited. Among the studies mentioned above, only Ahmi and Kent (2013) focused on both adopters and non-adopters of IT while the remainder of the studies were only focused on the adopters of IT.

Therefore, the objectives of this study is to investigate the current IT adoption among internal auditors in public sector, to identify the factors that influence IT adoption for both groups of adopters and non-adopters of IT and to develop a conceptual model of IT adoption among internal auditors in the public sector. This paper only focuses on a conceptual model which will lead to the upcoming study in exploring IT adoption by internal auditors in public sector.

This paper is organised as follows: Section 2 covers the literature review which include the background of the internal audit practices, the importance of IT for auditors, IT implementation by auditors and the available framework of IT adoption. Section 3 discusses the conceptual model and presents the hypotheses. Section 4 highlights the research method that going to be conducted. Finally, the last section provides a brief conclusion and opportunity for future research.

2. Literature review

The objective of the internal audit is to undertake independent, regular and systematic review of the system of internal control so as to provide reasonable assurance that such a system continues to operate satisfactorily and effectively (Abdul Aziz, Amirah & Syed Ahmad, 2010). In the public sector organisations, the internal audit function holds high potential for promoting accountability and improving government performance (Md Ali et al., 2008). In Malaysia, the requirement to established internal audit in the public sector has been documented in

Treasury Circular No. 2, 1979 (Perbendaharaan Malaysia, 1979) under the title of the Implementation of Internal Auditing in Federal Government Agencies. This circular was then being replaced in October 2004 with Circular No. 9: Implementation of Internal Auditing in Federal Ministries and Departments and State Governments (Perbendaharaan Malaysia, 2004).

The importance of having the Internal Audit Unit (IAU) in the public sector is to provide assurance and advisory services objectively to add value and improve an organisations operation. The objective of the IAU is to help the organisation achieve its objectives through a systematic, disciplined approach to evaluate and determine the effectiveness of control and governance processes (Perbendaharaan Malaysia, 2004).

The IAU is responsible for conducting audits of financial management and performance audits. The financial management audit includes examination of financial systems, internal controls and financial records to determine whether expenses, revenues, assets and stores have been handled in accordance with the laws, regulations and instructions. While performance audit includes assessing the activities of an organisation to define its goals have been achieved and the resources used in a prudent, efficient and effective (Perbendaharaan Malaysia, 2004).

As stated in Perbendaharaan Malaysia (2004), the terms of reference of the IAU are to:
a. study the reliability and effectiveness of financial and internal controls;
b. review the level of compliance with policies, laws, regulations and directives;
c. review the organisation's activities are managed in a prudent, efficient and effective;
d. review the organisations assets and interests are safeguarded against loss, fraud and abuse;
e. give advice or opinion on internal control systems, including ICT;
f. operate audit function in the Statutory Bodies under the auspices of the Ministry without the supervision of the Internal Audit Unit in accordance with the requirements of General Circular No. 3 of 1998;
g. report to the Chief Executive of the audit findings and follow-up on issues raised;
h. prepare the Annual Plan and Annual Report for the approval of the Chief Audit Executive, and
i. present the Audit Report on the Financial Management Committee and Accounts.

2.1. Importance of IT for auditors

Governments are investing large amounts of money on IT due the magnificent benefits that IT can bring to their operations and services. Most of the users rely on IT to make decisions without exactly know how the computers work. In order to reduce all the risks that associated with the use of computers, auditors have to take advance steps to make sure that the data that have been produced to the decision maker are reliable.

One of the methods that they need to implement is by having the relevant tools that are also related to IT within their audit. CAATTs have been introduced a long time ago to help auditors to detect for example some irregularities or misstatement in the financial report.

CAATTs can help auditors to do numerous audit tasks that are related to IT. Braun and Davis (2003) define CAATTs as any use of IT in assisting the audit. Rafeq (2004) defines CAATTs as the software tools for auditors to access, analyse and interpret data and to draw an opinion for an audit objective. CAATTs are used as part of audit procedures to process data of audit significance contained in the client's information systems (Singleton, 2006). CAATTs also permit auditors to increase productivity, as well as that of the audit function (Zhao, Yen & Chang, 2004). Examples of CAATTs include generalised audit software (GAS), utility software, test data, parallel simulation, integrated test facility and embedded audit modules.

Janvrin, Bierstaker and Lowe (2009) have identified nine different functions or techniques of CAATTs as follows:
a. Evaluate fraud risks
b. Identify journal entries and other adjustments to be tested
c. Check accuracy of electronic files
d. Re-perform procedures (i.e., aging of accounts receivable, etc.)
e. Select sample transactions from key electronic files

    f.   Sort transactions with specific characteristics
    g.   Test an entire population instead of a sample
    h.   Obtain evidence about control effectiveness
    i.   Evaluate inventory existence and completeness

The importance of IT for auditors cannot be negated anymore especially in the current information age. Like it or not, IT is a must for auditors to perform within the current computerised environment.

2.2. IT adoption by auditors

As discussed in the previous section, there are few studies that have been conducted to understand the IT implementation especially in CAATTs area by auditors. The latest study conducted by Ahmi and Kent (2013) found that there are two groups of factors that may increase the likelihood that auditors will use GAS and the factors that auditors might choose not to adopt GAS. They found out that there are nine factors that influence the use of GAS among those auditors that adopt GAS while there are five other factors that influence the auditors not to use GAS. Those factors are represented in Fig. 1 below:
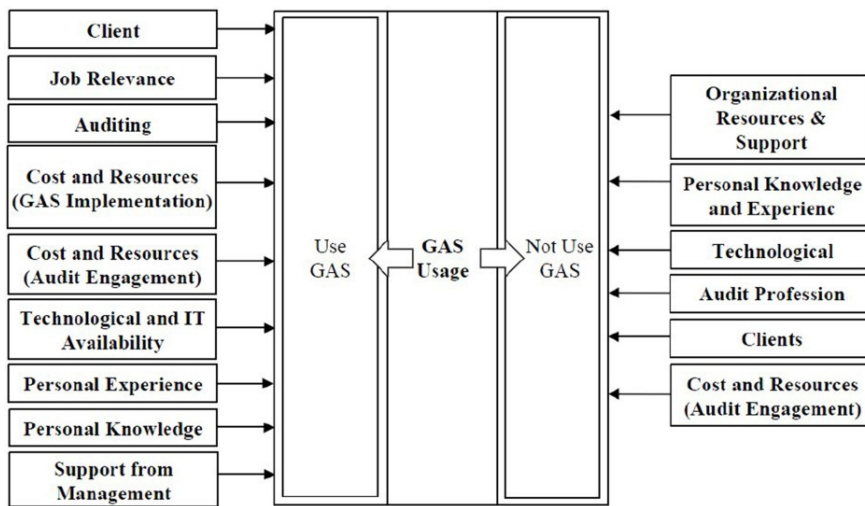

Fig. 1. Research Model on GAS Utilisation.
(Source: Ahmi & Kent, 2013)

Janvrin et al. (2009a) studied the extent to which computer-related audit procedures are used and whether two factors – control risk assessment and audit firm size – influence the use of computer-related audit procedures. Janvrin et al. (2009b) found that performance expectancy and organisational and technical infrastructure support influences the likelihood that auditors will use CAATTs. They also suggest that to increase CAATT usage, audit firm management may want to develop training programs and enhance their computer technical support to increase the auditor's degree of ease associated with using CAATTs.

Mahzan and Lymer (2008) studied IT adoption, particularly of CAATTs among internal auditors, based on the Unified Theory of Acceptance and Use of Technology (UTAUT). They proposed a model of successful CAATT adoption by internal auditors, comprised of four dimensions covering the issues of factors influencing motivation, best practices of implementation, performance measurement criteria and challenges that can become barriers to successful implementation. They found that GAS is widely used by internal auditors in the UK and the factors that influence the usage of GAS include the ability to train employees on the usage of GAS, compatibility of the software within the department and the ability of software to meet the data manipulation needs.

2.3. IT adoption framework

There are many available theories used in studying IT adoption. For example, technology acceptance model (TAM) by Davis (1989); the Technological-Organisational-Environmental (TOE) framework by Tornatzky and Fleischer (1990), the theory of planned behaviour (TPB) by Ajzen (1991), the diffusion of innovation (DOI) theory by Rogers (1995), and the unified theory of acceptance and use of technology (UTAUT) by Venkatesh, Morris, Davis and Davis (2003). Among those theories, the TOE framework has been widely used and endorsed in several studies with various technology innovations and diverse contexts to explain technology adoption assessments (Srivastava & Teo, 2007; Guo, Huang, Zhang & Chen, 2010; Pudjianto, Zo, Ciganek, & Rho, 2011; Troshani, Jerram & Rao, 2011).

Based on the solid theoretical foundation and the consistent empirical support presented in previous studies, this study will explore the applicability of the TOE framework in investigating the IT adoption scenario in the Malaysian public sector, especially by government internal auditors. Tornatzky and Fleischer (1990) developed the TOE framework to describe the organisational components that affect a firm's adoption decision. The framework identifies three factors; technological, organisational and environmental. Technology describes the existing and new technologies relevant to the firm, organisational factors refer to the available resources within the firm and environmental describes the industry features where a firm is conducting business (David, Agboh & Radhakrishnan, 2010).

There are a few studies that implemented the TOE framework in order to understand the IT adoption factors especially in the government sector. For example, Srivastava and Teo (2007) used it in cross-country study that analyses the development of e-government at the national level. They indicated that the TOE framework served as a useful theoretical framework for understanding the adoption and performance of technological innovations and IS in a government organisational context.

Guo et al. (2010) proposed a conceptual model based on the TOE framework for examining the adoption of open source software in the governmental organisational context. They found that the TOE model was valid and provide potentially helpful insights for future practice. Pudjianto et al. (2011) examined factors for e-government assimilation in Indonesia and employed the TOE framework to develop a theoretical model to explain e-government assimilation. Their results showed that ICT infrastructure has the strongest significant relationship with e-government assimilation. Top management support, regulatory environment, ICT expertise, and competitive environment are also significant factors to explain e-government assimilation in Indonesia.

Troshani et al. (2011) also employed the TOE framework as an analytical tool to confirm the adoption of Human Resources Information Systems (HRIS) in the public sector. Among the items that have been used within the technology context to test on HRIS adoption were better integration, accessibility, operational efficiency, adoption costs and inherent HRIS complexity. In an organisational context, factors such as management commitment and human capability have been identified while in an environmental context, factors such as regulatory compliance and successful adoption stories are among the items that have a significant impact on HRIS adoption success.

3. Conceptual framework

A research framework based on the technology-organisation-environment (TOE) frameworks will be used to guide the research effort. TOE framework is a general theory of technology diffusion and therefore is an appropriate theoretical groundwork for studying the adoption of IS innovation (Venkatesh & Bala, 2012). The TOE framework also has a solid theoretical basis, consistent empirical support, and the potential of application to IS innovation domains, though specific factors identified within the three contexts may vary across different studies (Oliveira & Martins, 2011). The model as shows in Fig. 2 will be used as a start up in order to develop the hypothesis and then will be modified to align with scope of this research.

3.1 Technology factors

Technological context describes both the internal and external technologies relevant to the IAU. In order to adopt an IT, the internal audit department would have to consider the availability of technology that currently exist as well as the characteristic of technology that probably going to be adopted.

Hussain (2010) has identified one of the factors that influencing the use of technology in accounting practices are the availability of technology itself. However, later he found that the availability of technology was actually just a choice, but the need of technology itself was the reason to implement the particular software. In this case, the availability of audit software or other related audit technologies need to be investigated in order to understand the IT adoption scenario among the internal auditors. Ahmi and Kent (2013) stated that technological availability could also include both human resources and IT infrastructure. Human resources could also refer to the availability of expert staff who is later needs to operate the technology. Venkatesh and Bala (2012) however referred the availability of technology as a readiness of technology. Others might perceive the availability of technology as the availability of financial funds that organisation is ready financially to pay for the technology cost (Rosli et al., 2012). Implementation of new systems definitely requires investments in software, hardware, network and personnel (David et al., 2010). Therefore, this research posits that:

H_1: *Availability of technology will affect the internal audit department to adopt IT*
H_{1a}: *Availability of audit experts in technology will affect the internal audit department to adopt IT*
H_{1b}: *Availability of IT infrastructure will affect the internal audit department to adopt IT*
H_{1c}: *The readiness of technology will affect the internal audit department to adopt IT*
H_{1d}: *Availability of the budget to adopt IT will affect the internal audit department to adopt IT*

According to Mahzan and Lymer (2009), the selection criteria of CAATTs are the features, ease of use, cost, compatibility with organisation system and its flexibility. Those are among the characteristics of audit technologies that must be considered in IT adoption among internal auditors. Therefore, it is anticipated that:

H_2: *Characteristics of technology will affect internal audit department's decision to adopt IT*
H_{2a}: *Features of technology will affect internal audit department's decision to adopt IT*
H_{2b}: *Ease of use of technology will affect internal audit department's decision to adopt IT*
H_{2c}: *Cost of technology will affect internal audit department's decision to adopt IT*
H_{2d}: *Compatibility of technology will affect internal audit department's decision to adopt IT*
H_{2e}: *Flexibility of technology will affect internal audit department's decision to adopt IT*

3.2 Organisational factors

The organisational context such as scope, size, and managerial structure represents the internal factors to an organisation influencing an innovation adoption and implementation (Tornatsky & Fleischer, 1990). However, organisational factors that are more cited in the literature include organisational support (Ahmi & Kent, 2013; Rosli et al., 2012) and organisational sizes (Ahmi & Kent, 2013; Janvrin et al., 2008).

According to Rosli et al. (2012) top management can facilitates the communication and coordination that is necessary for the planning and adoption of technology among the employees. Curtis and Payne (2008) found that if audit firm's management encourage the use of new technology, the auditors would have a tendency to use the audit technology. Instead of just encouragement from the organisation, their support is also important to accomplish the success of IT adoption. Thus, this study posits that:

H_3: *Organisational support will affect the internal audit department to adopt IT*

Usually, larger organisations sized are more likely to adopt an IT than small sized organisations (Ahmi & Kent, 2013; Janvrin et al., 2008; Tornatzky & Fleischer, 1990). Larger organisation may have more capital and human resources to ensure that technology can be well adopted (Rosli et al., 2012). Hence, it is posited that:

H_4: *Organisational sizes will affect internal audit department's decision to adopt IT*

3.3 Environmental factors

Environmental context refers to the part in which a firm conducts its business including its industry, competitors, and dealings with the government (Tornatzky & Fleischer 1990). One of the main subjects of auditor is the auditee or client. Client's system must be audited to ensure that business transactions are correctly processed and reports are accurately generated (Rosli et al. (2012). Rosli et al. (2012) then added that the higher complexity of client's system, the more necessary for audit firm to adopt IT. Hence, it is hypothesised that:

H₅: Client's characteristics will affect internal audit department's decision to adopt IT

Most of the government transactions and activities are most of the time relying on the government's regulations, policies and guidelines. As the establishment of the IAU in public sector was governed through Treasury Circular, thus it can be posited that:

H₆: Government regulation will affect internal audit department's decision to adopt IT
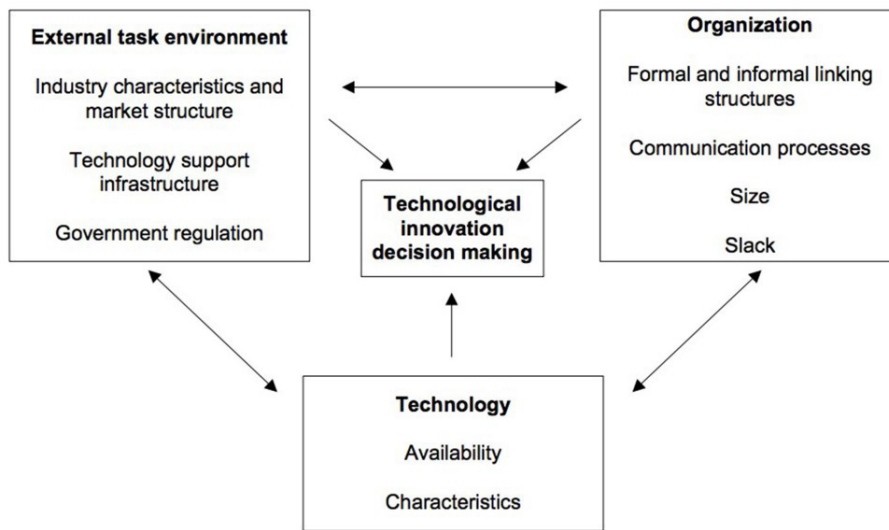

Fig. 2. TOE framework.
(Source: Tornatzky & Fleischer, 1990)

4. Research method

There are three levels of government in the Malaysian public sector: Federal, state and local government. Federal government consists of ministries, departments and statutory bodies. There are a total of 13 states in Malaysia, which consist of state government departments and statutory bodies. While local governments include city hall, city council, town council and district council that are governed under the state governments. Currently, there are 471 agencies or organisations in the Malaysian public sector. All agencies under the federal government level have established the IAU. However, there are a number of state statutory bodies and local governments that are yet to establish the IAU. The details are shown in Table 1.

All of the internal auditors in the above organisations will be the respondents of this study. The unit of the analysis will include the internal auditors as well as the government organisations itself. The details methods that will be applied in this study include:

a. A few interview sessions will be conducted among internal auditors in Malaysian public sectors. They will be chosen based on the type and size of the organisation that have IAU function. The purpose of this

interview is to investigate the current practice of IT adoption among them. This study will focus on the particular IT tools, which have been specifically designed for audit purposes.

b. Pilot study will then be conducted in order to confirm the factors that influence the adoption or non-adoption of IT among government internal auditors. Initial questionnaire will be designed and distributed to selected internal auditors and academicians to be piloted.

c. Based on the findings from the interviews and the results from the pilot study, a preliminary framework will be designed.

d. To evaluate the IT adoption model, a questionnaire will be enhanced and administered to all of the internal auditors in Malaysian public sectors.

Table 1. The total number of organisations in Malaysian public sector and the number of organisations that have internal audit unit.

Type of Public Sector		No. of Organisations	No. of Organisations that have IAU
Federal:	Ministry	23	23
	Department	8	8
	Statutory Body	123	123
State:	State Government	13	13
	Statutory Body	157	93
	Local Government	147	98
TOTAL		471	358

5. Conclusion

This paper proposed a conceptual model of IT adoption by internal auditors from three aspects: technological, organisational and environmental perspectives in which TOE framework has been adapted as a fundamental concept. The model will be used as a guide to conduct further investigation to obtains a better understanding on the issues of the IT adoption among internal auditors in the Malaysian public sector. This paper also highlights the importance of IT to auditors, especially in achieving audit effectiveness and efficiency. Indirectly it will enhance audit productivity that gives ultimate impact to the economy.

Acknowledgements

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