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Critical factors of accounting information systems (AIS)
effectiveness: a qualitative study of the Malaysian federal
government

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Critical Factors of Accounting Information Systems (AIS) Effectiveness: A Qualitative Study of the Malaysian Federal Government

ABSTRACT

This study presents a qualitative empirical evidence from a combination of the pilot study (using a focus group approach) and semi-structured interviews with accounting personnel at the Accountant General's Department and accounting divisions at the ministry level. This study aims to explore the critical factors of Accounting Information System (AIS) effectiveness and user satisfaction criteria as a measurement for AIS effectiveness in the context of the Federal Government of Malaysia. The discussion during the focus group and the interviews emphasis on the user's needs in order to operate the system effectively, which reflect the critical factors of the system's effectiveness. Additionally, their expectation towards an effective system is discussed in order to investigate the user satisfaction criteria for the measurement of AIS effectiveness. As a result, there are 26 critical factors of AIS effectiveness discovered in this study for the Federal Government of Malaysia, which categorised into three factors that are people, organisation and technology. On the other hand, the measurement of AIS effectiveness based on user satisfaction is classified into three main characteristics, which are perceived easiness of the system, perceived quality and information, and perceived benefit from the system. A framework of the critical factors of AIS effectiveness is proposed in this study.

1.0 Introduction

A huge scale of the government operation in various ranges of industries provides a great opportunity as well as challenges to its stakeholders. The complexity of the government can also be seen in their accounting operation. Furthermore, other factors surrounding the government, such as political influence, technology evolution, economic condition, globalisation and so on, add greater challenges to the accounting in the government sector. Specifically, an increase demand for a high quality of information to support decision making has called for an effective Accounting Information System (AIS) in place (Chalu, 2012). In response to that, both private and public sector organisations have made a massive investment to enhance their AIS (Chalu, 2012), including the Government of Malaysia. However, an enormous investment in AIS does not guarantee its effectiveness. According to Belfo & Trigo (2013), the current technologies are not efficient enough to respond to the concerns and challenges in the accounting domain. As a consequence, fraud and corruption are still happening in current practices. In the context of Malaysian Government, Ilias et al. (2009) discussed in their study about end users' dissatisfaction with a computerised accounting system used within the Government organisations which indicate the ineffectiveness of the system. To date, there are multiple and mixed findings on the determinants of the system effectiveness (Chalu, 2012). The researchers are still struggling to build determinants that have the greatest influence on the AIS effectiveness (Chalu, 2012; de Guinea et al., 2005). Moreover, there is inconsistency in system effectiveness measurement that is caused by the variation in the definition of system effectiveness among studies (Thong and Yap, 1996). Thus, this paper aims to fill these gaps by exploring, (i) the critical factors of AIS effectiveness, and (ii) user satisfaction criteria for an effective AIS.

The scope of this study focuses on the Malaysian Federal Government. The Government is chosen due to several reasons. First, the Government plays a great responsibility in managing public's money for development, citizen and the country. Second, a massive investment in technology made by the Government to improve fiscal management should provide opportunities for the AIS. Third, there are limited studies conducted in the critical factors of AIS effectiveness, especially in the government sector. Thus, this study may shed some light to the present literatures in AIS effectiveness.

2.0 Background of Study

2.1 The Malaysian Federal Government

The Malaysian government is comprised of three tiers, which are federal government, state government and local authority. In addition to that, there are statutory bodies, government agencies and government link companies that are incorporated under particular acts (i.e. Companies Act 1967). This study focuses on the Federal Government of Malaysia, in which consists of 23 ministries and the Prime Minister's Department. Each of the ministries and the Prime Minister's Department has its own accounting division. These divisions were given an authority as a Self-Accounting Department (SAD) by the Accountant General's Department (AGD) to serve the ministry or department. Every SAD (hereinafter referred as accounting office) or also known as accounting office is supported by their responsibility centres located throughout the country. The responsibility centre is responsible for collecting data, record keeping process and reporting to the accounting office. Overall, the accounting operations are managed and monitored by the AGD.

The government effort to continuously support the advancement of technology and improvement of financial management in the public sector can be seen in the Tenth Malaysia Plan (year 2011 – 2015), in which approximately 650 million in Malaysian Ringgit had been estimated by the Government for technology advancement (Jabatan Perdana Menteri, 2010). This advancement, which includes AIS, aims for effectiveness and efficiency of operation as well as minimising task redundancy through integrated and centralised system (Jabatan Perdana Menteri, 2010). On top of that, in 2011, the Malaysian government had announced about moving towards the accrual accounting by 2015. However the transition from cash basis to accrual based accounting was postponed. Through an email conversation between The Edge and the Ministry of Finance, The Edge Malaysia reported that the "implementation of accrual accounting has yet to take place and is scheduled to happen on a date to be determined after the relevant acts are tabled before Parliament" (Lee, 2015, p. 1). In order to realise the transition, the Government is upgrading their accounting system to cater the modules in accrual accounting. The current accounting system, Government Financial and Management Accounting System (GFMAS) is customised for cash basis accounting. GFMAS is used at the AGD and the accounting office of each ministry to retrieve and process accounting transactions and produce valuable information for reporting purposes. Whereas, the input of the accounting data is done at the responsibility centre by using Electronic Budget Control and Planning System (eSPKB) for recording expenses and transactions, and Standard Collection and Receipting System (eTerimaan) for collecting revenue. Moving towards the upgraded system, known as 1 Government Financial and Management Accounting System (1GFMAS), eSPKB and eTerimaan at the responsibility centre will be replaced by 1GFMAS. This enables the transmission from decentralisation with different server to centralisation with one server between the AGD, accounting office and responsibility centre. 1GFMAS which initially planned to be implemented along with the implementation of accrual accounting is also postponed until 2017. Having known the fact that 1GFMAS is developed to cater the transition from cash basis to accrual based accounting, the delayed of 1GFMAS could also affect the implementation of accrual accounting.

2.2 Accounting Information Systems

Prior to 1960, inadequate function of technology has created doubt among the accountant on how secure the information is stored in the system (Pierre et al., 2013). However, as the technology grows, manual accounting system is no longer capable to fulfil the needs of information for decision-making process in this highly competitive technology era (Brecht and Martin, 1996). Thus, almost all of the organisations in the world moved from a manual accounting system to more sophisticated system that equipped with technology in order to cope with the increase in business transaction volume and high demand for useful information. According to Dandago and Rufai (2014), the emergence of information system in accounting process has facilitated the accountant with several

technological tools in order to provide a high quality of information and solve any related matters.

Hence, by taking into account the application of technology, AIS in this study defined as an application of computer and technology in the accounting process (Pierre et al., 2013; Nicolaou, 2000), which include collecting, recording, storing and processing the data to produce information for decision makers (Romney and Steinbart, 2006). The system referred in this study covers three main subsystems as discussed in Hall (2010), which are daily transaction processing system¹, general ledger and financial reporting system² and management reporting system³. These subsystems, process both financial and non-financial transaction in order to produce a good information (Hall, 2010).

Practically, information technology plays an important role in enabling the AIS to provide reliable and relevant information. The information should be produced in a timely manner for the use in the decision-making process (Al-Zwyalif, 2013; Kharuddin et al., 2010). Apart from the importance of AIS in supporting the decision making process (Appiah et al., 2014; Al-Zwyalif, 2013; Pierre et al., 2013; Pornpandejwittaya, 2012; Ramazani and Zanjani, 2012; Tóth, 2012; Halabi et al., 2010; Kharuddin et al., 2010; Sajady et al., 2008), AIS specifically plays an essential role in producing a high quality of information for managing business activities (Dalci and Tanis, 2009), planning, controlling (Kharuddin et al., 2010), monitoring, coordinating and evaluating performance (Sajady et al., 2008). In the context of user, Ilias and Zainudin (2013) stated the importance of AIS in assisting its users to competently completing their tasks. Ali et al. (2012, p. 296) discussed AIS in a broader context as "an important enabler to achieve sustainable competitive edge". Thus, AIS is crucial in supporting the organisation to maintain and engage with their strategic opportunity (Ramazani and Allahyari, 2013). In this globalisation era, the organisation must able to compete rather than just survive. The ability to compete means the ability of organisations to continuously improve their performance (Salehi et al., 2010). In this matter, AIS offers a platform to guide the management team in maximising individual and organisation performance through a better and effective decision. Therefore, the effectiveness of AIS should be set as one of organisational priority and it should not just to be achieved, but also to be maintained. Hence, it is essential to investigate the critical factors that lead to the effectiveness of the system.

3.0 Literature Review

3.1 Factors influencing AIS Effectiveness

AIS operates throughout the flow of accounting information, from the beginning (raw data) until the end process of reporting. In order to be effective, it needs the surrounding components (i.e. people, technology, infrastructure, organisation) to perform effectively.

Empirical studies conducted by prior researchers found a numerous factors that significantly influence the effectiveness of AIS. As AIS is part of the information system, empirical studies on the factors influencing the effectiveness of information system, information technology and ERP are discussed further in this section. On top of that, other related empirical studies such as studies on the factors needed to support the quality of information, implementation and success of system are also reviewed for the reason that the effectiveness is about continuous quality and success. Table 1 shows the summary of recent empirical studies on the factors that significantly influence the systems in various contexts (i.e. effectiveness, implementation and data quality). The factors in Table 1 had been grouped accordingly to the main theme of the factor (i.e. top management commitment and middle management commitment were grouped into commitment).

¹ The system support daily transaction (i.e. documents, reports and communication within the organisations).

² The system operates to generate reports that commonly required by the regulations and standards.

³ The system runs to provide specific reports for internal use such as monthly management report.

Source: (Hall, 2010)

Table 1: Summary of Empirical Studies of the Significant Factors Influencing the Effectiveness of Systems

No.	Criteria	Daoud & Triki (2013)	Al-Hiyari et al. (2013)	Saleh (2013)	Chalu (2012)	Pornpandejwittaya (2012)	Rahayu (2012)	Komala (2012)	Dehghanzade et al. (2011)	Kouser et al. (2011)	Tuzcu and Esatoğlu (2011)	Doom et al. (2010)	Ismail (2009)
	Context of Study >>	Information Quality, System Quality and Reporting	AIS Implementation and Accounting Information	Data Quality in AIS	Effectiveness of AIS	Effectiveness of AIS	AIS Implementation	Accounting Information Quality	Effectiveness of AIS (Human Factors)	Effectiveness of AIS	Information Technology Project	ERP Implementation	Effectiveness of AIS
1	Allocation of resources						√					√	
2	Clear and relevant planning and strategy						√				√	√	
3	Commitment	√	√	√			√	√	√			√	
4	Communication			√								√	
5	Culture											√	
6	Data quality		√				√						
7	Experience								√				
8	External expert	√			√							√	√
9	Individual openness, self oriented and competitive								√				
10	Infrastructure					√							
11	Knowledge							√		√			√
12	Manager participation									√			
13	Organisational or Management support				√	√	√	√				√	
14	Performance review						√						
15	Proper documentation										√		
16	Qualification of personnel				√								
17	System suitability			√									
18	Training						√		√			√	
19	User/Job satisfaction								√				

As to enrich the finding of factors influencing AIS effectiveness, prior studies discussing the potential factors affecting the AIS, information system, information technology, ERP in terms of project, implementation and adoption are also reviewed in this section. Table 2 shows the summary of potential factors reviewed in prior studies.

3.2 Accounting Information System Effectiveness

Definition of AIS effectiveness has been adopted from the definition of information system and management information system effectiveness in various ways depending on the context discussed in the study. Generally, the information system is said to be effective when it is capable to accomplish its objectives (Hamilton and Chervany, 1981), achieve organisational goals (Raymond, 1990) and support decision-making task (Thong and Yap, 1996). The effectiveness of information system has been discussed variously from the perspective of benefit, performance, budget, standards, quality and support to organisation operations and practices. It should be reminded that a successful system might not always be effective. While the effectiveness definition refers to the ability, impact on improvement, achievement and satisfaction, the success definition adopted from the information system field defined by Ajami and Mohammadi-Bertiani (2012) as user acceptance and continued use of the system. Appropriate management and use of successful system will lead to system effectiveness.

In AIS, the definition of system effectiveness has been studied and discussed in specific context. Sajady et al. (2008) viewed the effectiveness of AIS as when its benefit is higher than its cost. The benefit refers to the impact on improvement of operations. According to Salehi et al. (2010), AIS effectiveness refers to successfully applied system that meets user requirements. The effectiveness of AIS is further elaborated as users' perception of capability of the system in providing information that meets their requirements, especially in the decision making process (Dehghanzade et al., 2011; Sajady et al., 2008; Nicolaou, 2000). Another study conducted by Pornpandejwittaya (2012) specifically defined the effectiveness of AIS based on the features of information quality. The features are reliable, relevant and timely. The variety of views in defining the effectiveness of AIS has led to numerous ways of measuring it (i.e. user satisfaction, system usage, cost-benefit analysis, data quality). This paper focuses on user satisfaction to measure the effectiveness of AIS.

3.3 User Satisfaction

User satisfaction is widely applied in measuring the effectiveness as well as success in information system, management information system, AIS, marketing, product and service. User satisfaction in information system defined as user's feeling on the fulfilled expectation in terms of the ability of the system in providing the information needed (Ives et al. 1983). Inability of the system to meet users' needs will lead to dissatisfaction (Thong and Yap, 1996; Ives et al., 1983). The suitability of user satisfaction as a surrogate for effectiveness in information system continue to be debated among the researchers. Argument to support the validity of user satisfaction in measuring the system's effectiveness is blended from psychological expectancy theory, where the satisfied users perform better in decision making and more productive as compared to dissatisfied users, suggesting the success of the system in achieving organisational goals (Gatian, 1994). The ability of the system to bring benefits such as improvement and achieving the organisation's targets shows the effectiveness of the system.

Extending the definition of user satisfaction in the information system field, user satisfaction in this study defined as users' feeling towards the AIS in meeting their expectation which covers not just the tangible output such as information, but also on other intangible aspects of the system such as benefit. The user's expectation is viewed in terms of the perceived criteria for an effective system.

Table 2: Summary of Potential Factors Affecting the Systems as Reviewed in Prior Studies

No.	Criteria	Ram & Corkindale (2014)	Shaul & Taube (2013)	Fardinal (2013)	Imtiaz et al. (2013)	Zhang et al. (2013)	Ramazani and Zanjani (2012)	Aziz et al. (2012)	Wiechetek (2012)	Ngai et al. (2008)	Nah and Delgado (2006)
	Context of study >>	ERP Implementation Success	ERP Implementation	Accounting Information Quality in AIS	Information Technology Project	Information Technology Service Management Implementation	Accounting Software	Information Technology and Information System Implementation (people factors)	Information System Implementation	Adoption of ERP	ERP Implementation and Upgrade
1	Advanced/Sophisticated technology		√								
2	Allocation of resources	√								√	
3	Appreciation and motivation	√	√					√		√	√
4	Benchmarking with succes organisation/project		√							√	
5	Business process re-engineering, management and improvement									√	√
6	Change menagement	√	√							√	
7	Clear/relevant planning and strategy	√	√		√			√		√	√
8	Commitment	√	√		√	√		√	√	√	√
9	Communication	√	√		√			√	√	√	√
10	Culture	√						√	√	√	√
11	Data quality control	√	√							√	
12	Experience	√	√		√	√		√		√	
13	External expert	√	√							√	√
14	External pressure		√								
15	Feedback management		√							√	√
16	Individual behavior	√						√			
17	Individual capability					√				√	
18	Infrastructure	√	√						√	√	
19	Internal control		√	√			√				

Continue...

... continue

No.	Criteria	Ram & Corkindale (2014)	Shaul & Taube (2013)	Fardinal (2013)	Imtiaz et al. (2013)	Zhang et al. (2013)	Ramazani and Zanjani (2012)	Aziz et al. (2012)	Wiechetek (2012)	Ngai et al. (2008)	Nah and Delgado (2006)
	Context of study >>	ERP Implementation Success	ERP Implementation	Accounting Information Quality in AIS	Information Technology Project	Information Technology Service Management Implementation	Accounting Software	Information Technology and Information System Implementation (people factors)	Information System Implementation	Adoption of ERP	ERP Implementation and Upgrade
20	Internal expert					√					
21	Knowledge	√	√					√	√	√	√
22	Knowledge transfer		√								
23	Leadership	√			√			√			
24	Monitoring and control				√	√				√	
25	Organisational/Management support	√	√		√	√		√		√	√
26	Performance review	√	√			√				√	
27	Presence of champion	√								√	
28	Project management	√									
29	Proper documentation	√				√			√		
30	Qualification of personnel	√	√		√	√				√	√
31	Relationship within users		√					√		√	
32	Risk management		√		√						
33	Staff retention		√							√	
34	Software maintenance		√							√	
35	Software quality	√				√					
36	System capability	√	√				√			√	√
37	System easiness								√		
38	System flexibility		√				√		√		
39	System suitability	√	√				√			√	√
40	Team work				√			√			
41	Training	√	√		√		√	√	√	√	√
42	User involvement/participation		√		√	√		√	√	√	√
43	User/Job satisfaction	√				√		√			

4.0 Methodology

The fieldwork to explore the critical factors of AIS effectiveness in this paper conducted in two phases. Since the scope of this study focuses on the Malaysian Federal Government, it is a requirement to apply for a permission to conduct the research. Thus, an approval from the Economic Planning Unit (EPU), Prime Minister's Department was obtained accordingly.

Prior to data collection, reviews were performed on prior literatures about the determinants of AIS effectiveness, measurement for the effectiveness and accounting studies related to the Government of Malaysia. A further reviews in information system, Enterprise Resources Planning (ERP), data quality, information technology and implementation of system also performed to enrich the findings of the critical factors.

As for the fieldwork, phase one is a pilot study using focus group approach to gain understanding of the practices of AIS in the Malaysian Federal Government. During this phase, early discussions about the critical factors of AIS effectiveness and their perception towards an effective AIS were sought. The pilot study was conducted at the Account General's Department (AGD) and the accounting division of the Ministry of Finance of Malaysia. The preliminary findings from this pilot study are used to enlighten the understanding of the system and to brighten the direction as well as for the construction of semi-structured interview question for the phase two. Phase two is a semi-structured interview, in which conducted at the accounting divisions of ministry level. A total of 22 interviewees that comprise of the chief accountant, deputy of chief accountant and accountant from 10 ministries were interviewed. Both pilot study and semi-structured interview focused on the accounting personnel that use the system for managing data and transactions and then process it into information to perform various accounting functions such as analysis, reporting and so on. Administrative users that solely responsible for key in the data are not included in the scope of this study because they only use the system for transaction processing.

On the other hand, the analysis of the qualitative data of this study is run in NVivo 11 software⁴ application. Coding and structuring the qualitative data through the software help to segregate the data into specific themes. The software also able to provide a frequency of data or point mentioned by the interviewee across the sessions. However, since this is an exploratory study in the context of the Malaysian Federal Government, the frequency of the point mentioned across the interview session is not analysed. All relevant points discussed are considered.

5.0 Discussions and Findings

5.1 Pilot Study

A pilot study was conducted in April and May 2015 at the Accountant General's Department (AGD) and accounting division under the Ministry of Finance Malaysia. The pilot study was conducted through focus group approach with three divisions within the AGD, AGD's top management and accounting division. These divisions were chosen due to their roles in providing accounting service and managing the accounting operation for the Malaysian Government. The purpose of this pilot study is to gain understanding of the AIS practices within the Malaysian Federal Government prior to semi-structured interview. Factors influencing the effectiveness of AIS and user's perception towards an effective AIS were discussed during the pilot study to acquire understanding for the development of semi-structured interview question.

⁴ NVivo is one of the available software used to analyse qualitative data "to cater for researchers needs to undertake projects ranging from fine, deeply reflective analysis to analytic processing of larger volumes of text sources" (Bazeley, 2007).

5.1.1 Accounting Information System for the Malaysian Federal Government

The Malaysian Federal Government is currently using Government Financial and Management Accounting System (GFMAS) for their accounting system, which powered by SAP⁵ 4.7 software. The GFMAS was first launched in 2006 with a big bang implementation at AGD level and by phases at ministry and responsibility centre level. The system is customised for cash basis accounting. The main function of the system is to process and retrieve the accounting information from eSPKB and eTerimaan, process accounting transaction and produce financial and accounting information (i.e. financial report) for reporting. These systems are intranet based network, which can be accessed through any computer within the organisation that has the application installed.

eSPKB is a Budget Planning and Control System Electronic that use to process payment and accounting related transactions. eSPKB was implemented in the year of 2000 to control and manage the Federal Government budget, in which this system was integrated with Branch Accounting System (BAS) prior to implementation of GFMAS. eSPKB is also developed to integrate with other eGovernment applications such as Human Resources Management Information System (HRMIS), Project Monitoring System and so on. Data keyed in into eSPKB will then process and forwarded by the system to GFMAS for further action. On the other hand, e-Terimaan is a Standard Collection and Receipting System that processes the government's collection and accounting record related to revenue. eTerimaan was implemented in 2008 to smoothen the accounting process, replacing the manual system of the Government's collection. eTerimaan is integrated with GFMAS through eSPKB. Both eSPKB and eTerimaan are using the same server and platform. The integration between the systems allow reconciliation to be done between the accounting record at responsibility centre and reporting at accounting office as well as the head quarter, AGD. The main purpose of accounting system is to manage accounting data and produce financial statements. The accuracy of data and classification of account keyed in into eSPKB and eTerimaan are ensured through digital check and approval in GFMAS at the accounting office as explained by the interviewee.

"GFMAS is an accounting system uses at the accounting office (ministry) level. The system supports accounting functions in reporting, monitoring, controlling and decision making."

The Malaysian Federal Government is currently upgrading its accounting system in order to cater the transition from cash basis to accrual accounting. The upcoming system named as 1 Government Financial and Management Accounting System (1GFMAS). 1GFMAS is using SAP ECC 6.0⁶ that integrated with SAP HANA⁷. The integration is expected to create an intelligent system to manage the accounting information, enhance the accounting operation and improve financial reporting for the federal government. 1GFMAS will be applied to all accounting operations replacing eSPKB and eTerimaan. The 1GFMAS is customised for cash based and accrual based accounting. This means that the system will be able to generate two different accounting based report for the Malaysian Federal Government. However, the implementation of 1GFMAS which supposed to take place in 2016 was postponed as the system is not ready for commissioning by the said date. Regardless of the changes (e.g. upgrade system) in their AIS, the critical factors that lead to the system effectiveness should be maintained by the organisation in order to achieve and sustain the system's effectiveness.

⁵ SAP is the acronym for System, Application and Products. The system is developed for various function in Enterprise Resource Planning (ERP) covering the accounting and finance function.

⁶ SAP ECC 6.0 is one of the latest version of SAP. ECC stand for ERP Central Component, which covers the SAP Business Warehouse, SAP Strategic Enterprise Management and Internet Transaction Server.

⁷ SAP HANA is a platform for the real time data driven application that built with in-memory database. It allows integration with various data sources.

Source: <http://go.sap.com/developer.html>

5.1.2 Preliminary Findings on the Critical Factors of AIS Effectiveness

Factors that perceived important or highly needed by the user in order to use the system effectively are discussed and discover during the pilot study on top of the factors listed from the literature reviews. Those factors are crucial as it reflects the critical factors for the system to be effective.

In the Malaysian government, the chart of account which providing coding structure in the AIS is applied extensively during the input, process and output stage. It is very important for the user to fully understand about the coding structure so that the accounting data are recorded in the right account classification. The code is used by the other users (i.e. accounting office) to retrieve the data and turn it into valuable information.

"The user depending on the manual chart of account to ensure the classification of accounting transaction is recorded correctly."

Besides that, not all of the system's users are accounting personnel. The majority of the users at responsibility centre are non-accounting staff. Hence, other than seeking advice from the accounting office, having Standard Operating Procedure (SOP) and other related manual or guideline are highly necessary in order to operate the system effectively. Having SOP, manual or guideline can smoothen the learning curve for the upcoming system as well. On top of that, an effective communication within the users is also crucial towards the system effectiveness. Their involvement in early stage of the decision making process will contribute to the effective utilisation of information produced by the system.

"In order to ensure everything is fine, the manual/guideline on how to use the system is prepared prior to system test."

"..sometimes the prepared budget did not reflect the needs of the respective department. However, that is just a minor issue. In most cases, the respective departments and divisions involved in the preparation of budget."

As a preparation to face the changes in technology and accounting treatment, training is conducted simultaneously to prepare and update the knowledge of the system user. At present, not all of the staffs at the responsibility centre have an accounting background. Therefore, moving towards the upgraded accounting system and accrual accounting, change management strategy is applied in order to ensure the staffs are adequately occupied with relevant knowledge and capability. The Government is going to place at least one accounting personnel at each responsibility centre. It shows that accounting knowledge and capability to manage accounting transaction are critically needed in order to operate the AIS effectively.

"..we have proposed to the top management to allocate at least one accounting officer with accounting background at each of the responsibility centre."

In addition to that, internal and external expertise also plays significant roles to support the operation of the system. The Malaysian government has their internal expertise to deal with technical as well as accounting issues. For example, the accounting office at ministry level always offers their technical and advisory support to the responsibility centre.

"Every ministry has an accounting office that provides advice to their responsibility centre."

"We have internal expertise to manage any technical issue related to the system."

Moreover, the government also appointed external expertise as a consultant in upgrading and maintaining the system. As a strategy to strengthen the capability of

internal expertise, transfer knowledge between external to internal as well as within the subordinate is applied. The AGD is highly encouraging the culture of knowledge sharing not just within the Government, but also with the external party such as vendor and consultant. The Government effort to embed with sharing knowledge culture can be seen from the training structure planned for the upcoming system. The plan is to train the trainer at the ministry level and the trainer will play their roles in sharing their knowledge with the respective responsibility centre. In general, the culture of organisations may also influence the effectiveness of the AIS. Previously, the insight of information produced by the AIS majorly conquered by the top management while lower management only doing their routine tasks such as recording and compiling. However, moving towards the upcoming system and accrual accounting in 2016, the culture of knowledge development is used as one of the strategy to strengthen the human resources.

"Accounting office plays an important role to spread the knowledge about the system to the responsibility centre. Train of Trainer will be appointed to train the system user at the responsibility centre."

"..culture of having ability to explain the information generated by the system is spread within the organisation. By having so, all levels of management can share their opinion during the decision making process."

Apart from relying on human and organisational factors, the technological factors also crucial towards the effectiveness of the AIS. Having a sophisticated technology is expected to improve the accounting operations. The automation of accounting function through technology requires a strong internal control in order to ensure the data are accurate and securely managed. Most of the recent accounting systems are equipped with the internal control functions within the system such as authorisation, auto backup, and limit check. In addition to that, individual performance review is practiced within the Malaysian Federal Government organisation through the achievement of Key Performance Indicator (KPI) and management meeting. Additionally, monitoring and checking activities (i.e. document inspection) are also performed by the accounting office at the responsibility centre. Both monitoring and control are perceived to be important in detecting non-compliance of procedures, rules and regulations as well as any breach on the internal control.

"The system has its own internal control such as authorisation and threshold in which amount exceeds threshold will be rejected by the system."

"Since the accounting operation mostly performed online, the purpose of inspection is to check the originality of the supporting documents. This is important to ensure the compliance as ticked on the submitted checklist, assurance of integrity and accountability of the Government."

5.1.3 Preliminary Findings on the Criteria of AIS Effectiveness

Most of prior studies measured system's effectiveness based on user's satisfaction. The satisfaction can be in terms of the features and capability of the system as well as the quality of its output. This is in line with the preliminary findings from the pilot study conducted with several accountants at the Accountant General's Department and Ministry of Finance as described by some of the interviewees.

"Stakeholders' satisfaction indicates the effectiveness of the system."

"If the system able to meet, support and fulfil their (users) concern, then the system is considered effective"

Naturally, the satisfaction comes from the fulfilled requirement towards the system capability. This should include the whole process of AIS from input to output. Technically, the users looking forwards for the easiness feature of the system such as user-friendly, easy to understand and ease of use. In addition, the speed in retrieving the accounting information is also one of the criteria that the user looking for.

"In my opinion, the system is effective when the system is user friendly, producing reliable data and easier to access (as compared to previous ways of accessing the data)."

"System's effectiveness is considered when it can achieve its objective."

"The system is considered effective if the transaction can be quickly processed for reporting."

Besides, the system is considered effective when it's able to produce reliable data with easy access and provides the high internal control within the system. In the most cases, the use of accounting system automates most of accounting functions (i.e. general ledger, cross-checking). Apart from that, the effectiveness of the system is also viewed from the perspective of the quality of information generated by the system. Reliable information is important to support the decision making process. Since a high quality of information is crucial for better decision making, the system's ability to provide such information reflecting its effectiveness.

"The system is considered effective when it can help in budget control and allocation. We use the system to retrieve the accounting data and support decision making."

"The system is effective when it's able to produce an accurate data."

5.2 *Semi-structured Interview*

Semi-structured interviews were conducted in August 2015 at the accounting office, ministry level. Formal invitation together with consent form were sent through email to all the chief accountants in June and July 2015. Out of the total of 23 ministries and a Prime minister's Department, 10 of the ministries were agreed to be interviewed that resulted to 22 interviewees comprises of the chief accountant, deputy of chief accountant and accountant. The accounting office was targeted for the interview due to its roles as a user as well as intermediate between the responsibility centre and the Accountant General's Department (AGD). Commonly, the basic accounting tasks such as recording of the accounting data that done by the responsibility centre will go through checking and approval at the accounting office before the data forwarded to the AGD for further action. The remaining ministries did not participate due to their unavailability, busyness and some of them did not reply the email. Follow up calls have been made, but some of them can't be contacted through the general line and some of them unwilling to participate due to their unavailability during the requested date.

The agenda of the interview was sent to the respective participants a week before the scheduled interview takes place. Please refer to Table 3 for the agenda of the semi-structured interview. Each of the interview started with asking the interviewee's working experience, education background and general information about the organisation. The overview of AIS discussed about interviewee's understanding on the AIS. Further, the AIS effectiveness section requires the interviewees to explain about their expectation towards the criteria for an effective AIS. The criteria focused on user satisfaction. Next, the critical factors of AIS effectiveness discussed by asking their opinion about the factors that they think are important as well as their needs in order to operate the system effectively. On top of that, the interviewees also asked about the factors that lead to the ineffectiveness of the system. The last agenda, in which discussing about the strategy to sustain the

effectiveness of AIS is actually contributing in finding the critical factors of AIS effectiveness. Please refer to Appendix 1 for the semi-structured interview questions.

Table 3: Agenda for Semi-structured Interview

Agenda	
A.	General Information: Respondent's and Organisations Background
B.	Overview of Accounting Information System
C.	Accounting Information System Effectiveness
D.	Critical Factor of Accounting Information System Effectiveness
E.	Strategy to Sustain the Effectiveness of Accounting Information System

The majority of the interviewees are female and a member of Malaysian Institute of Accountant. The lower education level of the interviewees is a Bachelor's Degree and the highest is a Master's Degree. They come from various educational backgrounds, in which one of it is in accounting field. The interviewees consist of 9 chief accountants, 4 deputy of chief accountants and 9 accountants. They are responsible to monitor and process the accounting data forwarded by the responsibility centre for evaluating and reporting purpose. On top of that, they are the advisor to their responsibility centre for any issues related to accounting and the system. Additionally, they play an intermediary role between AGD and their responsibility centres whenever necessary. They have access to both GFMS and eSPKB or eTerimaan (whichever applicable to their job scope). Table 4 shows the descriptive statistic about the background of the interviewees.

Table 4: Descriptive Statistic of the Interviewees' Background

Description		Percentage (%)
Gender	Male	27
	Female	73
Education Level	Bachelor's Degree	68
	Master's Degree	32
Professional Body	Yes – Malaysian Institute of Accountant	86
	No	14
Position	Chief Accountant	41
	Deputy of Chief Accountant	18
	Accountant	41

5.2.1 Additional Critical Factors of AIS Effectiveness

On top of the list drafted from the literature reviews and factors discover during the pilot study, some other additional factors were found during the semi-structured interview sessions. Some of the factors discussed during the interview are the well-known factors in prior literature such as staff allocation, relevant strategy, organisational and management support, commitment, communication, culture, qualification, internal and external expert, performance review, training and infrastructure. Those factors are reported in prior studies to have a significant relationship with the system either from the context of implementation, data quality or effectiveness. However, the discussion during the interview provides a better picture of the Malaysian Federal Government practice.

"Non-accounting personnel do not understand the flow of the accounting data. They do not know. They just key in. But, that does not restrain them to complete their work because the work will then be checked by their supervisor."

Some other factors have been extensively reviewed by previous researchers such as monitoring, internal control, knowledge transfer and the relationship within users. Advancement in technology and improvement in internal control supposedly able to reduce the unnecessary delay and redundant task. In the context of the Malaysian Federal Government, the practice of inspection on the document and procedure is performed at least once a year by the accounting office to all responsibility centre throughout the country. While one of the accounting office functions is to review the data keyed in by the responsibility centre, the responsibility centre is responsible to keep the supporting documents and provide it when requested. The quality of data, which is one of the criteria of AIS effectiveness, starts from the input process. Thus, the purposes of the inspection are to ensure the existence and completeness of the supporting documents, and compliance with the related procedures.

"We try to eliminate unnecessary delay. But at the same time we try to maintain high integrity on checking."

Therefore, the manual guideline on how to use the system and file manager that clearly describe the procedure and the job scope are important to the user in order to operate the system. However, by just having the manual and file manager would not be enough if the user did not comply with it. Breaking the rules, non-compliance of procedure and breach the authorisation to access the system are some of the reasons that lead to the ineffectiveness of the system.

"You have to do this, you have to call this screen and this how we work. And that is why, even you fresher, we must have the manual. When you have the manual to go through, you know what to do. Then we have the file manager, how to do it."

"As I said, the manual is important so that we able to know all the useful functions in the system. If not, with that expensive system, we will only get some of the benefits of it."

"The system has its own internal control, in which only authorised personnel can access to certain levels. However, non-compliance with the authorisation by giving the access to unauthorised personnel probably when the staff is off duty, causing the system ineffective."

One of the reasons that cause the non-compliance through giving access authority to unauthorised personnel is staffing problem. Some of the small responsibility centres in remote areas only have one or two personnel. Thus, when the personnel going off for leave or attending courses, some of the transaction might not able to be processed. The staffing issue is not just on the matter of lacking, but also its allocation. Some of the interviewees mentioned that the Government should have a right person allocated according to their task or job scope.

"Sometimes we don't have enough staff ... if the staff going off for leave, many transactions will pending. Especially in rural areas which they only have one or two staffs."

"If you look at the setup of Self Accounting Department (Accounting Office), function for each SAD is same for all. We have to train people, we have to do reconciliation, run system, report.. All the same. But the maximum strength is 24 staffs as compared to large SAD. 24 staffs to do voucher, to train people, to give

advice, to hands on thing, to solve problem and on top of that to do checking and inspection.”

“..please make sure the right people are in the right place. Right meaning here, accounting personnel. So that they understand the debit and credit ... and will be able to advise their boss.”

Furthermore, not all of the AIS users have an accounting background including the top management level. In the Malaysian Federal Government, the highest position in every ministry is the Chief Secretary (equivalent to Chief Executive Officer in private company). The Chief Secretary may come from various educational backgrounds, in which those without accounting knowledge may not interested in the report produced by the AIS. It is common in the Malaysian public sector that people are not really interested in the accounting report unless there are specific issue they would like to look at. Some of the interviewees mentioned that the system will be useful if the information produced from it are utilised at all levels.

“AIS should able to educate the top management in making decision. Then we can see the benefit of the system.”

“No matter how sophisticated system you have, there is no point if the produced information is not fully utilised”

On the other hand, the effectiveness of AIS is not just influenced by its users, but also the related operations that integrate with it. For example, the proses of staff’s claim started from the responsibility centre to finance department and forwarded to account office. Thus, the relationship between involved departments in terms of commitment and effective communication is necessary to smoothen the process. While some prior studies discussed the potential factors of AIS effectiveness in terms of relationship within users from the perspective of ERP implementation or adoption, in which focused on good relationship between project team and users (Shaul and Taube, 2013), team work or collaboration (Aziz et al., 2012; Ngai et al., 2008), this study views the relationship within users in broader context of the AIS. The users may come from various departments that connected through the system.

“If there are delays, you have to see it from other angles as well because some of the process started from the finance department.”

Apart from human performance, rapid changes in technology and increase in the volume of transactions or other related factors might have an impact on the technical performance of the system. Thus, technical review of system performance also important towards the effectiveness of the system. This can be in terms of Information Technology (IT) audit or Electronic Data Processing (EDP) audit to ensure that the system works as required. On top of that, benchmarking with other country can also provide the status of the current system used. Especially in the case of government, it is more difficult to assess because the government has no competitor within the country. Hence, comparison or benchmarking with other successful country will be helpful in ensuring that the system is up to date.

“The system have to be audited... so if there is something wrong with the system, it can be highlighted for further action or improvement.”

“We can say that we have a good system. But, other countries might say that they have adopted the system 10 years ago.”

Overall, the AIS effectiveness depending on all of the components that involve throughout the accounting information flows. The critical factors of AIS effectiveness in

this study are classified into three categories, which are organisation, people and technology.

5.2.2 Specific Criteria for the Measurement of AIS Effectiveness (User Satisfaction Approach)

Prior studies used various ways in measuring the system effectiveness (i.e. cost-benefit analysis, impact on performance, system usage, and user satisfaction). The effectiveness criteria explore in this study are based on user satisfaction criteria related to the system. An effective system is a system that able to meet its user's requirement (Salehi et al., 2010). Hence, the interviewee's requirement towards the criteria of an effective AIS was discussed during the interview session.

Some of the interviewees mentioned that a good system that satisfy their requirement is an easy to use system. Ease of use in this context mean is the easiness features of the system such as user friendly, simple and easy to understand each of the applications provided by the system. Complicated system may discourage learning and exploration of the system, in which causes limited usage of the application or function available in the system.

".. the system should be simple and easy to understand. It will be difficult if the system is not user friendly."

"We have to bear in mind that the system is not only used by the accounting personnel. The system also used by Administration and Diplomatic Officer (PTD), engineer, lawyer, doctor and so on. Thus, it is important that the system must be user friendly. Meaning, the system is easy to understand ... and uses layman language for accounting that everybody can understand."

"The system should be user friendly. So that, it's not difficult to understand each component of the system."

Apart from that, the interviewees also emphasize on the quality that they required. The quality discussed during the interview covers the system and its output (information). In the context of the information quality, most of the interviewees want a high quality of data and information. The common features of a useful information quality are accuracy, completeness, timeliness, relevance and summarisation (Hall, 2010). They also want the system to be able to produce various types of report and provide a summary of information that can meet the requirement for different level of management. For example, the system able to segregate two expenses report, expenses paid by cheque and expenses paid by Electronic Fund Transfer (EFT). Information required may vary according to the level of management. While operation or lower level management and middle management may need detailed information, top management commonly asked for the summary of the information (Hall, 2010). The variation of report that meet user's requirement will add value to the information produced that subsequently contribute in decision making. In order to maintain a high quality of data and produce a high quality of information, it requires a quality of the system itself. The quality of the system in this study is viewed in terms of the system's performance, such as speed, real time update, reliability, security and automation of accounting entry.

"The system should able to produce many types of report. Let's say I want collection reports by cash and by money order, can the system do that?"

"So the information given must first, complete. Second, accurate."

"..good information is the information that accurate, has its integrity and genuinely. Meaning that, we have no doubt on the information. That is the right one."

"Currently, we have a very good system in place. As you know that our account, we can close the account on time."

"The system should be able to provide the current balance. Let's say the information requested at 9 o'clock, the system should be able to show the information as at 9 o'clock."

"In my point of view, if the system is good, it would be able to auto entry to the relevant journal when we key in the data. Meaning that, only one entry."

"Make sure that people can't easily change the data. It shouldn't be easily entered and changed."

"As for the system's performance, does it slow? Or speed enough?"

Besides that, applying technology in accounting process definitely simplifies some of the accounting processes, especially when it comes to submission of a report or document. Online submission makes the process easier and reduces the consumption of paper. Online transaction can speed up the accounting process. In addition, the integration between the AIS and other eGovernment systems will give benefit to the user in terms of broader access to relevant information (i.e. non-financial information to support the financial data). Furthermore, it may also enhance the staff performance as things can be done faster than before.

"I remember the last time we had to print three copies of payment voucher. Now we only have to print one copy."

"..able to retrieve whatever information that requested by the top management."

"Last time ..it takes about one month to get your claim settled. But now, if you submit your claim by today, you will get your payment by tomorrow."

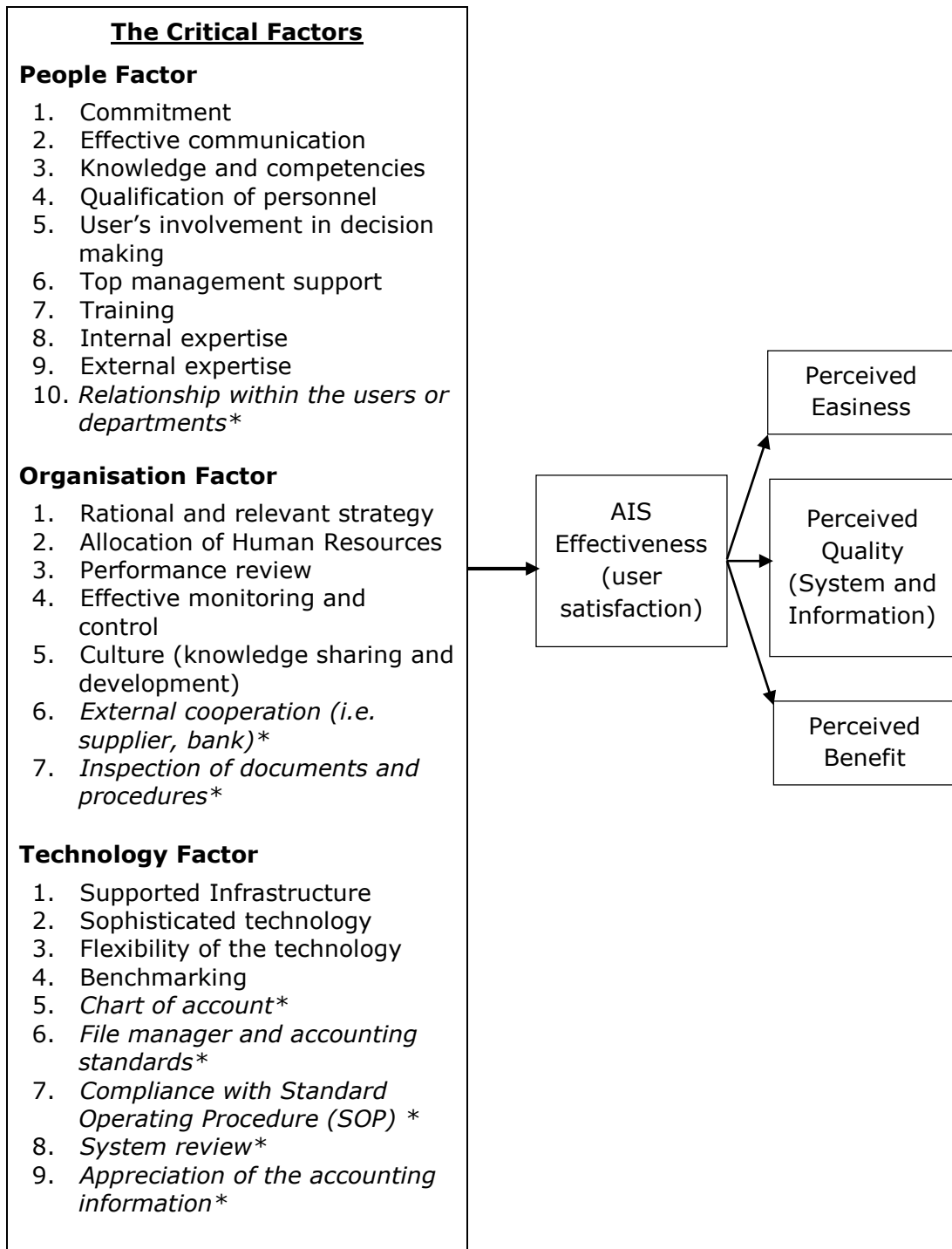
"To smoothen the process, we commonly use a computer application."

"Through GFMAS, the Government has introduced Electronic Fund Transfer (EFT) payment, in which benefits the stakeholders as well. Last time we issue cheques, but now it's direct transfer to their account."

There are many ways to satisfy the system's users. The satisfaction requirement also varies from one person to another, depending on their level and usage of the system. However, this paper intends to come out with a general user satisfaction criteria by considering the user's roles and responsibilities in using the system. Thus, the user satisfaction criteria are divided into three categories, (i) perceived easiness of the system; (ii) perceived quality of the system and information; (iii) perceived benefits from the system.

5.3 A Proposed Framework for the Critical Factors of AIS Effectiveness

Started with a draft list of critical factors of AIS effectiveness drawn from the literature reviews, the factors are refined accordingly to practically reflect the needs and expectations of the users of the system. Thus a proposed framework for the critical factors of AIS effectiveness is illustrated in Figure 1. The critical factors are categorized into three sections, which are people, organisation and technology. On the other hand, the effectiveness of AIS is measured from the perspective of user satisfaction towards the perceived easiness features of the system, perceived system and information quality and perceived benefit brought by the system.



* Additional/specific factors discovered during the pilot study and semi-structured interview

Figure 1: A Proposed Framework for the Critical Factors of AIS Effectiveness (Source: The author)

6.0 Conclusion

Rapid changes in technology and improvement in accounting standard do not just impact the private sector, but also the public sector organisation. The Eleventh Malaysia Plan (year 2016 –2020) aims to enhance the productivity and services in the government

sector. Specifically, to continue the advancement in technology for the Government in the Tenth Malaysia Plan, the encouragement of data integration across the agencies within the government sector will be emphasized (Jabatan Perdana Menteri, 2015). The integration also covers the financial and accounting data. The Malaysian Federal Government is currently upgrading their accounting system which expected to be fully implemented by 2017. A massive investment towards the AIS should bring benefit to the Government as a return.

Several recommendations can be drawn from the findings of this study. First, the critical factors of AIS effectiveness proposed in this study reflect the current practice within the Malaysian Federal Government sector. There are 26 critical factors outlined in this study that classified into three categories, which are people factor, organisation factor and technology factor. Although prior studies found and reviewed a long list of factors influencing the effectiveness of AIS, this study narrow it down to specific relevant factors in the today's practice. Thus, as Malaysia is moving towards the advancement of their AIS in 2017 (upgrading their accounting system), these critical factors should be actively maintained and practiced in order to sustain the effectiveness of the AIS. Second, this study discussed the specific criteria that satisfy the system's users as a measurement for AIS effectiveness. The user satisfaction criteria are classified into three main sections which are perceived easiness of the system, perceived quality of the system and information, and perceived benefit from the system. The majority of the interviewees in this study agreed that the current system is satisfying (except for several minor issues that solved and be improved in ongoing basis) and hope that the effectiveness can be sustained regardless of any upgrade taken place in the future.

While the proposed framework in this study extends the insight of the critical factors of AIS effectiveness in the context of the Malaysian Federal Government, further study is needed to investigate the actual performance on the critical factors in current practice. Furthermore, given the main objectives of AIS (i.e. manage accounting data and producing reports) are same for all organisations, regardless of any sectors they are in, the proposed framework can also be applied to the other public and private sector organisations. Moreover, the user satisfaction criteria to measure the system's effectiveness are discovered from the perspective of its users, which also apply to other users in other sectors. But, careful consideration should be placed in terms of aligning the critical factors of AIS effectiveness proposed in this study with other sectors due to other factors such as culture, organisation structure and orientation that might affect the relevant critical factors for that organisation.

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Appendix 1: Semi-structured Interview Questions

- A. General Information: Respondent's and Organizations Background
1. Please tell me about your education background and working experience relative to accounting and information system.
 2. What is your role in your organisation?
- B. Overview of Accounting Information System (AIS)
1. How do you define the AIS from the perspective of your organisation?
 2. What are the objectives of AIS in your organisation (i.e. budgeting - expenses, planning, decision making, etc.)?
- C. Accounting Information System (AIS) Effectiveness
1. What do you expect from the system in order to satisfy your requirements?
 2. How will you define the effectiveness of AIS in your organisation? Or what are the criteria of an effective AIS?
- D. Critical Factors of Accounting Information System Effectiveness (AIS)
1. What do you need in order to have an effective system? Or what are the important factors in order to operate the AIS effectively? Or what would make the AIS work effectively?
 2. Why do you think they are critical/crucial towards the effectiveness of AIS?
 3. What causes the system ineffective? Or what lead to ineffectiveness of the system?
- E. Strategy to Sustain the Effectiveness of Accounting Information System (AIS)
1. In your opinion, what is the best strategy for the AIS to sustain its effectiveness? Or how would you make sure the AIS is effective? Or what is needed to ensure the effectiveness?