

Technological, Organisational and Environmental Aspects of Audit Technology Acceptance

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Abstract

The purpose of this paper is to use the Technology, Organisation and Environment (TOE) framework to understand the audit technology adoption in audit firms. Previous studies have only looked from the viewpoint of individual auditors and do not use a framework in which to understand the audit technology adoption. The audit technology differs from other information technology adoption because audit tools change the way in which auditors carry their tasks. One of the major contributions in this study is to use the TOE framework to analyse the factors in organisation adoption. Data of this study were gathered through questionnaire surveys that were self-administered to 1,367 audit firms registered in the Malaysian Institute of Accountants directory. Our findings indicate that although firms generally acknowledge that there are advantages of audit technology implementation and the benefits outweigh the costs, the firms also recognise that their organisations are only somewhat ready to adopt and their staff's competency are only at a moderate level to be able to use the audit technology. Our survey also indicates that the role played by professional body support is important to increase its adoption.

Keywords: accounting information systems, audit, IT audit, audit technology utilisation, audit firms, technology acceptance, technology-organisation-environment framework, theoretical framework

1. Introduction

Professional audit service provided by public accounting firms is vital to most businesses in providing assurance that businesses' financial reports are true and fair (Ismail, 2009). Auditors have to gather and evaluate audit evidence to examine whether their business clients have managed business transactions properly. In the growth of information technology (IT), businesses progressively adopt accounting information systems (AIS) to manage their business processes. Evidently, it is imperative that audit firms to be able to also audit AIS and use audit technology as a support tool to audit their clients' businesses.

Audit technology is an IT application in auditing that signifies the use of any computer-assisted audit tool to improve auditor's capacity in performing an audit (Elliott & Jacobson, 1987). It ranges from a simple audit automation using spreadsheet application to an advanced practice of audit software with databases and business intelligence applications (Braun & Davis, 2003; Rosli, Yeow, & Siew, 2013). By embracing audit technology in auditing, it allows organisations to perform audit tasks effectively and efficiently (Braun & Davis, 2003).

Many previous literatures studied the implementation of technology in audit profession, focusing on internal auditing job where the technology was used by internal auditors in private companies and public organisations (Huang, Hung, & Tsao, 2008; Mahzan & Lymer, 2009; Kim, Mannino, & Nieschwietz, 2009; Moorthy et al., 2011; Ramamoorthi & Weindenmeer, 2004; Mahzan et al., 2009). Despite the wide usage of audit technology in internal auditing (Mahzan and Lymer, 2009) and the importance of audit technology (Ismail, 2009), such utilisation is not extensive among public accounting firms specifically in performing external audit of their business clients (Curtis & Payne, 2008). Furthermore, previous study examines the adoption of audit technology through the perspective of individual auditors (Janvrin, Bierstaker, & Lowe 2008).

Hence, this paper's objective is to examine the extent of audit technology adoption in public accounting firms

that provide audit services. Using the technological, organisational and environmental (TOE) lens, this study also examines the factors influencing organisations' decisions to adopt audit technology.

The remainder of this paper consists of five sections and organised as follows. The subsequent section discusses previous literature and research framework on audit technology adoption. Then, the paper presents the approach and methodology used for data collection. This is followed by the results and discussions of the findings. Conclusion and suggestions are then presented in section four. Finally, the paper provides a brief limitation and opportunity for future research.

2. Literature Review

As auditing is regulated by standards and requirement of the law, the external and internal audit works are burdened with lots of audit investigation and have to deal with huge amount of business data that need to be audited. Both external and internal auditing have to perform test of controls and substantive test to gather evidence about management's assertions of financial statement and to respond to their respective corresponding entity that they are accountable to. The external auditors represent external interested parties or stakeholders, whereas the internal auditors represent the interest of the internal management of an organisation.

In addition, audit work and sufficient audit documentation must be prepared within the stipulated time. The International Standards on Auditing (ISA) 230 requires all audit documentation to be timely prepared as to increase the quality of audit work. Timely audit documentation is also to ensure effective assessment has been made to the gathered audit evidence and conclusion of the audit review has reached before the auditor's report is completed (IFAC, 2008). It is stated in the ISA 230 that timely audit documentation is important in which *"documentation that is prepared after the audit work has been performed is likely to be less accurate than documentation prepared at the time such work is performed"*. Auditing is also pressured with the requirement to avoid audit lag (Afify, 2009). If the number of audit days increases, then the quality of financial reporting would be jeopardised because organisation cannot provide timely information to their investors (Mohamad-Nor, Shafie and Wan-Hussin, 2010). Therefore, external audit work must be performed quickly, efficiently and effectively.

Although, the importance of audit technology is widely accepted by the professional accounting bodies and audit firms, in practise the audit technology implementation is not widespread among public accounting firms (Curtis & Payne, 2008). In Malaysia, despite high AIS usage among businesses (Ismail, 2009), the investment and acceptance of audit technology is still minimal among audit firms (Mahzan & Veerankutty, 2011). Only 21% of audit firms use audit technology despite them highly acknowledging the benefits of audit technology (Ismail and Abidin, 2009).

Review from literature has found that gap exist as most preceding studies explored audit technology acceptance in internal audit setting, focusing the viewpoint of individual internal auditors in organisations (Huang, Hung, & Tsao, 2008; Mahzan & Lymer, 2009; Mahzan & Veerankutty, 2011). Although these studies have delivered rich understanding on the causes that determine audit technology acceptance, the contributing factors were primarily deliberated from individual auditor's point of view.

TOE framework is the primary used theory in investigating technology adoption in organisation (Venkatesh and Bala, 2012; Zhu, Kraemer and Xu, 2003). TOE framework (Tornatzky and Fleischer, 1990), suggests that three components namely technological context, organisational context and environmental context influence the adoption process of a technological innovation. This study supports the technological components of TOE with technology characteristics of Diffusion of Innovation (DOI) theory (Rogers, 2003) and uses Institutional Theory to explain the environmental components' impacts on audit technology adoption.

This study demonstrates the influence of (1) technological factors (relative advantage, compatibility, complexity, trialability and cost-benefit of audit technology), (2) organisational factors (firm's top management support, IT competency of firm's employees and firm's readiness), and (3) environmental factors (complexity of client's accounting systems, professional accounting bodies supports and competitive pressure) on audit technology adoption.

Audit technology adoption in the context of this study is defined as any computer-assisted audit application tool used by audit firms in performing audit tasks. Adoption of technology is regularly used by previous studies to study user's acceptance of technology innovation (Venkatesh & Bala, 2012; Zhu & Kraemer, 2005; Zhu, Kraemer, & Xu, 2003).

3. Method

3.1 Participant and Data Collection

Study data were gathered through questionnaire surveys that were self-administered to managing partners, partners, audit managers and audit seniors in 1,367 audit firms in Malaysia. The audit firms were taken from The Malaysian Institute of Accountants (MIA) Member Firms Directory website. The MIA listing is used as the population frame because MIA is established under the Accountant Act 1967 to regulate the accounting profession in Malaysia. 168 responses were returned and only 166 questionnaires were usable for analysis (response rate of 13.10%). We attempted to follow up non-responses twice during our three month data collection. The questionnaire items were adapted from previous validated survey instrument. A seven-point scale ranges from 1-point (strongly disagree) to 7-point (strongly agree) was used in the questionnaire. The dependent variable of audit technology adoption was gathered based on the percentage of audit work performed using the audit technology. The percentage is a strong measure to assess the degree of usage and utilisation of a technology (Venkatesh & Bala, 2012). This study followed the same percentage measures by Venkatesh and Bala (2012) where the percentage was collected in seven groups i.e. 0% (none); 1%-15%; 16%-30%; 31%-45%; 46%- 60%; 61%-75% and 76%- 100%.

Table 1. Operational definition of independent variables

Variables	Operational Definition	Source
Technology Relative Advantage	The perceived advantages that an audit firm would acquire from audit technology adoption.	Rogers (2003)
Technology Compatibility	The degree to which audit technology fits with audit requirements and tasks to be completed.	Rogers (2003)
Technology Complexity	The degree to which audit technology is perceived as relatively difficult to understand and use.	Rogers (2003)
Technology Trialability	The degree to which audit technology may be tried out and experimented before adoption.	Rogers (2003)
Technology Cost Benefit	The degree of which the benefits of audit technology outweigh the cost of audit technology adoption.	Rogers (2003)
Top Management Support	The level of support given by firm's top management to audit technology adoption.	Bradford and Florin (2003)
Organisation Readiness	The level of available financial and technological resources in audit firm for adopting audit technology.	Venkatesh and Bala (2012)
Employees' Competency	The degree of IT competency owned by personnel in audit firm.	Tornatzky and Fleischer (1990)
Complexity of Client's AIS	The level of client's AIS complexity, difficulty and volume of transactions processed by client's AIS.	Janvrin <i>et al.</i> (2008)
Competitive Pressure	The degree of competitive pressure in audit firms' business environment.	Zhu <i>et al.</i> (2003)
Professional Accounting Bodies Support	The degree to which the standards, guidance and support given by professional accounting bodies encourages audit firms to adopt audit technology.	Swan and Newell (1995)

3.2 Statistical Analysis

The study uses descriptive statistics to analyse the data. The descriptive statistics allows factors to be easily understood and interpreted.

4. Results

4.1 Organisation Profile and Degree of Audit Adoption

Demographic analysis shows that 6.0% of the respondents were from Big-4 firms followed by 27.1% from medium-sized audit firms and 66.9% were small-sized firms. All of the participated firms provided financial auditing service (100%), IT auditing (18.7%), internal auditing (29.5%), taxation (89.8%), business advisory (45.2%) and financial advisory (54.2%). Descriptive analysis on audit technology adoption depicts that a high proportion of respondents used less advanced audit technologies in carrying out audit works. As depicted in Figure 1, 98.2% of respondents used Spreadsheets followed by Audit Automation Software (66.5%).

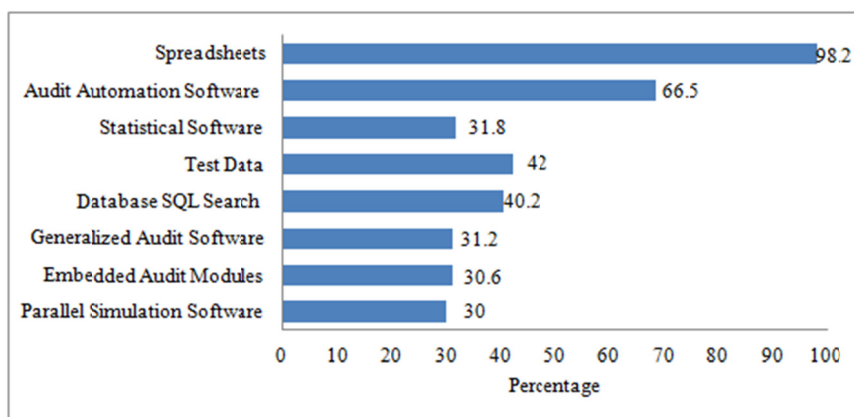


Figure 1. Degree of audit technology adoption

Table 2. Audit technologies utilisation

Audit technology	Percentage of audit work accomplished using audit technology					
	1-15%	16-30%	31-45%	46-60%	61-75%	76-100%
	%	%	%	%	%	%
Spreadsheets	1.2	0.0	3.0	1.8	18.7	73.5
Audit Automation Software	6.6	1.2	4.2	11.4	12.0	31.1
Statistical Software	6.0	2.4	4.8	7.2	3.6	7.8
Test Data	9.0	4.2	7.8	7.8	7.2	6.0
Database SQL Search	8.4	5.4	7.8	6.0	4.8	7.8
Generalized Audit Software	4.2	3.0	4.8	3.0	9.0	7.2
Embedded Audit Modules	4.8	3.0	8.4	6.0	4.2	4.2
Parallel Simulation Software	4.2	3.0	6.0	6.0	7.8	3.0

4.2 Technological Aspect

The survey results show that the respondents believed that audit technology provides advantages to the firm (average mean for relative advantage of 5.23). To adopt the audit technology, the respondents placed importance on whether the benefits outweigh the costs (average mean for cost-benefit of 4.76) and how well the audit technology fits into their current work practices and procedures (average mean for compatibility of 4.54).

The respondents felt that audit technology is not very complex and is easy to understand and use (average mean for perceived complexity of audit technology of 3.66). Thus, this may explain why the respondents remain neutral on the importance of using the audit technology on a trial basis (average mean for trialability of 4.03).

4.3 Organisational Aspect

The respondents believed that that management support for promoting audit technology such as providing financial resources, training and IT facilities is an important factor in audit technology adoption (average mean for top management support of 4.51). The respondents also felt that their current organisation's employees are only slightly competent to operate the audit technology (average mean for employees' competency of 4.51). Likewise, the survey indicates that the respondents somewhat agreed that their organisation is ready to adopt the new audit technology (average mean for organisational readiness of 4.35).

4.4 Environmental Aspect

We found that professional accounting bodies support to be the highest score in the environmental aspect (average mean of 4.55). However, client's AIS complexity (average mean of 4.10) and competitive pressure (4.09) were ranked as somewhat neutral in influencing the firms to adopt audit technology.

5. Discussion

This study identified the extent of audit technology adoption among public audit firms in Malaysia. We found that the adoption of audit technology among audit firms was concentrated on the less advanced audit applications. Most of audit firms utilised spreadsheet application and electronic working papers to audit their clients' financial

reporting systems. This could be due to the number of small and medium sized audit firms that are a feature of the Malaysian context (Ismail and Abidin, 2009).

Previous study did not look at adoption of audit technology from an organisation perspective. Using the TOE framework, we also identified factors that lead the adoption of audit technology from the view of an audit firm. In the technological aspect, audit firms admitted the benefits of audit technology to help them perform audit tasks efficiently and agreed that the benefits from the audit technology outweigh the initial investment and maintenance costs that they have to bear. They also perceived that their firms' practices and procedures are compatible with the requirements of the audit technology. They also perceived that audit technology is not a complex application and could be learned without much difficulty. Thus, the firms did not see trialability of audit technology as important.

From the organisational aspect, the IT competencies of audit firms' employees and support from the firms' top management were at moderate level. They felt that the organisations were somewhat ready for audit technology adoption.

Lastly in the environmental aspect, the audit firms felt that professional body support was important. Due to the number of small and medium sized firms in the survey, both client's AIS complexity and competitive pressure factors were rated low in influencing audit technology adoption. It is also found that the firms' clients' AIS were not too complex that require them to use advanced audit tools to perform audit works.

This study suggests that although firms do acknowledge the benefits of audit technologies, firms readiness, top management support, and employee's competency are only found to be moderate level. It is expected that with adequate support, IT facilities and training, the adoption of audit technology could be improved. It is also recommended that awareness on audit technology usage should be imparted in the tertiary education syllabus. By exposing accounting students with essential audit technology skills, it could encourage more new prospect of competent audit practitioners in adopting audit technology. We also found that encouragements among the professional accounting bodies are needed to increase adoption of audit technology.

6. Limitations and Future Research

This study is the first stage of exploring the adoption of audit technology in accounting firms. The data findings are limited to descriptive analysis. More in-depth analyses will be presented in future research to investigate the relationship among the constructs, the effects of firm's size as the moderating variable and to finally validate the model.

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