Influence Factors 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. Furthermore with the advance of information and communication technology (ICT), electronic information sharing is increasingly needed to support decision making. Ministry of Higher Education and Scientific Research (MOHESR) in Iraq has decided to give the ability of making decisions to its universities to let them make their decisions by themselves. Unfortunately not all the Iraqi public universities are able to make their decision because limitation of experience and resources, such as information. The limitation of electronic information sharing between universities and MOHESR is considered as a huge gap in order to increase the universities’ information. Thus, this study found out the theoretical framework with the influence factors of electronic information sharing between them. Finally, this framework can increase the participation of electronic information sharing between Iraqi public universities and MOHESR.

Keywords: Information sharing, Influence factors & higher education sector.

I INTRODUCTION
Information sharing refers to the exchange of information among employees within or outside an organization for effective decision making (Dawes, 1996). Information sharing arises from the complexity of solving problems on the delivery of services to public organizations (Bigdeli, Kamal, & deCesare, 2011). Iraqi public universities use ICT, such as the internet to get the information and knowledge for the purpose of scientific research, and also it uses to share information between universities staff and MOHESR (Mehdi & Ahmed, 2011). The limitation of electronic information sharing is considered as a big gap between Iraqi public universities and MOHESR (Mahmoud, 2010; Husain, 2013; Ali, 2013). This problem currently exists among Iraqi agencies and has been recognized by public universities in Iraq (UNESCO, 2011; Al-Aqaby, 2012). In general, current higher education in Cambodia has difficulty to coordinate among agencies in terms of information sharing (Vicheth, 2012). Moreover, Educational government in South Korea feels that it is necessary to share information among education agencies to attain efficient and effective processes (Kim, 2006). Finally, according to Miskon (2013), Malaysian higher education important plan for the next years is to manage communication and information sharing. However, electronic information sharing has different categories of benefits, such as technical, organizational, inter-organizational and environmental (Estevez, Filottrani, Janowski & Ojo, 2011).

II LITERATURE REVIEW
The studies about the electronic information sharing are limited (Akbulut et al., 2009; Bigdeli et al., 2013b). Bigdeli, Kamal & de S (2012), identify electronic information sharing factors to enhance decision making in Local Authority Government (LAG) in United Kingdom. Their research is based on five main characteristic that influence Inter-organizational system (IOS), these characteristics are:

A. External Environment
External environment has direct effect on information sharing between departments in authority operates (Pardo and Tayi, 2007; Akbulut et al., 2009). Political pressure has influence on central government to decision-making processes of local authorities. This pressure also can affect the collaboration network, design, implementation and adoption of inter-organizational systems (Fedorowicz et al., 2007). Economic pressures mean that the central government economic may affect inter-department collaborations at a local level (Fedorowicz et al., 2007). Information sharing needs policies to create an environment to share information effective among departments (Bigdeli et al., 2012). Community pressures are data privacy and data protection because they have influence on decision of sharing personal information or not in departments (Bigdeli et al., 2012).

B. Organizational Environment
Electronic information sharing between organizations’ departments based on collaboration and network relationship (Gil-Garcia et al., 2009; Fedorowicz et al., 2007; Pardo & Tayi, 2007). Inter-
organizational leadership is the ability and commitment of top management to provide optimistic support for electronic information sharing of inter-departmental (Bigdeli et al., 2012). Return on Investment refers to the analysis of costs and benefits of information sharing in tangible and intangible ways because they may have influence effect on decision-making of building electronic information sharing (Bigdeli et al., 2012). Network collaboration culture refers to network collaboration between departments in order to delivery and manages public services (Bigdeli et al., 2012). Organizations have complex network collaboration among its departments (Gil-Garcia et al., 2007). Authority size can consider as one of the factors of electronic information sharing in inter-departmental (Bigdeli et al., 2012). Size of organization can be measured base on resources of organizations, volumes of transaction and size of workflow (Akbulut, 2011).

C. Technology Environment

Technological factors refer to effect of technical characteristics on electronic information sharing in inter-departments (Bigdeli et al., 2012). IT capabilities are the ability of applying effective IT in department to share information electronically with others (Bigdeli et al., 2012). Data security and privacy are considered as one of the important factors in the collaboration context of inter-department (Bellamy and Raab, 2005; Nash, 2008). The limitation of data security and privacy is reducing public trust and confidence in a department because of the disability of sharing personal information (Bigdeli et al., 2012). In order to make successful information sharing in inter-department, it is necessary to use good quality of the information (Klieschewski and Scholl, 2006). Information quality can improve the collaboration among departments and can enhance the quality of service that is delivered to the public (Bigdeli et al., 2012). Interoperability framework refers to compatibility standards of adopting information system among organizations (Dos Santos and Reinhard, 2007). Technical interoperability means the use of integrated information systems among government organizations to enable them to work together by using common standards to integrate work processes (Bigdeli et al., 2012).

D. Electronic Information Sharing Characteristics

Electronic information sharing characteristics refer to factors that may encourage organization or not to participate in electronic information sharing. Two different opinions exist with regard to the cost of electronic information sharing in the public organization. Firstly, cost has negative influence on electronic information sharing in organization (electronic information sharing; Fedorowicz et al., 2010). Secondly, cost can inspire role of departments by encouraging them to establish such initiatives (Gil-Garcia et al., 2009). Benefits refer to the benefits that organization will gain when sharing information electronically with others (Bigdeli et al., 2012). Benefits of electronic information sharing in inter-department in public sector can give more encouragement to departments to share their information (Gil-Garcia et al., 2007).

E. Inter-departmental Environment

It refers to relationship among departments and also their business and operational processes (Bigdeli et al., 2012). Business process is an important issue in the context of electronic information sharing in inter-department (Pardo and Tayi, 2007). The usefulness of electronic information sharing in public organization would be only to save budget and enhance performance if the decisions and business processes are not aligned or merged (Fedorowicz et al., 2007). Electronic information sharing is strongly based on network and collaboration relationship where these depend on mutual trust (Gil-Garcia et al., 2009). Critical Mass refers to the number of departments that shares or will share their information electronically in (Bigdeli et al., 2012). Depend on the above arguments, many important gaps can be found in the current studies:

- Electronic information sharing studies in vertical or horizontal functioning between government organizations are so limited.
- Previous studies on electronic information sharing were done when the information technologies were not as advanced as they are today.
- Electronic information sharing studies mainly focus on the use of multi databases that creates several limitations, like availability and accessibility of data and information. Moreover, multi-databases make technical incompatibility, such as...
different data format, different data definitions, standards of data transmission and integration of information as well as quality of information.

- Electronic information sharing studies are few and all of the proposed frameworks and models based on government sectors without any focus on higher education sector.
- So far there is no any vertical electronic information sharing in inter-organizational in public organization in Iraq.

III THEORETICAL FRAMEWORK

Adopted Technology Organization Environment (TOE) framework developed by Tornatzky and Fleischer (1990) to guide the investigation of this study. Moreover, the main reason for selecting this framework is that this approach has the potential to address objectives of this study. According to Kurnia and Johnston (2000), any adapted framework needs to be developed and refined to match the context it is applied to within a certain period of time. However, this study has used social exchange theory and critical mass theory to investigate the factors that influence electronic information sharing between Iraqi public universities and MOHESR. These theories had been applied in electronic information sharing studies. The framework of this study consists of four characteristics named, electronic information sharing, technological, organizational and environmental. Figure 1 shows the theoretical framework of this study.

A. Electronic Information Sharing Characteristic

Electronic information sharing has characteristics that affect the means of electronically sharing information among government agencies (Akbulut, 2011). A number of characteristics affect electronic information sharing, such as information quality (Yan et al., 2009; Estevez et al., 2010; Bigdeil et al., 2012), and benefits and risks (Tie-man, Juan, & Ai-li, 2010; He-Jiang 2010; Yang & Maxwell, 2011; Bigdeil et al., 2012). This study focuses on the following factors:

1. Benefits

Benefits pertain to the possible gains of sharing information electronically among agencies, such as less cost, highly accurate information, and reduced time (Yan, Sun, & Wang, 2009; Jing & Pengzhu, 2009). Staffs members in Iraqi public organizations have lack good understanding of the usefulness of government in electronic sharing information, which reduces the significance of increasing electronic information sharing in Iraqi government (Alwan & Abdurrahman, 2010; Ahmed, Jasem & Hassan, 2012). Hence, it is hypothesized that:

\[ H_1: \text{Benefits will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.} \]

2. Risks

Similar to benefits, government organizations consider the risks relative to the projects of electronic participants (Yan, Sun, & Wang, 2009; He-Jiang, 2010). Several huge risks of sharing information among agencies exist, such as making important information available to strangers (Estevez et al., 2010). The risks are considered as the main factors for increasing information sharing among the Iraqi public organizations because government information is secured from threats and malicious acts, thus increasing the level of trust and confidence between these organizations (Alwan & Abdurrahman, 2010; Abdul-Alrahman, 2011; Salman, Abdul-Majeed & Ismaeel, 2012; Ahmed, Jasem & Hassan, 2012; Al-Shakarchy, 2013). Hence, it is hypothesized that:

\[ H_2: \text{Risks will have a negative effect on electronic information sharing between Iraqi public universities and MOHESR.} \]

3. Costs

The costs of electronic information sharing refer to the costs of obtaining the useful technology for sharing, including the system, installation, implementation, migration, integration, interface,
training, maintenance, and communication costs (Jian & Pengzhu, 2007b, 2009; Estevez et al., 2010). Finance is one of the largest issues in Iraqi agencies because the money that the agency obtains is inadequate to purchase hardware, software and training staff to develop a real basic for increasing electronic information sharing (Abdul-AlRahman, 2011). Hence, it is hypothesized that:

\[ H_1: \text{Costs will have a negative effect on electronic information sharing between Iraqi public universities.} \]

B. **Technological Characteristics**

Technological characteristics refer to the use of external and internal technologies to establish relationships and collaboration among government agencies (Bigdeli et al., 2012). Kamal, Singh, and Ahmed (2012) indicate that information sharing and technology are practically linked with each other because information sharing is considered as an IT project (Yang & Maxwell, 2011). This study focuses on the following factors:

1. **IT Capability**
   IT capability pertains to the use of technological sources and experiences in government agencies to encourage employees to electronically share information (Jing & Pengzhu, 2009). The IT skills of staff and availability software and hardware have influential effects in and within the Iraqi public organization. The increment of IT capabilities in the public organizations in Iraq increases electronic information sharing (Alwan & Abdurrahman, 2010; Mahmoud, 2010). Moreover, the lack of infrastructure and a huge gap in the IT skills between government agencies are evident (Ahmed, Jasem & Hassan, 2012). Hence, it is hypothesized that:

\[ H_2: \text{IT capability will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.} \]

2. **Information Quality**
   The quality of government services provided to the public enhances the relationship between government agencies and citizens and improves the efficiency of interactions (Prybutok, Zhang & Ryan, 2008). Information quality consists of several characteristics, such as timing, accuracy, credibility, and adequacy of information sharing (Xiao-rong & Sui-cheng, 2010). However, decision makers in Iraqi public universities pay more attention to obtaining high quality information because this approach allows them to make the best decisions (Muhii, 2009; Asim and Ibrahim, 2013).

\[ H_3: \text{Information quality will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.} \]

3. **Compatibility**
   Compatibility refers to the capacity to provide equal levels of software, hardware, and skills in each government agency (Estevez et al., 2010; Bigdeli et al., 2012); it consists of organizational and technical compatibility. Organizational compatibility pertains to the compatibility in the skills of staff at every level of government that can help in electronic information sharing (Jing & Pengzhu, 2007b, 2009). Technological compatibility refers to the unification of information technologies (software and hardware) required from the staff to electronically share government information (Akbulut, 2011). Abdul-AlRahman (2011) cited the incompatibility of software and hardware as one of the technical barriers and the incompatibility in staff skills and experiences as one of the organizational barriers in Iraqi public organizations. Hence, it is hypothesized that:

\[ H_4: \text{Compatibility will have a positive effect on electronic information sharing between Iraqi public universities.} \]

4. **Complexity**
   Complexity refers to the degree to which participation in electronic information sharing with organizations is perceived as a relatively difficult process (Akbulut et al., 2009). Some public organizations decided to stop using information systems because of the complexity of these systems (Akbulut, 2011). Iraqi organizations require consideration of a number of technical issues thus they need to include new change to their operational systems (E-Iraq, 2014). Hence, it is hypothesized that:

\[ H_5: \text{Complexity will have negative effect on electronic information sharing between Iraqi public universities and MOHESR.} \]

5. **Data Warehouse**
   Data warehouse provides solutions for issues regarding electronic information sharing because the DW establishes a platform for achieving electronic information sharing (Culing, Tianhe & Guojun, 2006; Qi & Quan-hong, 2011). Moreover, electronic information sharing can be established directly by using email and indirectly by using data repository
such as data warehouse (Akbulut et al., 2009). The central information system of government agencies can assist in improving information sharing (Yang, Zheng, & Pardo, 2012). According to Ahmed, Jasem and Hassan (2012), Iraqi departments that belong to the same level should have a common database to foster information sharing and increase interaction. Moreover, Hamad and Asman (2010), data warehouse can enhance the performance of the Iraqi universities, increase the interaction among them and improve the quality of inserted information. Hence, it is hypothesized that:

**H₇:** Data warehouse will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.

C. Organizational Characteristic
Agency 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 et al., 2009; Akbulut, 2011). This study focuses on the following factor:

1. Top Management Support
Top management support refers to the support of top managers that can create a better environment in which employees are encouraged to share information with other agencies (Akbulut, 2011; Kamal et al., 2012). Alwan and Abdurrahman (2010) cited top management support is one of the important factors for the Iraqi public organization because it is necessary to encourage the staff to participate. Additionally, the Iraqi government system requires political leadership and strong management to support efforts to encourage the staff to become more creative (Fadhelalla, 2012). Hence, it is hypothesized that:

**H₈:** Top management support will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.

2. Collaboration
Good network collaboration among organizations can increase and manage the delivery public services (Gil-Garcia et al., 2007), that can allow information to be shared efficiently. Collaboration is needed because of difference of culture and commitment between participants. Moreover, it has been known as a complex processes within long time to achieve the objectives and goals of organizations (Pardo and Tayi, 2007). Iraqi government organizations need to increase the collaboration between them (Alwan & Abdulrahman, 2010). Hence, it is hypothesized that:

**H₉:** Good collaboration will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.

3. Size
Size refers to the effects of organization size on electronic information sharing (Akbulut, 2011). Some large organization uses electronic information sharing since a traffic records division was already in place, along with a workforce responsible for data entry and IT staff to support the initiative. Interestingly, an increase in size did not necessarily translate into electronic information sharing (Akbulut et al., 2009). However, some small agencies, especially those with supportive top management, were found to be more innovative and willing to share information electronically (Bigdeli et al., 2012). Therefore, this study suggests that the size of the university can affect the interaction and information sharing with MOHESR. Hence, it is hypothesized that:

**H₁₀:** Large size will have positive effect on electronic information sharing between Iraqi public universities and MOHESR.

D. Environmental Characteristic
Environmental characteristics denote the effects of the environment on the operations of government agencies (Akbulut, 2011). Researchers have cited the numerous influential effects from the external environment that the agencies cannot ignore (Jing & Pengzhu, 2007b, 2009; Bigdeli et al., 2012). This study focuses on the following factors:

1. Policy/Legal Framework
Jing and Pengzhu (2009) indicated that policy and law is one of the important factors in the electronic information sharing environment because the politicians may impose additional barriers if each government agency has different rules and standards on sharing e-information (Jing & Pengzhu, 2009; Bigdeli et al., 2012). The e-Iraq has included in its future plan a strategy called “legal frames,” which provides any individual in Iraq with the ability to securely share his/her information (E-Iraq, 2012). The Iraqi government has developed the Government Interoperability Framework (GIF), a standard document on sharing e-information among government agencies (GIF, 2011). Hence, it is hypothesized that:
**H12:** Policy/legal framework will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.

2. **Interagency Trust**

Interagency trust refers to the belief that the information has been sent to the right agency and is deemed to be useful to the agency. Conversely, interagency trust pertains to the belief that the information has been received from the right agency, and the information is correct (Akbulut et al., 2009; Yang & Maxwell, 2011). Therefore, the Iraqi government should improve the trust among staff because trust is an important and essential factor among public organization (Abdul-Alrahman, 2011). Hence, it is hypothesized that:

**H13:** Interagency trust will have a positive effect on electronic information sharing between Iraqi public universities and MOHESR.

3. **Upper Level Leadership**

Upper level leadership refers to the capability of an external leadership to exert influence on its organizations to act in a prescribed manner (Akbulut et al., 2009; Jang & Pengzhu, 2009; Jing & Pengzhu & Yen, 2014). Specific tactics included encouragement, recommendations, providing incentives, and imposing penalties. Iraqi public organizations have external effect from the upper level leadership (Alwan & Abdulrahman, 2010; Ali, 2013). Hence, it is hypothesized that:

**H14:** Upper level leadership will have positive effect on electronic information sharing between Iraqi public universities and MOHESR.

4. **Critical mass**

Critical mass refers to the organizations that currently sharing or will share it information by using electronic information sharing project (Akbulut, 2011). Organizations are affected by the acts of similar organizations when they made decisions to use electronic information sharing (Bigdeli, 2013b). If the organizations are successfully sharing information electronically, that can help to motivate non-sharing organizations (Akbulut, 2009). This study suggests that the high numbers of participant universities can give more encouragement to share information electronically with MOHESR. Hence, it is hypothesized that:

**H15:** Critical mass will have positive effect on electronic information sharing between Iraqi public universities and MOHESR.

5. **Social Network**

Social network refers to personal relationships between inter-organizational (Jing & Pengzhu, 2007a). It includes relationship, mutuality, long-term benefits, trust, favor, loyalty, concept of commitment and reciprocity (Shin, et al., 2007; Jing & Pengzhu, 2009). Good social network between inter-organizational can provide better trust environment and enhance the ability of cooperation in electronic information sharing (Jing & Pengzhu, 2009; Jing & Pengzhu & Yen, 2014). Staff behavior has influence effect in Iraqi organizations (Abdul-Alrahman, 2011). Hence, it is hypothesized that:

**H16:** Social network will have positive effect on electronic information sharing between Iraqi public universities and MOHESR.

**IV CONCLUSION AND FUTURE WORK**

Electronic information sharing, technological, organizational and environmental characteristics are the issues that contribute to the success or failure of information sharing practice between Iraqi public universities and MOHESR. Moreover, this study suggests the use of a data warehouse as a factor in electronic information sharing research in order to increase information shared between the Iraqi public universities and MOHESR. However, it will be followed by adata analysis of questionnaire study to test forthe hypothesis and validate of the theoretical framework. The contribution of result through the combination of these factors will increase the understanding of inter-organizational information sharing participating in Iraqi higher education sector.

**REFERENCE**


