



# ELECTRONIC INFORMATION SHARING BETWEEN PUBLIC UNIVERSITIES AND MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH: A PILOT STUDY

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## ABSTRACT

Many institutions in the higher education sector use electronic information sharing to enhance their services and decision making. Ministry of Higher Education and Scientific Research (MOHESR) in Iraq has adopted electronic information sharing to provide better services. However, the electronic information sharing system among universities and MOHESR is limited. In this study, a theoretical framework that includes the influencing factors of electronic information sharing was proposed to enhance the electronic information sharing among them. A questionnaire was designed to examine the hypothesis for each factor. To verify the reliability of the questionnaire, a pilot study was done twice. The first one was observed low value for three factors. However, the values obtained through a second study were accepted.

**Keywords:** *Electronic Information Sharing, Influence Factors, Higher Education Sector & Pilot Study.*

## 1. INTRODUCTION

Information sharing refers to the exchange of information among employees within or outside an organization [1], [2], or allowing authorized access to database to enhance the quality of decision making [3], [4], [5], [6], [7]. Therefore, ministries of higher education in several countries use information communication technology (ICT) to build interaction channels among its branches, which enables electronic information sharing [8], [9], [10], [11], [12]. The higher education sector in Iraq employs ICT, including the Internet, for scientific research. In addition, ICT is used to share information between university staff members and Ministry of Higher Education and Scientific Research (MOHESR) [13]. Nevertheless, the level of electronic information sharing in the higher education sector of Iraq is at its infancy, which presents a challenge [14], [15], [16], [17], [18]. In other countries in South East Asia such as South Korea, the education sector believes that information sharing among education agencies is necessary to achieve efficiency and effectiveness in its processes [8]. In Cambodia, the higher education sector faced challenges in coordinating among agencies in implementing information sharing [11]. In Malaysia, the higher education sector has planned to manage communication and information

sharing for the following years [12]. The limitation of information sharing reduces the quality of university services, gives rise to poor decision making, wastes time and effort, and increases cost.

The theoretical framework of electronic information sharing between Iraqi public universities and MOHESR had been developed in to four characteristics (technological, organizational, environmental and electronic information sharing). Moreover, sixteen influence factors has been explained and each one had included in its proper characteristic. This framework can increase the information sharing among them electronically, thus, that can support decision making and e-participation in these universities [16]. However, this study illustrates the suitable design for the questionnaire of electronic information sharing between Iraqi public universities and MOHESR in order to evaluate this framework. Therefore, two pilot studies had done in order to find better reliability of the questionnaire.

Anyway, electronic information sharing can be classified into three types of benefits, namely, beneficiary (citizenship and government), target (product and process) and effect (primary and secondary) [19]. According to [19] mentioned



that five views have been proposed based on these three types in order to classify the benefits of electronic information sharing. The first view is the natural view, which is based on the technical, organizational, and political benefits [1], [2]. Second is the effect, which refers to the primary and secondary effects of the benefits of electronic information sharing (the primary effect is derived from the implementation and the secondary effect is achieved from the primary effect) [20]. Third is the beneficiary view, which refers to the internal beneficiaries (i.e., the staff in a government organization) and external beneficiaries (i.e., the citizen and businesses outside the government organization). Fourth is the target view, which is based on the product and process benefits. Fifth is the horizontal view which refers to the benefits of the entire system, such as efficiency, effectiveness and responsiveness [21]. Figure 1 shows all of the five views.

### 1.1. Research Barriers

The present study aims to enhance electronic information sharing between public universities and MOHESR in Iraq. However, several limitations should be addressed. First, electronic information sharing studies are exceedingly few [22], and with no study about higher education sector, thus, this study had difficulty to design the questionnaire. Second, university employees have limited understanding of electronic information sharing, given that electronic information sharing between the ministry and the universities in Iraq is a new technology [23], [24]. Third, there are few number of employees who shares information electronically with MOHESR. Fourth, the different levels between the ministry and the universities are considered as issues in the questionnaire answers. Fifth, most of the participants have been in Malaysia for two to three years, thus, they already do not know about the new enhancement in their universities. Sixth, data warehouse is one of the new contributions in electronic information sharing, of which the university staff has limited understanding. Finally, the political climate in Iraq adds other challenges in the present study.

## 2. PREVIOUS STUDIES

The theoretical framework and the questionnaire of this research have built based on the previous studies of electronic information sharing.

### 2.1. Theoretical Framework

The framework of this study was adopted from the Technology Organization Environment (TOE) framework developed by Tornatzky and Fleischer (1990) [25]. The TOE framework was likewise selected because of its ability to address the objectives of this study. Kurnia and Johnston (2000) [26] stated that the adapted framework has to be developed and refined to match the context to which it is being applied.

This study has adapted TOE framework in order to make it more suitable for electronic information sharing area. Thus, the result of this adaption is Technological characteristics, Organizational characteristics, Environmental characteristics and Electronic information sharing characteristics. Social exchange theory, critical mass theory and TEO adoption framework as well as the previous studies were employed to investigate the factors that influence electronic information sharing between Iraqi public universities and MOHESR. These theories have been applied in electronic information sharing studies [27], [28]. Social exchange theory refers to share information in the public sector [29]. This theory bases on power and the trust thus, three factors had been employed from it (Top management support Upper Level Leadership, Interagency trust). Critical mass theory refers to the more number of participants can increase the organization's participation decision of information sharing [30]. Thus, one factor had been found from this theory which called Critical Mass. However, from the TOE framework the size factors had been noticed in this study [25]. The cause behind this is that the large organizations have more resources to adopt any new system [31].

Moreover, the remaining factors had been adopted from the previous studies. However, each characteristic has many influencing factors. The influencing factors of the current research are benefits, risks, costs, IT capability, information quality, compatibility, complexity, data warehouse, top management support, collaboration, size, policy/legal framework, interagency trust, upper level leadership, critical mass, and social network. Moreover, the present study has 16 hypothesizes, with one hypothesis for every factor. Figure 2 shows the theoretical framework of this study.



The factors that can promote engagement in electronic information sharing between public universities and MOHESR have been identified. Two pilot studies were performed to evaluate the questionnaire items and to determine the appropriate questions for the survey. The questionnaires have been distributed among staff members who share information with MOHESR. The succeeding section explains the questionnaire design.

## 2.2. Designed Questionnaire

The survey method was employed in this study because surveys provide a good way to begin reports and is a suitable method for examining factors and hypotheses. A questionnaire is used for data collection. [32] showed that the questionnaire design relies on three criteria, namely, the manner by which the questions are written, planning for the classification of variables, and the appearance of the questionnaire. This study uses a six-part questionnaire. Part 1 includes the questions related to demographic factors. Part 2 relates to the state of electronic information sharing. Part 3 relates to the characteristics of electronic information sharing. Part 4 relates to organizational characteristics. Part 5 includes questions related to technological characteristics. Part 6 relates to environmental characteristics. See the appendix A.

The instruments are designed based on the content of each factor. Suggestions and pieces of advice from colleagues and supervisors were taken into consideration to improve the design of the instruments, as well as to build the questionnaire. The questionnaire is written in English and then translated into Arabic, which is the official language in Iraq. Table 1 shows the operationalization of the factors and items.

## 3. PILOT STUDY

Pilot study is a small test of a study which use to check the validity and reliability of procedures and measures [40]. However, the most objectives of doing pilot study is to test the reliability and validity of the items. According to Zikmund (2003) [41], pilot study uses to test the study aimed in order to enhance the particular research items. However, this study has been used two pilot tests.

In the first pilot study, the questionnaires have been distributed among Iraqi students who are taking doctorate and master's degrees in Malaysian universities. The participants were chosen on the basis of their administrative experience in Iraqi public universities. In addition, more than a hundred emails were sent to members of the administrative staff in Iraqi public universities. However, only 35 questionnaires were collected, five of which have not been answered correctly. Thus, the total number of correctly answered questionnaires is 30. The first pilot study shows that three factors have values less values for three factors, namely, IT capability, data warehouse, and policy/legal framework, thus, the second pilot study is needed.

In the second pilot study, questionnaires were distributed amongst Iraqi students who are studying doctoral and master's degrees in Malaysian universities and who have administrative experience in one of the Iraqi public universities. The assistance of the Iraqi Cultural Attaché in Malaysia was obtained to find students that will qualify. Moreover, several emails were sent to the members of the administrative staff from some of the Iraqi public universities. However, among the 35 questionnaires that were collected, five were not correctly answered. Table 2 illustrates the demographic characteristics of the first and second pilot study of this research.

In this study, how the participants electronically share information with MOHESR has been asked. Five ways were mentioned in the questionnaire with an option to add another one. However, the participants have not added any other ways of information sharing. Thus, the percentage of using the five ways mentioned in the questionnaire is different based on each study. figures 3,4 and 5 show the percentage of the most popular electronic way used in information sharing between the public universities and MOHESR in Iraq for the both pilot study 1 and 2. However, the result shows that email is the most electronic way that has been used to share the information electronically with MOHESR. Finally, the results show there are limitation of using the electronic devices in order to share the information among public universities and MOHESR.



In addition, three participants in the first pilot study have mentioned that they have used a webcam to connect with MOHESR. Two of them have been using it once a month, whereas the other one has used it several times a day. Moreover, one participant mentioned that he shares information using MOHESR's database. In the second pilot study, four of the participants have mentioned that they use a webcam (three of them have used it several times, whereas a month and the other one has used it once month). Moreover, the participants have not used the database to access the ministry's information. The two pilot studies show that the most used means to share information electronically between the universities and MOHESR are through phone, email, and website. In addition, the use of webcam is limited, and the use of database has been mentioned only once in both studies.

Electronic information sharing study in Iraqi higher education sector has measured the percentage of electronic information sharing and the time information sharing has started. Thus, the participants of the two pilot studies illustrate the percentage of electronically sharing information with MOHESR. Most of the participants have mentioned that the percentage of sharing is less than 61%. Most of the participants have mentioned that information sharing has started 3 years ago. Table 2 shows the presentage of sharing information with year of started the sharing.

Cronbach's alpha is the most common test in measuring the reliability of the pilot study questionnaire [42], [32]. The Cronbach's alpha test has values ranging from 0 to 1; a higher level of range implies a greater value of reliability [43]. Values that are 0.9 and above are excellent; values of 0.8 and above are good; values of 0.7 and above are acceptable; values of 0.6 and above are questionable; and values less than 0.6 are poor [43], [44].

The data collected from the two pilot studies have been analyzed by using SPSS 20 to know the values of each factor in Cronbach's alpha. The first pilot study shows that three factors have

values less than 0.7. These three factors, namely, IT capability, data warehouse, and policy/legal framework, have values of 0.634, 0.563, and 0.537, respectively. Therefore, the second pilot study is needed. Some suggestions from the participants have been considered to improve the questionnaire items. Many changes in some of the items of the second pilot study have been done to make the questionnaire clearer and easier to understand by rewriting them again. Moreover, the items of factors have been reduced (Benefits, Compatibility, Complexity and Upper Level Leadership) because of the repetition and modifications of the questions. All the factors have values more than 0.7 which are acceptable. Table 3 shows the Cronbach's alpha and number of items for each factor.

#### 4. CONCLUSION AND FUTURE WORK

A study was proposed with an objective to examine the influencing factors of the electronic information sharing framework between Iraqi public universities and MOHESR. A set of questionnaires has been designed based on previous studies of electronic information sharing. Two pilot studies were conducted to test reliability. The first study shows that three factors, namely, IT capability, data warehouse, and policy/legal framework, have values less than 0.7. Some corrections have been made to improve the items. The second pilot study was needed to verify the items. In the second pilot study, all the factors have values more than 0.7 which are acceptable.

The two pilot studies have been conducted using the questionnaires which are distributed among the staffs who share information with MOHESR in Iraq. This study will be followed by a research paper to show the results of the data analysis of the survey. The next research paper will then test the hypothesis and validate of the theoretical framework. The results of the tests may contribute to provide more understanding of electronic information sharing in the higher education sector.

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Table 1: Operationalization of the factors and items

Factor	Items	References
Benefits	9 items	[33], [6], [31] [19]
Risks	5 items	[2], [33], [6], [31]
Costs	4 items	[33], [6], [31]
IT capability	4 items	[27], [33], [31]
Information quality	4 items	[31]
Compatibility	4 items	[33], [6], [31]
Complexity	2 items	[6]
Data warehouse	4 items	[34], [35], [36], [37][38]
Top management support	4 items	[33], [6], [31]
Collaboration concept	3 items	[31]
Size	3 items	[6], [31]
Policy/Legal framework	3 items	[33], [6], [31]
Interagency Trust	4 items	[33], [6], [31]
Upper level leadership	4 items	[6], [31]
Critical Mass	4 items	[6], [31]
Social Network	3 items	[39], [33], [7]

Table 2: Demographic characteristics

Variable	No. of participants		% of participants	
	Pilot study 1	Pilot study 2	Pilot study 1	Pilot study 2
<b>Gender</b>				
Male	21	24	70.0%	80.0%
Female	9	6	30.0%	20.0%
<b>Age</b>				
Less than 30	6	3	20.0%	10.0%
From 30 to 40	20	21	66.7%	70.0%
From 41 to 50	3	5	10.0%	16.7%
More than 50	1	1	3.3%	3.3%
<b>Education</b>				
Bachelor	8	5	26.7%	16.7%
Master	20	22	66.7%	73.3%
PhD	2	3	6.7%	10.0%
<b>Years of Experience</b>				
From 1 to 5	12	6	40.0%	20.0%
From 6 to 10	15	14	50.0%	46.7%
From 11 to 15	2	8	6.7%	26.7%
More than 15	1	2	3.3%	6.7%
<b>Type of Position</b>				
Administrator	12	10	40.0%	33.3%
Administrator and Academic	18	20	60.0%	66.7%
<b>Name of Office, Department and Centre</b>				
President office	1	1	3.3%	3.3%
Research and development	7	2	23.3%	6.7%
Student Affairs	2	1	6.7%	6.7%
Studies, planning and follow-up	3	1	10.0%	3.3%
Continuing Education	3	0	10.0%	10.0%
Ratifications and documents	0	1	0.0%	3.3%
Scholarship and Cultural Relations	3	1	10.0%	3.3%
Finance Affairs	0	0	0.0%	0.0%
Public Relations and Media	2	0	6.7%	0.0%
Physical Education	0	0	0.0%	0.0%
Engineering Affairs	2	6	6.7%	20.0%



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Legal Affairs	2	2	6.7%	6.7%
Audit	0	0	0.0%	0.0%
Quality	1	0	3.3%	0.0%
General Secretariat of the library	0	0	0.0%	0.0%
Directorate dormitories	0	0	0.0%	0.0%
Studies	2	0	6.7%	6.7%
The development of teaching and training of university	0	3	0.0%	10.0%
TOEFL	0	0	0.0%	0.0%
Research and training campus	0	0	0.0%	0.0%
Information technology	1	4	3.3%	10.0%
Statistic and information	1	1	3.3%	3.3%
Architecture	0	1	0.0%	3.3%
Coordinator	0	1	0.0%	3.3%
Electronic Eng.	0	3	0.0%	10.0%
Elect. network	0	1	0.0%	3.3%
Import	0	1	0.0%	3.3%
Mechanical Eng.	0	1	0.0%	3.3%
<b>Level of Position</b>				
Top manager	1	1	3.3%	3.3%
manager	1	5	3.3%	16.7%
Responsible	14	8	46.7%	26.7%
Employee	14	16	46.7%	53.3%

Table 3: Percentage and started time of sharing

Variable	No. of participants		% of participants	
	Pilot study 1	Pilot study 2	Pilot study 1	Pilot study 2
<b>Percentage of sharing information</b>				
Zero	2	2	6.7%	6.7%
From 1% to 20%	3	10	10.0%	33.3%
From 21% to 40%	7	7	23.3%	23.3%
From 41% to 60%	18	10	60.0%	33.3%
From 61% to 80%	0	0	0.0%	0.0%
From 81% to 100%	0	1	0.0%	3.3%
<b>Years of Sharing information</b>				
Zero	2	2	6.7%	6.7%
Less than a year	1	3	3.3%	10.0%
From 1 to 3 years	20	20	66.7%	66.7%
From 4 to 6 years	6	2	20.0%	10.0%
From 7 to 9 years	0	3	0.0%	6.7%
10 year or more	1	0	3.3%	0.0%



Table 4: Cronbach's alpha and number of items

Factor name	Cronbach's Alpha		N of Items	
	Pilot study 1	Pilot study 2	Pilot study 1	Pilot study 2
Benefits	.765	.889	13	9
Risks	.942	.786	5	5
Costs	.927	.939	4	4
IT Capability	.634	.740	4	4
Information Quality	.908	.766	4	4
Compatibility	.825	.715	5	3
Complexity	.870	.916	3	2
Data warehouse	.563	.961	4	4
Top management support	.900	.896	4	4
Collaboration	.715	.719	3	3
Size	.742	.748	3	3
Policy/ Legal framework	.537	.914	4	3
Interagency trust	.880	.788	4	4
Upper Level Leadership	.875	.795	5	4
Critical Mass	.840	.790	4	4
Social Network	.863	.730	3	3

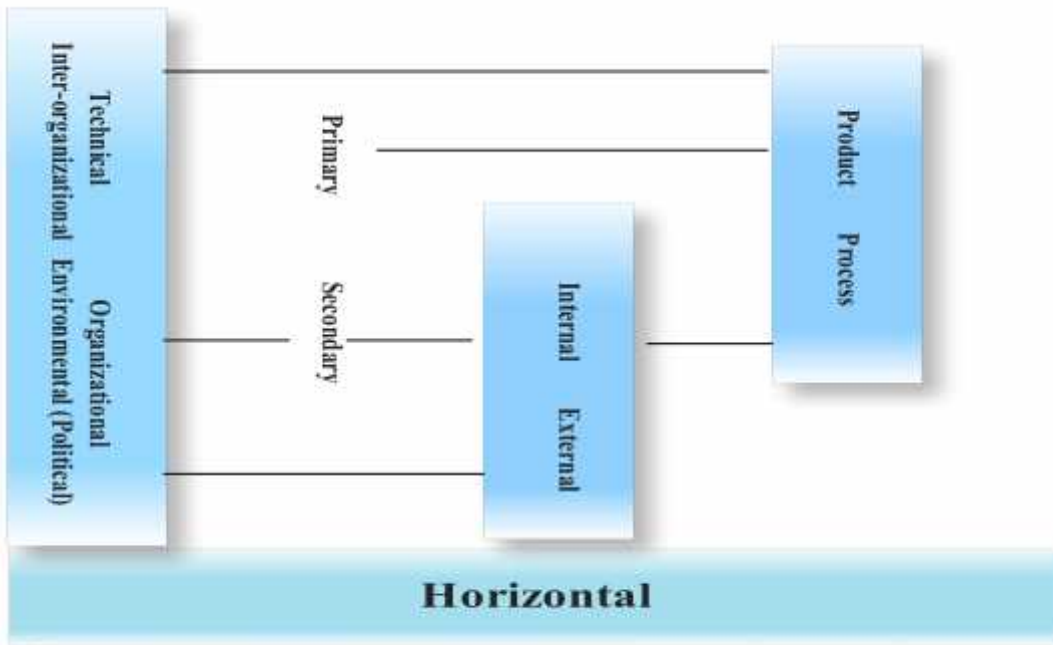


Figure 1: Benefits of Electronic Information Sharing [19].

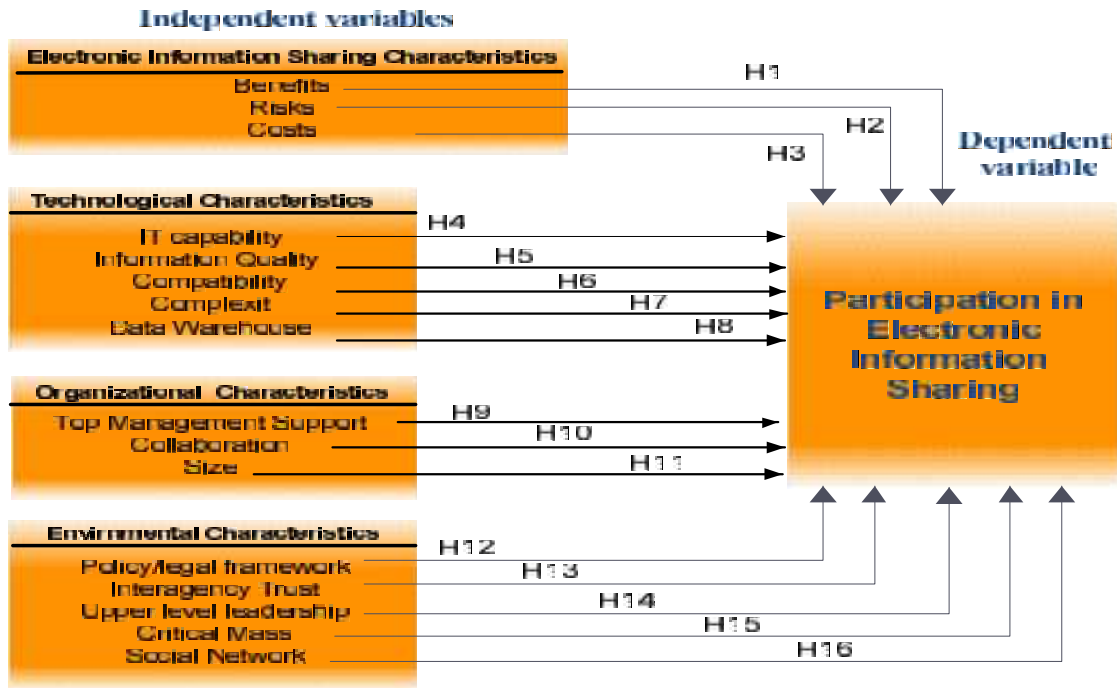


Figure 2: A Framework of Electronic Sharing Information between Higher Education Sectors

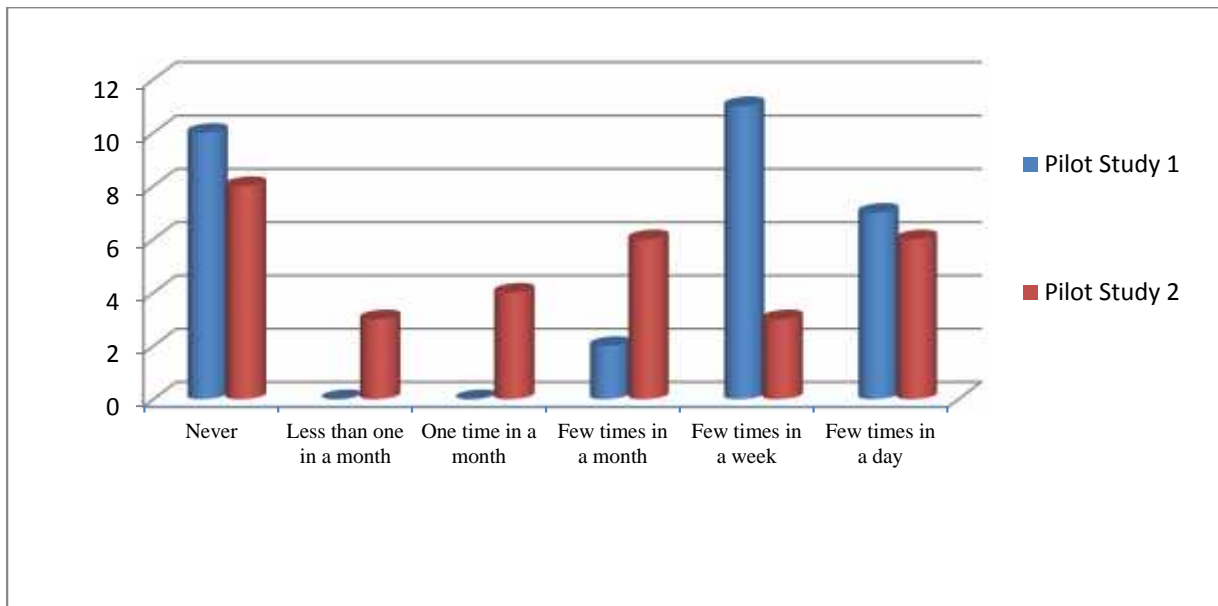


Figure 3: Line/Mobile usage

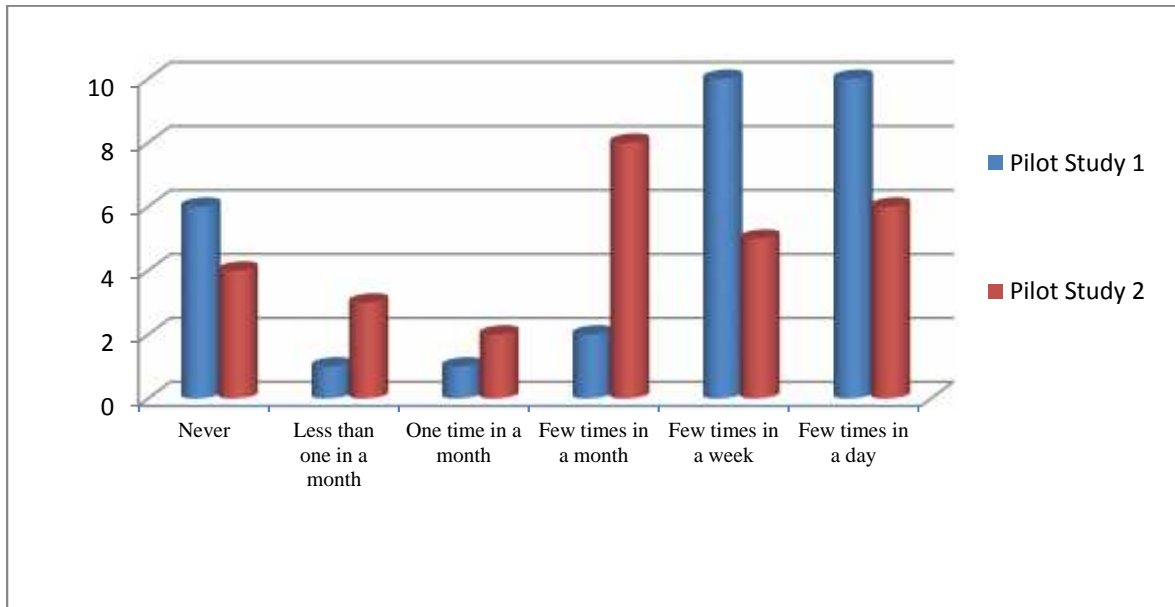


Figure 4: Email Usage

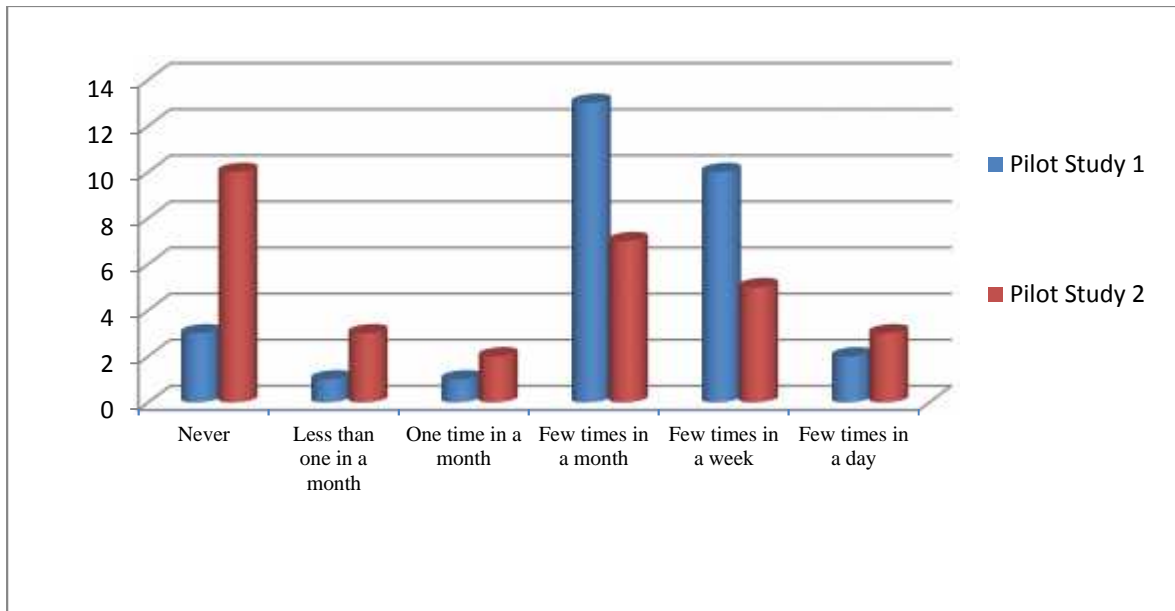


Figure 5: Website Usage



*Appendix A: Factors and Items*

Factor	Items
Benefits	<p>Electronic information sharing less cost paper sharing.</p> <p>Electronic information sharing provides information timeliness.</p> <p>Electronic information sharing improves university services.</p> <p>Electronic information sharing makes the answering and responding fast and easier.</p> <p>Electronic information sharing improves decision making.</p> <p>Electronic information sharing improves connection and interaction with MOHESR</p> <p>Electronic information sharing improves the trust between staffs in University and MOHESR.</p> <p>Electronic information sharing reduces the bureaucracy.</p> <p>Electronic information sharing increase paperwork.</p>
Risks	<p>There are challenges of the accuracy/validity of shared information electronically.</p> <p>There are challenge of external evaluation/ criticism of shared information electronically.</p> <p>Electronic information sharing reduces full control over information.</p> <p>Electronic information sharing threats university policy making power.</p> <p>There are no challenges of losing information while shared.</p>
Costs	<p>Information systems are set-up costly.</p> <p>Staff training is costly</p> <p>Software and hardware maintenance are costly.</p> <p>Infrastructure set-up is cheap.</p>
IT capability	<p>Our university need information systems applications and good technical support.</p> <p>Our university need a good telecommunications infrastructure.</p> <p>Our administrators staffs need a good computer knoweldge.</p> <p>Electronic information sharing never need to hardware, software and IT skills.</p>
Information quality	<p>Our current information has the quality to be shared with Ministry of Higher Education.</p> <p>The information quality increases the trust between our staff and Ministry of Higher Education's staff.</p> <p>Information quality enhances the relationship among our staff and Ministry's staff.</p> <p>Information quality reduces the quality decision making.</p>
Compability	<p>Employee skills in our uiniversity are different than in MOHESR.</p> <p>Telecommunication infrastructure and database in our university are different than in MOHESR.</p> <p>Electronic information sharing with Ministry of Higher Education conflicts with our university's needs.</p>
Complexity	<p>Information technologies required for electronic information sharing easy to understand and use.</p> <p>Electronic information sharing is a complex process.</p>
Data warehouse	<p>We need to share information by sharing our databases with MOHESR.</p> <p>Save our information and the MOHESR information in one repository support information sharing.</p> <p>We need to store our univeristy information with MOHESR's information in one data repository to make them accessible.</p> <p>Accessibility of access databae conflicts information sharing.</p>



Top management support	<p>Top manager motivates the university staff by incentives or rewards and punishments.</p> <p>Our top manager interests to share the university's information electronically with Ministry of Higher Education.</p> <p>Our top manger considers sharing information electronically with Ministry important to our university.</p> <p>University top manager has no role to support the electronic information sharing with Ministry.</p>
Collaboration	<p>Our university and Ministry of Higher Education have a good collaboration.</p> <p>Our staff have good collaboration concept.</p> <p>Good collaboration between university and Ministry of Higher Education increases electronic information sharing.</p>
Size	<p>Number of information systems increase electronic information sharing with Ministry of Higher Education.</p> <p>Number of employees improves electronic information sharing with Ministry of Higher Education.</p> <p>Size of our university reduces electronic information sharing with Ministry of Higher Education.</p>
Policy/legal framework	<p>Our university needs to legislation and policies to organize electronic information sharing with MOHESR.</p> <p>Legliation and policies build good relationships and trust among our staff and Ministry staff.</p> <p>Legliation and Policies increase the risk of sharing information electronically between our university and the Ministry.</p>
Interagency trust	<p>Our university and Ministry of Higher Education have a high level of mutual trust.</p> <p>Our university should protect staff when they shared information electronically to increase their trust in sharing.</p> <p>Trust in electronic information sharing increase the participation and collaboration.</p> <p>The trust between the university and Ministry of Higher Education staffs give negative impression.</p>
Upper level leadership	<p>Ministry of Higher Education recommends that our university share information electronically.</p> <p>Ministry of Higher Education requests that our university share information electronically.</p> <p>Ministry of Higher Education provides information regarding the advantages and disadvantages of sharing information.</p> <p>Ministry of Higher Education not influences our decision to participate/not participate in electronic information sharing with them.</p>
Critical mass	<p>Number of universities that participant in electronic information sharing increase the sharing with Ministry.</p> <p>Most of our shared information with Ministry of Higher Education is shared/will soon be shared electronically.</p> <p>The use of electronic information sharing systems by universities is inevitable and essential.</p> <p>Electronic information sharing between other universities and MOHESR fail to encourage us to participate in electronic information sharing with the Ministry.</p>
Social network	<p>Our university and the Ministry have high concepts of commitment and loyalty.</p> <p>Social network improves collaborations between our university and Ministry of Higher Education.</p> <p>Our university and Ministry of Higher Education have low relationship.</p>