STRATEGIC INFORMATION SYSTEM PLANNING MODEL FOR ENHANCINGINFORMATION FLOW PERFORMANCE IN ORGANIZATION

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MODEL PERANCANGAN STRATEGIK SISTEM MAKLUMAT UNTUK MENINGKATKAN PRESTASI ALIRAN MAKLUMAT DALAM ORGANISASI

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DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

30August 2013 MUNEER HAZAA ABDULLAH ALSURORI
P39768

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ABSTRACT

Strategic Information Systems Planning (SISP) is defined as the means of identifying application systems which support and enhance organizational strategy. SISP provides insights towards lessening the aforementioned difficulties of organization's information flow problems. Past research on SISP has not been adequately carried out to investigate the information flow performance of the SISP implementations. Many issues are still associated with measuring the information flow performance of SISP implementations such as:1) awkwardness to measure the strategy performance at the security of information flow-specific levels, 2) the need to justify investment on SISP implementations on information flow, 3) the lack of robust framework which measures the actual results of information flow performance against specific SISP implementation as most studies have focused on technical issues. Therefore, this study aims to develop and to validate a SISP model designed to improve the information flow performance by incorporating the antecedent factors into information technology components, information needs and security of information flow factors. The methodology adopted in this study to achieve the major research objectives includes four phases namely; the theoretical study, the conceptual framework design, the survey design, the data analysis, and the model development and validation phase. Self-administered questionnaires were distributed to three hundred and fifty (350) employees at the Ministry of Higher Education and Scientific Research (MoHESR), Yemen and four (4) government universities in Yemen for quantitative data collection. Out of the total number of participants, 62.3% responded to the questionnaire. The descriptive and demographic profiles of the samples were obtained by using SPSS. The next stagedescribes the development and validating of the SISP model by adopting the Structural Equation Modelling analysis using AMOS. The results indicated that all the fit indices satisfy the recommended range of value which revealed that the model developed was acceptable. The validation results revealed that the entire model fitness is appropriate and provided evidence of the stability of theconceptual framework used in building the model. The results of the study also showed that: (a) information technology components have significant relationship with information needs (b) information technology components have a direct significant relationship with the security of information flow in the MoHESR and universities in Yemen (c) information needs have indirect influence through the information technology components on the security of information flow in the MoHESR and universities in Yemen. The developed model revealed that the investigated factors namely; information technology components, information needs and security of information flow factors provided an effective environment for analyzing, planning, implementing and controlling the information flow performance in the MoHESR and universities in Yemen.

ABSTRAK

Perancangan Strategik Sistem Maklumat (SISP) didefinisikan sebagai 'cara mengenalpasti sistem aplikasi yang menyokong dan meningkatkan strategi organisasi. SISP menyediakan wawasan ke arah mengurangkan kesukaran yang dihadapi berhubung masalah dalam aliran maklumat organisasi. Kajian lepas terhadap SISP masih belum mencukupi untuk menyiasat prestasi aliran maklumat setelah pelaksanaan SISP. Banyak isu masih dikaitkan dengan: 1)pengukuran prestasi aliran maklumat pelaksanaan SISP seperti kejanggalan untuk mengukur prestasi strategi di tahap tertentu keselamatan aliran maklumat,2) keperluan menjustifikasi pelaburan terhadap pelaksanaan SISP dalam aliran maklumat,3) kekurangan rangka kerja yang mengukur keputusan sebenar prestasi aliran maklumat berdasarkan pelaksanaan SISP tertentu oleh kerana kebanyakan kajian telah memberi tumpuan kepada isu teknikal. Berdasarkan isu yang telah dikenalpasti, kajian ini bertujuan untuk membangun dan mengesahkan satu model SISP yang direka bentuk untuk meningkatkan prestasi aliran maklumat dengan menggabungkan faktor anteseden ke dalam komponen teknologi maklumat, keperluan maklumat dan faktor keselamatan aliran maklumat. Metodologi yang digunakan dalam kajian ini untuk mencapai objektif utama penyelidikan melibatkan empat fasa iaitu; kajian teori, reka bentuk rangka konsep, reka bentuk kaji selidik, analisis data serta pembangunan model dan fasa pengesahan. Soal selidik telah diagihkan kepada tiga ratus lima puluh (350) pekerja di Kementerian Pengajian Tinggi dan Penyelidikan Saintifik (MoHESR) dan empat (4) universiti kerajaan di Yemen untuk mengumpul data kuantitatif. Sebanyak 62.3% peserta telah memberikan respons kepada soal selidik yang diedarkan. Profil deskriptif dan demografik telah diperoleh dengan menggunakan SPSS dan diikuti oleh analisis berikutnya iaitu mengesahkan model dengan menggunakan analisis Model Persamaan Struktur. Keputusan kajian menunjukkan kesemua indeks padanan memuaskan julat nilai yang dicadangkan dan ini menunjukkan yang model yang direkabentuk boleh diterima. Keputusan pengesahan menunjukkan bahawa keseluruhan model adalah sesuai dan menyediakan bukti kestabilan kerangka konseptual yang digunakan dalam pembinaan satu model. Keputusan kajian juga menunjukkan: (a) komponen teknologi maklumat mempunyai hubungan yang signifikan dengan keperluan maklumat (b) komponen teknologi maklumat mempunyai hubungan yang signifikan secara langsung dengan keselamatan aliran maklumat dalam MoHESR dan universiti-universiti di Yaman (c) keperluan maklumat mempunyai pengaruh yang tidak secara langsung (melalui komponen teknologi maklumat) terhadap keselamatan aliran maklumat dalam MoHESR dan universiti di Yemen. Model yang dibangunkan menunjukkan bahawa komponen berikut: teknologi maklumat, keperluan maklumat dan faktor keselamatan aliran maklumat menyediakan satu persekitaran berkesan untuk mengkaji, merancang, melaksana dan mengawal prestasi aliran maklumat dalam MoHESR dan universiti-universiti di Yemen.

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CHAPTER I

INTRODUCTION

1.1 BACKGROUND

Information and communication technologies (ICT) are increasingly becoming essential part of modernized lifestyles. In fact, as countries grow, the organizational and institutional structures have also to be reconfigured in such a way to meet the challenges of the rapidly changing information age. The rapid spread and predominance of the significant divers ICT applications have markedly brought about drastic technological, social, and economic transformation, which has eventually been materialized in a worldwide community of networks organized around ICT. In order to make advantage of the vast potentials of ICT, most countries of the world have developed national ICT policies, to serve as a framework for ICT integration in all aspects of the society. In fact, the Republic of Yemen in general and the Ministry of Higher Education of Yemen (MoHES) in particular recognized such roles and therefore, initiated a process for the development ICT Policy for Higher Education to take advantage of the existing ICT technologies to support its vision and strategic plan as it grows.

Furthermore, the role of information in supporting short and long-term decision making cannot be overlooked. ICT is increasingly becoming very important for supporting decision-making processes. Effective decision-making requires accurate, timely and relevant information. In the higher education sector of Yemen, decisions are usually made without capturing the relevant information required for high quality decisions. Applicable and relevant information are not available at the appropriate time resulting in inappropriate decision-making results. Hence, the high

education sector in Yemen will not be efficient and effective in running its perspective operation as long as poor management of information systems continue to exist and this would, therefore, pose potential challenges that hamper the successful management and implementation of higher education in Yemen.

The institutions across the high education of Yemen have also been influenced by the ICT technologies. In order to take advantage of the vast potentials of ICT, most countries of the world have developed national ICT policies to serve as a framework for ICT integration in all aspects of the society. Redesign would drastically bring about significant service delivery efficiency (Comptroller's 1995) In fact, the Republic of Yemen in general and the Ministry of Higher Education of Yemen in particular, recognized such roles and therefore, initiated a process for development of ICT Policy for higher education to take advantage of the existing ICT technologies to supports its vision and strategic plan as it grows. Yemen made tremendous efforts to introduce the ICT technologies for use across certain sectors. Nonetheless, there is low access to basic ICT facilities and equipments; low internet connectivity is commonly visible across the country public facilities and premises.

In 2004, the Ministry of Higher Education and Scientific Research (MoHESR) in collaboration of the institutions of the higher education in Yemen has formulated and approved a national ICT policy for the higher education sector in Yemen. The ICT policy is primarily aiming at facilitating the achievement of the strategic plans and goals of the MoHESR and the institutions of higher education in Yemen as well as strengthening the capacity of the higher education sector across Yemen. Furthermore, strategies were also formulated to help reaching these strategic goals. The ICT policy for the higher education sector in Yemen is composed of policy statements on objectives, structure, competition policy, satellite communication networks, management structure, financing opportunities and partnership for funding, capacity and human development and training, internet, research and development, safety and security, international perspectives, and policy implementation and review. The policy is envisaged to be realized through several ICT projects. As pointed out by Beynon-Davies & My iLibrary (2002)on it should be stressed that Yemen has made a significant step through the formulation of the ICT Policy for the higher education

sector. However, this may require a well-established investment programmers and sound timeframe to kick off. Perhaps, financial resources and capacity constrains remain one top of the major challenges in realizing such ambitious plans.

The vision statement as pointed out in the National ICT Policy of the higher education sector of Yemen is " Academic performance of the Yemeni institutions of higher education is contributing to the sustainable development of the national and global society through the deployment of information and communication technology". This initially implies long-term visioning for improving the performance of the higher education sector in Yemen. Decision support services are crucial to help in making sound decision and eventually they make effective performance evaluation.

The strategic goals of the development and utilization of ICT as indicated in the National ICT Policy of the higher education sector Yemen are quoted as follows:

i. To improve delivery of the higher education sector to the Yemeni society
ii. To strengthen governance in the higher education sector.
iii. To strengthen the human and technical resources which ensure sustainability.

Particularly with regards to goal (ii), governance is a critical issue and ICT would provide a solid background for improving the delivery mechanism and information sharing. ICT through the provision of consistent, complete, accurate, and timely information will serve as a backbone for effective and efficient decision-making processes.

The public administrative system in Yemen lacks basic attractive working environment across the board. There is a great need to ensure highly effective and efficient service delivery and re-engineer the public system processes throughout the introduction of ICT or process.

According to Zeng et al.(2007), information flow includes information transferring and feedback across organizations. Information flow plays an important role in enhancing the performance of organizations (Martin 2005). (Chudnov & Naumann 2010)argued that efficient information flow implies a need for security.

Therefore, securing efficient information flow is necessary to improve the organizations performance. According to Ahlfeldt et al.(2007), availability, confidentiality, integrity and accountability are considered as the main characteristics of security of information flow. They are simplified as access to the right information to the right people of the right time. IT components in SISP implementation which include hardware, software, human resources, networking and procedures provide bases to constantly monitor and evaluate the efficiency and effectiveness of the SISP implementation. Moreover, they also provide a substantiated evidence to determine progress toward the specific organizational objectives concerning information flow efficiency. According to Barwise and Seligman (1997), information flow and the logical design of distributed systems, provides a general theory of regularity that applies to the distributed information inherent in both the natural world of biological and physical systems and the artificial world of computational systems. Furthermore, information flow is a term used to describe the dynamic process whereby information is disseminated and searched for and received (Kremer 1980). In the context of information flow, it is also relevant to define data that makes up information. Information is the most important form of data extraction that is used as input for further decision-making process. One of the most critical factors which contribute to information flow efficiency of organizations is the information need. According to Keiseret al. (1988)the organizational information flow should be based on solid information need assessment which supports the goals and objectives of the organization.

Nonetheless, Strategic Information Systems Planning (SISP) plays an important role in management function, whereby it can help the organization to use IT more competitively, identify new higher payback IT applications and better forecast on IT resource requirement (Basu et al. 2002). According to Doherty et al(Salant), SISP also can be defined as 'the means of identifying application systems which support and enhance organizational strategy. It also provides a framework for the effective implementation of these systems'. Thus, SISP may provide insights towards lessening the aforementioned difficulties of organization's information flow problems by identifying the right business requirements and providing the right information systems in an efficient and effective manner that achieve the organizational strategy.

The fundamentals and foundations for scientific research do exist in Yemen, which are spread out in some of the centers, institutions and universities. The activities of these institutions differ in terms of type of activity, its size and effectiveness. Most of research and development is still in its embryonic stages and needs to be developed further to be more effective. The current administration's performance of these academic institutions in Yemen is reactive, dawdling, ad-hoc and lacks proper coordination and effective and efficient delivery mechanism (Yemen 2002).

A drastic reform to the performance of the academic and scientific research institutions has to be brought into place so as to increase the quality, efficiency and effectiveness of the administration performance for which greater impact would accrue on research progress. The administrative modernization of the MoHESR and other research institutions is essential to ensure highly efficient and effective service delivery. Reengineering of MoHESR and other research institutions systems throughout the introduction of an effective and efficient computerized information management and data communication systems will drastically bring about significant service delivery impacts (Walid & Chamhuri 2008).

1.2 PROBLEM STATEMENT OF RESEARCH

The current study focus is clearly linked with the performance of organization's security of information flow through SISP implementations. SISP implementations are usually viewed as involving time and resource consuming processes(Hevner et al. 2000).Security of information flow implies efficiency, confidentiality, integrity, availability, and accountability(Ahlfeldt et al. 2007). Failure of SISP implementations to ensure secured information flow across organizations would lead to a loss of opportunities, and waste of resources (Lai & Mahapatra 1997; Sohal et al. 2001; Stewart et al. 2002); Gotlschalk 1999a, 1999b, and 1999c). The issues associated with SISP implementations are closely linked with organization's information flow efficiency (Martin 2005). Therefore, a model for measuring the performance of SISP implementations is critical to ensure security of information flow.

Strategies are usually devised within organizations to achieve a specific goal over the underlying IT implementations. Numerous studies have been conducted to examine the performance of the SISP implementations (Basu et al. 2002; Galliers 1987; Lederer & Sethi 1988; Wilson 1989);. However, such studies have not been adequately carried out to investigate the information flow performance of the SISP implementations(Bailey & Francis 2008). Many issues are still associated with measuring the information flow performance of SISP implementations which include: awkwardness to measure the strategy performance at the security of information flow-specific levels; the need to justify investment on SISP implementations on information flow; the lack of robust framework which measures actual results of information flow performance against specific SISP implementation as most of studies focuses on technical issues (Bailey & Francis 2008). Therefore, the current study recognizes the need to go beyond the conventional performance measurement frameworks of IT implementation to look at the security of information flow. The current study will explore the literature on this very subject and then propose a measurement framework for information flow performance of the SISP implementations.

SISP plans and implementation evidently require enormous efforts in terms of time and funds in the pursuit of satisfying, maintaining and improving information flow of the organization(Hevner et al. 2000). Failure to achieve so evidently implies resources waste bearing in mind the scarce financial, human resources. Therefore, proper planning and implementation evidently is necessary to ensure that potential risks consequences at the level of organization's information flow efficiency are usually minimal.

According to Ahlfeldt et al. (2007), the current research has shown that the existing measures to achieve security of information flow are missing or inadequate. Bailey & Francis(2008), tried to identify other key socio-technical factors that could playa vital role in improving management of information flow. They concluded that there was a need for a framework for future research to provide a greater clarity on the necessary factors required for successful management of information flow. Furthermore, a focus on the relative impact, interplay and causal relationships between each of the key socio-technical factors found to influence information flow

performance was also recommended. Waters(2009) also conclude that a focus on the timing aspect of information flow which deals with time management in organizations is critically needed.

Therefore, based on the above discussion, further research efforts are needed to go beyond the conventional performance measurement frameworks of IT implementation to look at the security of information flow. Present research attempts to address several issues. The first issue is represented by the limited empirical attempt to analyze the information flow performance in the perspective of various dimensions including IT components, information needs and security of information flow factors. The second issue is the limitation of previous studies on the combination effects of these factors. The third issue is concerned with the limited empirical evidence on the development and validation of model for improving the Information flow performance. The problem that this research would resolve is whether or not SISP implementation dimensions (IT components, information needs, Security of information flow) are factors that can be used to analyze the information flow performance. Thus, the current study will take the MoHESR in Yemen as a case study for data collection, and framework testing exercise.

1.3 RESEARCH OBJECTIVES

Based on the statement of problem, the main objective of the current study is to propose a measurement framework and to design a model for information flow performance of the SISP implementations. Thus, in the context of the MoHESR and public universities in Yemen, the researcher attempts to achieve the following main objectives:

RO1: To explore the investigated factors related to the information flow performance.

RO2: To analyze the correlation among the investigated factors of each of the following variables: (IT components, Information needs, Security of Information flow).

RO3: To examine the relationships among the investigated factors namely: IT components, information needs and security of information flow.

RO4: To validate the proposed model for improving the information flow performance.

1.4 RESEARCH QUESTIONS

Based on the above research objectives, in the context of the MoHESR and public universities in Yemen, the researcher attempts to answer the following main questions:

RQ1: What is the descriptive profile of the investigated factors related to the information flow performance?

This research attempts to statistically describe all the investigated factors related to the security of information flow which draw the following sub-questions:

RQ1a: What is the descriptive analysis of the IT components?

RQ1b: What is the descriptive analysis of the information needs?

RQ1c: What is the descriptive analysis of the security of information flow?

RQ2: Is there any significant correlation among the investigated factors of each of the following variables: (IT components, Information needs, Security of Information flow)?

Concerning the second research questions (**RQ2**), the research attempted to analyze the correlation among the investigated factors. Thus, the following sub-questions need to be achieved:

RQ2a: Is there any correlation among IT components factors?

RQ2b: Is there any significant correlation among the security of information flow factors?

RQ3: Is there any significant relationship among the three investigated factors namely; IT components, Information needs, Security of Information flow?

While the second research question aims to investigate the correlation among the factors of each variable (e.g. the factors of the variable IT component), the third

research question examines the correlation among the three major factors (IT components, Information needs, Security of Information flow).

As far as the third research questions (**RQ3**) is concerned, the research attempts to explore if there are significant relationships among the investigated factors. Thus, the following sub-questions need to be achieved:

RQ3a: Is there any significant relationship between IT components and information needs?

RQ3b: Is there any significant relationship between IT components and security of information flow?

RQ3c: Is there any significant relationship between information needs and security of information flow?

RQ4: How does the proposed model improve the information flow performance in an organization?

1.5 SIGNIFICANCE OF THE STUDY

The current study recognizes the need to go beyond the conventional performance measurement models of IT implementation by looking at the security of information flow of SISP implementation. It will explore the performance of information flow of the SISP implementations using the MoHESR in Yemen as a case study for collecting the actual data from the field. Moreover, this research will provide new insights into improving the performance of the security of information flow from the very beginning stages of SISP implementation. In addition, this study will provide policy implication and recommendation for improving the performance of the security of information flow from the context of SISP implementation across the MoHESR in Yemen.

1.6 SCOPE OF THE RESEARCH

This study focuses on the role of SISP implementation on security of information flow performance. The analysis of SISP implementation will cover five components which include software, hardware, HR, networking, and procedures. On the other hand, the

performance of security of information flow will include confidentiality, integrity, availability, and accountability. The case study to carry out this research will be conducted on Yemen. As such, the study is intended to conduct a pilot research that contributes to enhancing the information flows between the MoHESR and the institutions of the higher education in Yemen. The research study will be focusing on analysis and design of information flow model. The case studies will include the MoHESR, and public universities in Yemen to accomplish the research objectives of this study.

1.8 DEFINATION OF CONCEPTS

There are several concepts in this study that need to be defined generally and operationally. The definitions are as follows:

1.8.1 IT Components

According to Laudon & Laudon (2000) that, IT consists of five main components in general namely software, hardware, network and communication, people and skill, and procedure and standards. Correspondingly, another division was presented by O'Brien (1995) who divided the IT into six components namely; software, hardware, human factor, network, procedure and standards. In the context of this research, the IT components refer to software, hardware, measurement, people and skill, communication, and procedure measurements.

1.8.2 Software

Software is a term used for the various kinds of programs and applications to improve information flow performance of the SISP implementation including software package and software support (Sohal et al. (2001), reliability and comparability, portability (Chirinos et al. (2005). In the context of the present study, software refers to the deliverability of the project, adequacy of work units, expected tendency of functionality changes, frequency of modification of package, availability of consultancy supports, and other similar components.

1.8.3 Hardware

Hardware is the physical component of the system (Sohal et al. (Sohal et al. 2001) which is an important aspect for improving the organization's information flow of the SISP implementation (Laudon & Laudon 2000). In the context of this study, hardware refers to the different pieces of hardware from various suppliers, technology integration, availability of hardware supporting the activities, capability of venders in supporting them and deliverability of hardware products**.**

1.8.4 Human Resources

Human recourses refer to the people and their skills and most importantly their commitments to their organizations. Allocation of the IT personnel's knowledge and skills is essential for improving performance related to operational activities and project management (Byrd 2004; Chilton & Hardgrave 2004; Jiang 2003). Communication is also another important aspect of direction and flow of information. Communication is an important aspect in the management of human resources (Okumus 2003). Information should be communicated clearly and precisely throughout the organization information to ensure that staff understands what is expected from them (Lee 2000). In the current study, human recourses refer to the allocation of the staff's experience, the skills in performing the tasks, change in the project teams, and implemented training programs and achievement.

1.8.5 Networking

Networks refer to the connectivity and communication across the entire organization (Heydecker et al. 2007). In this research, network and communication are, therefore, important components which should be taken into account to be measured for justifying the performance of information flow through the SISP implementation. This includes the adequate access coverage, the process of information sharing, sufficiency of network response, report published by the groups and similar activities that characterize networks.

1.8.6 Procedure

A procedure is a specified series of actions or operations which have to be executed in the same manner in order to always attain the same results under the same circumstances (Brodbeck (2002). In the context of this research, procedure refers to the extent of delegation of authority from top management to lower administrative levels including understandability of job description, clarity of documents, regular review of challenges and assessment of needs and evaluation of reports.

1.8.7 Information Flow

According to Work(Rowley) (1997), information flow is the movement of information objects from point of origin to a target user over time. Simple objects may be combined to form big objects. According to Barwise & Seligman (1997), information flow, the logical design of distributed systems, provides a general theory of regularity that applies to the distributed information inherent in both the natural world of biological and physical systems and the artificial world of computational systems. According to Jang et al. (Jang et al. 2010), information flow control can offer important security and privacy benefits by enforcing confidentiality and integrity policies. Haack et al.(Haack et al. 2008) indicated that information flow attributes are important security requirements which can be about confidentiality or integrity of data. In the context of the current study, the relevance and usefulness, timeliness, efficiency, effectiveness and reliability are considered as the most important factors for defining the metric for the current research.

1.8.8 Information Needs

Information needs refer to the needs of information in an organization. It is one of the most critical factors contributing to information flow efficiency of organizations (Nousiainen 2008) and discovering the possible failures in the flow (Bozarth et al. 2008). In this context, information needs refer to information needed in managing and planning, products and services, financial situation, development of technology and other attributes.

1.8.9 Security of Information Flow

Security of information flow is a major concern of IT implementations. It is fundamentally crucial. Access control has been widely used to manage the users' permissions to ensure security of information flow. (Li et al. 2003). It is defined by Rogerson (2004) as a suitable set of control which could be policies, practices, procedures, organizational structures and software functions. According to Åhlfeldt et al. (2007) availability, confidentiality, integrity and accountability are considered the main characteristics security of information flow. Therefore, this study extends the emphasis on that the concepts of security of information flow to stress on its different components which include availability, integrity, and confidentiality. The following further describes the security of information flow's concepts:

1.8.10 Confidentiality of Information

Confidentiality can be defined as the ability to avoid disclosing information to anyone who is not authorized to use it (Pipkin 2000). According to Thompson & Van Solms (2003), the confidentiality of information may be maintained by applying one of the two approaches: first, by restricting access to confidential information, and second, encrypting sensitive business information. This research conceptualizes this confidentiality as authorization of the access to all data on the server, providence of the system log for access to control all events, priority of the physical access control and raising of servers with classified information on isolated networks.

1.8.11 Integrity of Information

Integrity can be defined as the need to ensure that information has not been changed accidentally or deliberately and that it is accurate and complete (SANS. 2006.). Information integrity is a critical issue in the security of information flow. As such, information flow integrity can be thought of as accuracy. Therefore, maximizing information flow integrity requires improving the ability to protect information, data, or transmissions from unauthorized, uncontrolled, or accidental modification. In this present study, integrity of information is conceptualized as maintaining pprovision of

reliable information, preventing the data from alteration or destruction, protection of the privacy of employee and accessibility of all systems by properly authorized persons.

1.8.12 Availability of Information

The terms 'availability' is often associated with service level agreements. In terms of data availability, system availability, application availability, infrastructure availability, etc. According to Shirey (1995), information availability is the property of being accessible and usable on time when required by an authorized entity. In the context of the current study, the following general definition is used (Pipkin 2000). Availability is defined as the state of being able to ensure that users can use any information resource whenever and wherever it is needed in accordance with applicable privileges. In the context of the present study, availability of information refers to continuous availability of all servers to their customers, storing and distributing the data, tolerating hardware failure and backing up the data stored or distributed.

1.8.13 Accountability

Accountability refers to the ability of distinctly deriving performed operations from an individual (Åhlfeldt et al. 2007). There are various groups and individuals that are responsible for different activities regarding security issues. In general, for this study, the assumption is that users should be held responsible for their actions. According to the Concise Oxford English Dictionary, Bacchini(Bacchini 2012), the term responsible is defined as ''being the primary cause of something and so able to be blamed or credited for it; answerable to; morally accountable for one's behavior; capable of being trusted''. Responsibility is then simply described as ''the state or fact of being responsible''. In this study, accountability refers to protecting all systems by anti-virus/firewall, using surveillance devices in the institution, documentation and recordings.

1.9 SUMMARY

This chapter presented a general background of ICTs and its increasing importance recognized at the world level and in particular, in the study area, the MoHSER and universities in Yemen. It also specially stated the problem contextualized to current study area along with the objectives needed to be achieved in carrying out such research and research questions needed to be answered. Moreover, the three proposed hypotheses needed to be tested are stated, and the major significance of the study was presented. The scope of the study which is the role of SISP implementation on the security of information flow performance is also provided in this chapter. The last section of this chapter highlights the methodology adopted to be used as a guideline for achieving the research objectives and answering the research questions including the theoretical part of the study, the conceptual framework, survey design, data analysis model and strategy design proposed to be carried out in the present research. Chapter II introduces the detailed literature review of previous studies on SISP implementation, information needs and security of information flow.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

The SISP approach is a process by which organizations seek to maximize the return on IT investments and improve organizational performance through enhanced and secured information flow. Exploring the SISP implementations is expected to provide further insights into the organizational security of information flow from a planning perspective. This study extends the emphasis on that the concepts of security of information flow to stress on its different components which include availability, integrity, and confidentiality. The overall objective of this chapter is to present the findings generated from the literature on previous studies and experiences of similar initiatives that provide a basis for formulating a methodological and analytical understanding to achieve the aim of the study.

This chapter is composed of four sections. The first section presents definitions of some concept and components used to facilitate our understanding of SISP. The SISP brings about strategic benefits to the organization in such matters as a result of the effectiveness of IT implementation Beaumaster (2002); (Gottschalk 1999a). The first section also discusses the issues associated with the SISP and implementation in relation to information flow. Furthermore, it discusses the SISP Implementation in Education Sectors. The second section presents definitions of some concept and components used to facilitate our understanding of the issues associated with information flow in the MoHESR and universities in Yemen. This research argues that addressing key issues associated with information flow in such organizations is critically important. For instance, Gorrieri et al. (2009) indicates that

information flow analysis is important for examining the confidentiality in ICT systems. The third section discusses the main issues and factors that affect information Flow performance in an organization which include information needs, IT components and security of information flow. Finally, the fourth section is to develop information flow performance framework based on the literature review.

2.2 STRATEGIC INFORMATION SYSTEM PLANNING

This section discusses some relevant concept and components used to facilitate our understanding of SISP. In fact, there is a need to go beyond the technical solutions, to include human, procedural, and awareness factors, as well as proper planning, monitoring, and evaluation of IT implementations. Therefore, the integrated approach to security of information flow is needed, and the SISP approach has the potential to provide such insights from the very beginning. This section presents the key characteristics and benefits of the SISP and explores the potential of SISP implementation in relation to information flow performance. This section is also concerned with exploring the SISP approach for IT implementations. It enhances understanding of the potentiality of the SISP implementation to meet the objectives of the security of information flow specified in the current study. Furthermore, it explores the SISP potential in identifying business needs for enhancing information flow of organizations.

2.2.1 Definition of SISP

According to Abdul Wahab (2004; Doherty et al. ; Salant)(19994), the SISP can be defined as the means of identifying application systems which support and enhance an organizational strategy. It also provides a framework for the effective implementation of these systems. SISP is also defined by Bechor et al. (2010) as "the process of strategic thinking that identifies the most desirable IS on which the firm can implement and enforce its long-term IT activities and policies". On the other hand, Battaglia (1991) states that the SISP is the analysis of organization's information and processes together with the evaluation of risk, current needs and requirements. The result is an action plan showing the desired course of events necessary to align

information use and needs with the strategic direction of the company. Furthermore, the SISP is an exercise or ongoing activity that enables organization to develop priorities for information system development (Abdul Wahab 2004; Doherty et al. 1999).

According to Earl (1993), a complete SISP approach is combination of methods, processes and implementation. Organization invests very large amount of time and money in the SISP project. However, it is a very challenging task to produce an effective plan that achieves business objectives with efficient information systems support as new business strategies and information technologies are both rapidly moving targets (Hevner et al. 2000). In a typical SISP project, a team of key managers, users, selected clients, and IS specialist were formed (Hevner et al. 2000) and planning methodology was chosen. Information security planning is to mitigate risk associated with the processing of information with confidentially, integrity and authenticity (Wylder 2004).

According to Boar et al.(1993) the principles of the SISP are about planning the organization's activities and processes holistically. This plan is assumed to fit into the long term planning of the organization prior to its implementation. The technological aspect is an integral part of the organization's plan. The strategies are formulated by examining the ways in which technology may help the organization and how it can support customer needs. The SISP principles can be summarized in Figure 2.1.

The figure below shows how the SISP works within the holistic framework of the organization. The combination of business process and technology integration, the individual's capability to accept changes, organizational direction such as vision and mission are integrated together with holistic views of organizational processes to gear up the SISP. This planning process defines IT directions of the organization and also the way to achieve its target. The complete strategy of the organization fosters a holistic plan of IT application in order to fix and support the effectiveness of the organization (Hackney et al. 2000).

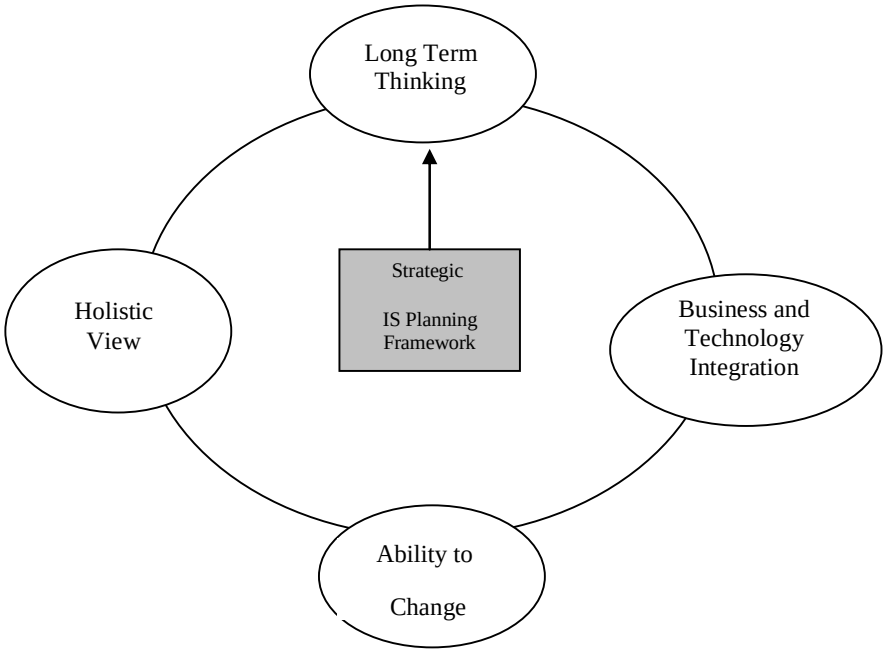

Figure 2.1 Basic SISP Principles

2.2.2 Benefits of SISP

According to Kearns & Lederer (2000), the SISP has increasingly become the main agenda for organizations to enhance their performance. The SISP provides a wide range of benefits to organization including organizational improvements in terms of information flow. Furthermore, what is most important is that it enhances the organization's competitive advantage by improving information flow performance. Essential benefits of the SISP have been identified by researchers based on the following reasons:

a) Bring into line, IT with business needs (Cragg et al. 2002; Lederer & Hannu 1996).
b) Integrating IT into an organization, and promote organizational competitiveness (Lee & Bai 2003);
c) Effectiveness of IT implementation (Beaumaster 2002; Gottschalk 1999a).
d) Helping to identify strategic applications by information executives and top management (Lederer & Sethi 1988) .

e) Justify IT investments by addressing the expectation out of such investments (Fane 2004; Parker 1995).
f) Planning the flow of information and processes (Cassidy 2005).

Studies have shown that the SISP assists managers in determining the new IS and IT strategies, allocating specific resources, positioning suitable applications and gaining competitive advantages (Basu et al. 2002). This is essential for an organization because the measurement of organization's success is based on the return on the money invested in IT. Thus, the SISP plays an important role in management functions since it can help organizations to use IT more competitively and identify new higher payback applications and better forecast on IT resource requirement (Basu et al. 2002). Furthermore, the picture that emerges from previous studies portraits the SISP as a relatively successful management process.

Based on previous researchers (Galliers 1987; Lederer & Sethi 1988; Wilson 1989), the findings seem to be consistent in reporting and indicating that most of IS managements are satisfied with the SISP implementation for organization performance Also found that the perceptions of the management improved as the organization moves from its first SISP exercise to subsequent SISP exercises. Lederer & Sethi(1988) broke down the SISP process into a number of component parts and measured the satisfaction of the IS planners they surveyed with each component part individually. They found out that there were considerable differences in their satisfaction. Whilst over half of them were satisfied with the SISP methodology used, this fell to less than one third for the SISP implementation.

According to Basahel (2010) SISP support(s) the success of an organization when an implementation is successful. Successful implementation means alignment of the results of SISP with the business needs (Clarke 2001). Alignment of IS-business is important in evaluating SISP. The latter seeks to affect the firm beneficially; one way of doing so is the fit between IS projects and the firm's objectives: 'Alignment is the degree to which the information system plan reflects the business plan' (Lederer & Hannu 1996). It has been suggested that alignment is one of four dimensions

used to evaluate SISP success. Here, alignment means the linkage between IS strategy and business strategy (Grover & Segars 2005; Silvius 2009; Thompson 1995).

Regarding the benefits obtained from implementing the SISP in Irish companies, (Finnegan & Fahey 1993) identified the following benefits from such implementations:

(i) New projects are justified
(ii) It provides a basis for IS budgets
(iii) The performance of the IS department can be judged more fairly
(iv) A strategy for technology selection is set
(v) Business managers become better informed and more involved in IT
(vi) Scarce IT resources are allocated more wisely
(vii) Emergency IS projects are avoided
(viii) Business programs are more assured of IT requirements.

Earlet al.(Earl ; Segars & Grover 1999) demonstrated that the success of implementing the SISP varies according to the SISP approach with the administrative and technological approaches being the least successful and the organizational approach being the most successful.

Obviously, the SISP brings about strategic benefits to the organization in such matters as effectiveness of IT implementation (Beaumaster 2002); (Gottschalk 1999a). However, effectiveness implies addressing issues associated with IT implementation at the planning level. Thus, this research argues that addressing key issues associated with the SISP implementation is critically important in improving information flow performance of organizations. For instance, Gorrieri et al.(2009), indicated that information flow analysis is important for examining confidentiality in ICT systems. Furthermore, based on the aforementioned benefits of the SISP, this research argues that information flow performance of organizations can be improved by identifying the right business needs. By so doing, appropriate applications and programs can be determined to streamline the organization's operations through effective and efficient

information flow. The effectiveness of IT implementations is also assessed in comparison to clear organization's strategic business goals and objectives.

Most importantly, achievement of such strategic goals and objectives is also reliant of continuing and reliable supply of relevant information for strategic decisions. In addition, the SISP is assumed to bring about results as expected. Substantial investments are put in to achieve the planned results and meet the expectations. Improved information flow performance of organization is one of the outmost objectives of the SISP investments. By so doing, such investments are mainly made in order for information flow to be significantly improved. Improved flow of information across the organization enhances its competitiveness by which the SISP investments are therefore justified.

2.2.3 The SISP Approach

Rather than merely being a methodology, the SISP approach is an integration of methods, processes and implementations as well as varieties of activities and behavior upon which organizations have reflected (Suhaimi 1998). According to Doherty et al. (Doherty et al. 1999) , an SISP approach comprises a mixture of techniques, elements, or procedures from different SISP methodologies. As a comprehensive approach, the SISP is not only based on certain techniques, but it involves some formal activities and some informal behavior. The necessary elements in the approach include methods, styles, processes, a focus and probability of implementation. There are five approaches to the SISP as suggested by (Earl 1993; Pita 2007) and they include organizational, administrative, method driven, business led and technological approach. These approaches have gained credence from an assessment of the extent of the rationality and adaptability of the planning process (LIU et al. 2008).

The organizational approach assumes that the SISP is based on a continuous integration of organizational and IT functions. The function of IS works in a close partnership with the rest of the organization, especially with managers and executives (Earl 1993). This approach emphasizes on management understanding and

involvement. Through this approach, the concept of learning organization is important in the development and implementation of the SISP.

I. The administrative approach concerns the alignment between organizational planning and IT resources of the organization. In this approach, allocation of suitable organizational resources in the planning process is important to ensure the success of SISP. This approach works in tandem with the normal financial planning. The benefit of this approach is that everybody knows about the procedures and all users have the opportunity to submit their proposals.

II. The method driven approach is about using specific SISP methodologies to ensure the success of SISP adoption. Effective utilization of SISP methodology helps in gaining an opportunity from the SISP process. The technological approach stresses the development of SISP process based on suitable/available technology and resources of the organization. Its emphasis is placed on the assumption that any given IS oriented model of any business is a necessary outcome of the SISP. Therefore, analytical modeling methods are appropriate to be applied in this approach (Earl 1993).

III. The last approach is the business led approach. This planning approach highlights the organizational process and activities in the development of the SISP. Affective organizational planning is expected to guide a suitable technological infrastructure to fit in with the organization's needs for information technology. Studies by Earl (1993) and Suhaimi (1998) indicate that the organizational approach with characteristics such as good alignment, analysis, co-operation, implementation, capabilities, satisfaction and contribution is the best approach in the SISP as compared to the other approach.

Pita et al. (2008) empirically analyze the five SISP approaches and investigate the covariance between these five approaches. The result reveals emerging relations between the approaches. The covariance between Administrative and Technological and between organizational and business-led approaches is strongest. Administrative approach has a strong influence on organizational and business-led approaches. The