Barriers of Electronic Information Sharing in Higher Education Sector

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Abstract: Information sharing is one of the important aspects that improve the quality of businesses and organizations. Furthermore with the advent of Information and Communication Technology (ICT), the trend of sharing has moved to electronic information sharing which is increasingly needed to support decision making in any government agencies, government link agencies including university. Higher education sector plays an important role in any country for the development and enhancement of the quality of human, society and nation; thus, universities have its own rule and control. Therefore, the objective of this research is to identify the electronic information sharing barriers in higher education. The research contributed by investigating five barriers of electronic information sharing in higher education sector. These barriers have been examined by adopting Technical Organization Environment (TOE) framework and Layered Behavior Model (LBM).

Key words: Information, communication, businesses, model, environment

INTRODUCTION

Information is based on data thus, it is important for this study to first giving some highlights on data. Data can be identified in many ways for example: words, figures, voices and numbers which can be gathered by different pathways such as experiment, observation and research and eventually can be applied in order to make graphs, statistics and reports (Kendal and Creen, 2006; Higgins *et al.*, 2014). Example of data shared between public universities and MOHESR include individual student such as name and result. Information is a processed of data which is attained after data is processed and refined, transformed and shaped into a structured manner in order to make it helpful, significant, comprehensible and clear to any individual (Harry, 1994).

Traditional information sharing means exchange the information between one person to another in another word, exchange information between a sender and receiver. Thus, information sharing is based on the personal behavior and self interest to share his or her information to others (Constant *et al.*, 1994; Razavi and Iverson, 2006). Jarvenpaa and Staples (2000) state, "information sharing embeds the notion of 'willingness to share.' Volition distinguishes information sharing from involuntary information reporting. Information sharing is a voluntary act of making information available to others... sharer could pass information on but doesn't have to." Examples of information shared between public universities and MOHESR consists of the exchange of student's reports, employees' reports, policies, rules, suggestions scholarship documents.

Recently, information sharinghas been hugely improvised by using information technology (Constant *et al.*, 1994; Williams, 1997; Volkoff *et al.*, 1999; Jarvenpaa and Staples, 2000). Thus, it has been used widely in the last few years in public sector because the internet and smart phones (Cairns *et al.*, 2011). Information now is available for the user in anytime and anywhere (Cairns *et al.*, 2011). In the last 15 years, public sectors have shifted from information protection principle into cross-organization information sharing. This shift happened based on three main keys: "events such as 9/11 that underscored the failure of prior governmental information sharing practices; policy changes that emphasized cross-government coordination to improve efficiency and reduce waste as evidenced in welfare reform and health care informatics and changes in technology that allowed organizations to exchange information based on standard transmission and information exchange protocols" (Yang and Maxwell, 2011). The next section will explain the electronic information sharing in public organization in details.

According to human actions a person is willing to share information with other people (Rioux, 2005). The sharing of information can be used as an approach to improve the relationship and social network between the givers and receivers (Marshall and Bly, 2004). Information sharing usually use simple technologies such as face-to-face conversations (Rioux, 2005; Rioux *et al.*, 2005). Marshall and Bly (2004) found out the function and value of information sharing by discovering three reasons of why people share their information with others:

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- To establish mutual awareness between information giver and information receiver
- To educate or raise consciousness
- To develop rapport

Electronic information sharing causes many challenges in public organization. These challenges are the result of the electronic information sharing among different kinds of public organizations within different level and background such as central organization and its sub. Thus, there is a need for collaborations between public organizations to provide better public services to citizens (Bigdeli, 2012). The sharing can be done by crossing the barriers that public organization face.

The revolution of information system has transformed information sharing into electronic information sharing or the sharing of information electronically (Lands Bergen and Wolken, 2001). Theoretical models proposed by Dawes (1996) and Lands Bergen and Wolken (2001) are considered as the first information sharing and electronic information sharing models, respectively (Estevez *et al.*, 2010). These models adopted information sharing of government agencies to make information sharing possible. With the advent of ICT and internet, the form of information sharing had been electronically upgraded.

Electronic information sharing means sharing the information electronically by using ICT such as internet, email, phone, mobile and websites (Akbulut *et al.*, 2009).

The electronic mode of information sharing increases and doubled up the transfer of information amount which can help the decision makers to make better and faster decisions (Akbulut *et al.*, 2009; Bigdeli *et al.*, 2013).

Electronic information sharing barriers in public sector: Pardo and Tayi (2007), pointed out four barriers of electronic information sharing in inter-organizational. Figure 1 shows the four barriers of information sharing and integration based on Pardo and Tayi (2007) research.

Fig. 1: Four barriers of electronic information sharing (Pardo and Tayi, 2007)

Policy and social environment: The first layer refers to standards, rules and policies of electronic information sharing between government organizations. This layer consists of many influencial factors that have positive and negative effects on inter-organizational information sharing such as policy concerns, legislation, economic and political situation (Pardo and Tayi, 2007). Legislations, policies and politic factors are the most influencial factors in electronic information sharing, so they need to be required. Electronic information sharing development and implementation are costly with tangible resources (for example money, people, equipment, etc.) and intangible resources (data and information). Moreover, benefits of electronic information sharing project between government organizations are still not clear. Therefore, governments prefer to spend their budget on other information technology projects.

Inter-organizational setting: The second layer refers to external challenges that affect information sharing in organization. Inter-organizational relationships and network collaborations have strong effect on information sharing (Pardo and Tayi, 2007). Goals of adopting electronic information sharing project are quite diverse between organizations (Navarret *et al.*, 2010). Thus, this difference of sharing goals and objectives between the government organizations can be identified as one challenge. Leadershipcan be an influence factor of electronic information sharing (Gil-Garcia *et al.*, 2007; Zheng *et al.*, 2009). Leadership at all levels plays a significant role in order to define the rules and situation for the individuals involved. Trust among inter-organizational can be identify as strong influence factor of electronic information sharing (Pardo and Tayi, 2007; Gil-Garcia *et al.*, 2010). Thus, creating a good environment trust among organizations can be seen as an important step to establish successful electronic information sharing project. Furthermore, financial matters can influence electronic information sharing in public organization. Because organizations need financial capability to procure and develop hardware, software as well as improve the level of IT skill of employees (Kim, 2006).

Organization/business processes: The next layer refers to organization and business process factors that influence information sharing in organization. In general, information systems have strong influence on the work process of organizations as these systems embed the processes and information flows in complex software (Pardo and Tayi, 2007). Information sharing and integration involves mutually adjusting work processes of

multiple organisations. It requires not only a technical transformation but also change in decision-making policies and in the mind-set of the employees. Therefore, change in processes, functions and management mind-set, especially in the public sector, represents a key issue (Lam, 2005). However the development and adjustment of separate processes, information flows and workflows is an extremely complicated task, resulting in a significant reduction in overall integration cost as the integration time and maintenance would be reduced.

Technology solution: In order to develop information sharing project, it is necessary to purchase and/or develop software, hardware and telecommunication technologies. However, ICT infrastructure is considered as an important challenge of electronic information sharing (Jing and Pengzhu, 2007). Moreover, information sharing could be based on sharing and accessing information from multi data sources, such as documents, images and text files. Therefore, this diversity of resources would cause many critical problems like different data format and information and incompatibale software and hardware. As a consequence to solve these problems, organizations should develop data standards, construct ontology systems and design interoperable applications to provide a structure to across heterogeneous and unstructured resources (Wixom and Watson, 2001; Lam, 2005; Pardo and Tayi, 2007). One of the biggest challenges in information sharing is when different organizations in different locations shared huge amounts of data and information that have different format and store in different platforms. This situation caused many kinds of factors including information quality, security, accuracy, consistency and completeness.

Pardo and Tayi (2007) identified the main challenges of electronic information sharing which can be used to show the barriers of electronic information sharing in this study.

Electronic information sharing barriers in higher education sector: The limitation of research in academic area of electronic information sharing (Bigdeli *et al.*, 2013b) gives more encouragement to develop a theoretical model that enables the influence factors affecting public organizations electronic information sharing to be identified and categorised (Akbulut *et al.*, 2009). Electronic information sharing in this study is viewed from an innovation perspective. An innovation represents an idea, practice or object that is perceived as new by the unit of adoption (Rogers, 1995). As such an innovation might refer to a new technology or a renewal in terms of thought and action (Thong, 1999). Electronic

information sharing between universities and Ministry of Higher Education and Scientifc Research typically requires the introduction of new technologies and new ways of thought and action. Moreover, decision making about adopting inter-organizational systems that assists information sharing has become essential to researchers in information systems field (Pardo and Tayi, 2007). In the last decade, many studies have described and analyzed different kind of factors that have affect in environment, intra-organizational and inter-organizational of adoption information sharing in government (Bigdeli, 2012b).

Technology organization environments based on the adoption of technologies and innovations in organization. Therefore, the adopted Technology Organization Environment (TOE) framework developed by Tornatzky and Fleischer (1990) was selected as a guide for the investigationin this study. The framework has been successfully utilized to explain the adoption of diverse information technologies, including inter-organizational systems (Iacovou *et al.*, 1995; Chau and Tam, 1997; Ramamurthy *et al.*, 1999). These studies have demonstrated consistent support for TOE's ability to provide a comprehensive perspective on innovation adoption while facilitating the flexibility to identify and categories unique factors that may emerge in particular situations (Zhu *et al.*, 2003).

The main reason for selecting this framework is due to its potential to address the issues in this study. According to Kurnia and Johnston (2000), any adapted frame work needs to be developed and refined to match the context it is applied to within a certain period of time. As mentioned earlier most of the previous studies on electronic information sharing focused on factors in which they assumed that the outcomes of technology adoption are determined by a number of variables known as factors identified at a particular time (Rukanova *et al.*, 2009).

Layered behavioral model was used to measure the effect of software development processes from the individual level till the external level (Curtis, 1988). Thus, it was utlized to analyze how the prolems of software can affecte the software productivity and quality through their impact on individual, social and organizational processes (Curtis, 1988). Individual refers to effect of person on the use the software or any technological project. Moreover, the evaluation of software project should be start from individuals to teams and projects, in order to determine the impacts on person to scale-up to an impact on technological project.The layered behavioral model should analysis the project as a system with multiple levels thus, the software project should be cheak base on the company. Business milieu refers to external influences from other as co-contractors or as customers.

However, there is a different between software projects and electronic information sharing, but there are enough reasons to adopt the layered Behavior Model in this research. First, the electronic information sharing is complicated and multi-layered creative activities as software project. Second, both of their purposes are to explore what and how the problems (factors) affect the activity processes at different levels. Third, layered behavioral model extends the scope from individual organizational project into inter-organization project. Therefore, LBM can be more suitable for this study. Fourth, the LBM includes the individual context which can use to provide explanation and understanding of effect of behavior of participation in electronic information sharing which has not been studied in electronic information sharing in higher education sector before. Fifth, this model was successfully tested in qualitative research in electronic information sharing among public organizations (Jing and Pengzhu, 2009) and not yet in higher education. Finally, it can set up to assist the research in order to analyze and answer the research questions of this study.

This study structures the exist challenges of electronic information sharing. Thus, in order to identify the these challenges, by the concepts of "Layered Behavioral Model" the model need to be adopted in order to achieve the ojectives of this study. According to (Jing and Pengzhu, 2009) the individual level refers to influences of particpation behvaior in electronic information sharing. Technology layer refers to technological contexs that influence the electronic information sharing project (Bigdeli, 2013a). According to Yang and Maxwell (2011), the technological issues are the most influence in adoption electronic information sharing between public organizations. Therefore, this study investigates the electronic information sharing in higher education based on technological point of view by discover the effect of cloud computing and social media on electronic information sharing. Organization layer mean the internal factors that have an influential effect on government agencies, thus encouraging the staff to share information with other agencies (Akbulut *et al.*, 2009; Akbulut, 2011). In this study agency layer points to the effect of university on participation of electronic information sharing. Finally, there is in extra influence of participation from the outside the university which called external environment layer (Bigdeli *et al.*, 2012; Jing *et al.*, 2014). Based on TOE and LBM the barriers of electronic information sharing in higher education sector have been discovered.

Individual barrier: Individual barrier focus on the employees in organization (Kamal *et al.*, 2012; Mohammed *et al.*, 2015). The employees in organization

is an important entity because the exchange method is based on them. Individual plays a crucial role in order to manage organization with assist by technology and almost dependent on information in making decision and provide service to the citizen. Organizational members' expectations prior to the initiation of information sharing activities will influence the attitude and initiative of employees towards the sharing process (Jing *et al.*, 2014). Most government leaders and staff have realized the benefits of information sharing (Kamal *et al.*, 2012; Jing *et al.*, 2014). When the staff knows the benefits of information sharing that can make them share more (Mendes Calo *et al.*, 2012).

ELECTRONIC INFORMATION SHARING BARRIER

Electronic information sharing has characteristics that affect the means of electronically sharing information among government agencies (Akbulut, 2003). A number of characteristics affect electronic information sharing such as cost (Yan *et al.*, 2009; Jing and Pengzhu, 2009; Estevez *et al.*, 2010; Bigdeil *et al.*, 2012; Mohammed and Huda, 2014) and benefits and risks (Jing and Pengzhu, 2009; Tie-nan *et al.*, 2010; He-Jiang, 2010; Yang and Maxwell, 2011; Bigdeil *et al.*, 2012; Dawes *et al.*, 2012).

Technological barrier: Technological characteristics refer to the use of external and internal technologies to establish relationships and collaboration among government agencies (Bigdeli *et al.*, 2012). Kamal *et al.* (2012) indicate that information sharing and technology are practically linked with each other because information sharing is considered an IT project (Yang and Maxwell, 2011). Technology builds a good platform for creating a safe atmosphere within each agency thus, allowing the environment to measure the security of information sharing (Kamal *et al.*, 2012; Mohammed *et al.*, 2015). For technological characteristics, IT is an effective and efficient tool for agencies for enhancing interagency collaboration (Yang and Maxwell, 2011; Bigdeli *et al.*, 2012) besides information quality (Bigdeli *et al.*, 2012), compatibility and complexity (Akbulut *et al.*, 2009). Data warehouse is also considered as information technological system (Jiang *et al.*, 2011) thus, it can be included in this context.

Organizational barrier: Organizational characteristics refer to the internal factors that have an influential effect on government agencies, thus encouraging the staff to share information with other agencies (Akbulut, 2003). Researchers have recognized the importance of providing rich sources of electronic information sharing, especially in the e-Government field (Yang and Maxwell, 2011; Mohammed *et al.*, 2012; Bigdeli *et al.*, 2012, 2013a; Jing *et al.*, 2014).

Fig. 2: Electronic information sharing barriers in higher education

Environmental barrier: Environmental characteristics denote the effects of the environment on the operations of government agencies (Akbulut, 2003). Researchers have cited the numerous influential effects from the external environment that the agencies cannot ignore (Jing and Pengzhu, 2007b, 2009; Bigdeli *et al.*, 2012). A number of environmental factors have been examined in e-Government, such aspolicy/legal framework and trust (Akbulut, 2003, Akbulut *et al.*, 2009; Jing and Pengzhu, 2007b, 2009). Figure 2 shows these five barriers of electronic information sharing in higher education sector.

CONCLUSION

Electronic information sharing considers as an important project in order to provide information and deliver services. Moreover, it can reduce time, effort and cost of getting information in order to support decision making. The objective of this study is to investigate electronic information sharing barriers. Five barriers have been examined named individual, electronic information sharing, technological, organizational and environmental. This study suggests the further studies to investigate more barriers. More model and framework should be used to find these barriers. Moreover, electronic information sharing factors should been found for each barriers. In general, there are few studies about electronic information sharing in higher education sector. Thus, future studies need to be done in this environment.

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