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IDENTIFYING AND PRIORITIZING INTEGRATION BARRIERS OF INFORMATION SYSTEMS TO FULFILL E-GOVERNMENT

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ABSTRACT

Integrating information systems of the country's electronic government is confronting some barriers. The purpose of this study is to identify the importance of each barrier to integrate information systems of e-government from some elites' viewpoints. Therefore, after selecting barriers and subset factors, each barrier group was categorized based on research literature (design, governmental, human, technical, and strategic barriers). To study variables normalization, Kolmogorov–Smirnov test was used. In inferential section, to review the status of research variables and the difference between main variables and their aspects among masters and elites, one-sample t test and independent t test would be used respectively. In the section of research inquiries analysis, discovery-factor analysis was employed to discover major aspects of the structure developed to measure research variables. In addition, two-phase certificate factor analysis model (CFA) was used with LISREL application to rank barriers. According to the research data, the most considerable barriers of integrating information system are as follows: strategic barriers (57%), governmental barriers (54%), technical barriers (45%), human barriers (45%), and design barriers (35%).

Keywords: e-government, information systems, integration

INTRODUTION

Since the late 1990s, governments at all levels have initiated e-government to their structures to provide high quality e-information service to people and businesses. Modern technologies in

public sector help not only providing service and increasing democratization, but also clarifying corruption decrease. This illustrates the importance of e-government information systems management as a fundamental component of modern governments and the transition of administration-oriented organizations to service-oriented ones [3],To identify how successful is e-government mission, Elfson [3],suggest that it is essential to evaluate e-government effectiveness and practices relevant to the evaluation. However, what procedures need to be conducted to fulfill assessment of e-government? Hojaji, Fazilat [6],believe that the basic target is to integrate coherent information systems through daily activities following e-government formation to achieve expected benefits.Otherwise, increasing researches and projects upon integrating E-Systems since 2003 indicate significance of today's consistent information systems. In addition to some broad data bases combinations such as Ebrary and Proquest as well as developing means to coherently acquire information contents of data bases such as Athens and Shibboleth indicate integrating information systems resulting from the studies. Information systems integration and developing united search ability in these systems may signify that there are heterogeneous information systems which must be incorporated to develop value added and user-centered ones.

This operation as one of the main aims of studies is titled such as information exchange, interoperability, interactivity etc[1],As seen in former studies, practiced notions and structures transition from private sector to public sector was difficult and anticipated outcomes could not be achieved [6],it is essential for experts to recognize the barriers of integrating e-government information systems.

Research Inquiries and Hypotheses

The main purpose of this study is to identify and prioritize integration barriers of information systems to develop e-government.

According to the target, two questions will be discussed as follows:

❍What are integration barriers of e-government information systems?

❍How can integration barriers of e-government information systems be prioritized and ranked?

To respond to the research inquires, five categories of barriers are identified based on research literature. Major studied hypotheses include:

-Integration of e-government information systems may be affected by design barriers.

-Integration of e-government information systems may be affected by human barriers.

-Integration of e-government information systems may be affected by technical barriers.

-Integration of e-government information systems may be affected by governmental barriers.

-Integration of e-government information systems may be affected by strategic barriers.

Theoretical & Empirical Background of the Research

As increasingly using e-government service and Public/Private organizations attempt to provide distance service, there are not considerable studies theoretically discussing e-government and the pathology of this field, as a result, they fail to conduct practical procedures. Reviewing literature can confirm the fact that these studies pursue the same topics containing e-government design with no innovation and ignore numerous barriers ahead of it.

This study, therefore, will review the data of conducted researches and various masters'

perspectives. Different international/national researches have pointed out several factors in their studies. Some of these factors have been repeated in most studies. Accurately reviewing factors and consulting e-government administrators/elites indicate that different factors of the articles, in fact, can be classified into five principal fields to thoroughly consider them in a conceptual framework of the research. Table 1 shows authors' studies and the factors introduced by them covering each selected field in this study. Finally, integration barriers of information systems will be discussed at five levels including; design, human, technical, governmental, and strategic barriers. Then selected criterions of each field will be described.

Table 1: Variables specified for information systems integration

Identified Barriers	Authors
Design Barriers	Vitalari & Dickson (Lau Edvin, 2003) Taheri (2006) Arab Mazar Yazdi et al (2006)
Human Barriers	Kajavi & Etemad Jouryabi (2009) , Bordbar (2010), Elahi, Abdi, and Danaeefard (2010)
Technical Barriers	Lam (2005) Mahjoub Eshrat Abdi et al (2013), Elahi, Abdi, and Danaeefard (2010), Sadeqi, Khosravi, and Abbasi Shahkouh, (2009)
Governmental Barriers	Lam (2005) , Yang, Tung-Mou, Lei Zheng, Theresa Pardo (2012), Lau (2003), Li (2005) , Elderman (1999), Boockholdt (1999), Kazemi et al (2008)
Strategic Barriers	Karami (2004), Farhangi, Hossainzadeh, and Salehi (2010), Moddares, Kamali, Talebpour, and Amid (2008)

Design barriers

Vitalari and Dickson, in their study, believe that design role can be very important. They also suggest that a system developer analyzes an organization's information needs in different phases such as storing, processing, retrieving, and promoting information and designs information systems [7],In Taheri's study, system designers and developers are considered one of the most serious barriers to integrate information systems (2006). The data of Arabmazar Yazdi, Fatollahi, and Kamrani indicate that information systems design may fail to meet basic business needs or improve organizational operations. An information system will be unsuccessful, if the design is not in conformity with the organization's structure, culture, and goals (2007). According to Lau Edwin, information system failures could be seen in developing data, costs, and operations. There may be some problems with information system design, thus, the data may not be adequately produced, used, and understandable [11].

Human barriers Human topics available in information system configurations and studied comprehensively by various authors are considered prominent. In Khajavi and Etemad Jouryabi's study, vital factors of success to develop information system include human resources, technical specifications of information

systems, and administrative strategies (2009). Elahi, Abdi, and DanaeeFard, in their study, suggest that essential factors to admit an e-government could be experienced e-service, individual innovation, self-confidence, and knowledge of users (2010). Gelderman reviews two criterions used to measure information systems success; 1) information system usage 2) users' satisfaction. In a survey study of Dutch administrators, he shows there is a significant relation between users' satisfaction and operations. This study suggests empirical evidence confirming the hypothesis that states users' satisfaction is the most appropriate scale to estimate information systems success [5],Boockholdt also believes users' views on data accuracy and appropriateness can be necessary for united information systems [2].

Technical barriers

The most influential challenge to integrate information systems is technological aspects. If information systems are not technically proper and do not develop integration conditions, systems combination will encounter difficulties. Mahjoub Eshratabadi et al [10],studying challenges of information/communication technology find 11 technological/technical barriers. Moddaress Kamali et al discuss integration as a serious upcoming challenge in e-government. They study technical specifications

of e-government including smart standardization and efficiency for portals, service companies (input and communications), and support companies as important components. From Bordbar's viewpoint, technical specifications such as appropriate hardware infrastructure can play a good role in successfully developing incorporated information systems.

Governmental barriers

From Lam's viewpoint, governmental barriers may prevent developing consistent information systems including concerns about citizens' privacy, lack of clarification in policies of public agencies, data property, immaturity of e-government, slow steps towards government improvement, governmental old/hereditary processes, and lack of a hero in e-government (Lam, 2010). Yang et al ask this question; "What are the boundaries to share and integrate information?" They believe that these types of boundaries will emerge between two or more similar organizations [13],According to Lau, political leaders' attitudes, expert shortage in public sector, poor cooperation of public sectors with one another may be fundamental barriers to integrate e-government (Lau, 2003). Li also believes that lack of interests amongst high-ranking administrators and politicians to change current circumstances would be one of barriers to integrate e-government [8],In the study of Kazemi et al [9],lack of clear organizational

procedures, poor communication networks in organizational structure, lack of consistency, cooperation and homogeneity in various departments are demonstrated as most serious organizational barriers to integrate e-government.

Strategic barriers

Karami in his study believes that ambiguity in organizational strategies could be a main obstacle. He states lack of strategic culture and thinking creates a situation in which existence of organizations with formulated strategic plans will be an exception but a rule (2004). In Elahi, Abdi, and Danaeefard's study, developing infrastructures and accessing to service are important to establish and use information systems (2010). Sadegi et al find technical/interactive principals remarkable. They consider basic criteria such as; using open standards, adaptability for changing needs over time, conformity with the internet, developing XML as a standard for data exchange etc. (2010). Hojaji in his study finds technical elements essential for integrating information systems including proper infrastructure, type of used factor system, speed of the internet, developing data centers, managerial system of monitoring, and operational servers (2012).

MATERIALS AND METHODS

This descriptive-survey study has an applied nature. To identify and prioritize barriers of

integrating information systems, first, five levels of design, technical, human, governmental, and strategic barriers were selected through reviewing theoretical/empirical backgrounds of integration barriers in the world especially in Iran. Then, to confirm selected model in the studied society, confirmatory factor analysis was employed. Model accuracy based on competency indices was confirmed.The research statistical society consists of 58 ICT experts (masters, engineers, and authorities in e-government department), Iranian Departments, and 76 board members of information science and epistemology faculties.Regarding the research nature, both library and field methods were used to gather data. A) Library study: To select the framework and extract the components of information systems integration, the researcher attempted to study the literature and background relevant to the topic. B) Field study: The researcher made efforts to visit research environments and Iranian Departments, interview people, directly communicate with the analysis department of e-government, and complete questionnaires to collect accurate data.

RESULTS

This study will identify the barriers of integrating e-government information systems. Thus, after collecting data dealing with the research variables, Kolmogorov-Smirnov test is carried out to determine whether the data (the variables) are normal. If the data are normal, parametric tests will be used to study hypotheses, if not, non-parametric coefficient can be used.

The table shows the test of variable normality in each category. If the Sig. is below and above 0.05, the data will be abnormal and normal respectively.

As shown in **Table 2**, all variables due to the questionnaire are normal, thus, parametric test is used to measure them. Now, research questions will be analyzed a follows:

❍ Research question1: What are integration barriers of e-government information systems?

To specify major components, a questionnaire containing 38 inquiries based on 1-5 Likert scale was developed. Then, it was completed by 134 masters and experts. Finally it was analyzed.

The question that whether the construct can measure the considered target is reviewed with exploratory factor analysis. Totally, the purpose of exploratory factor analysis is to discover main dimensions of designed construct to measure given variable or integration barriers of information systems in this research.Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett test are used to realize that whether the number of expected data (samples size and the relation between variables) is adequate to factor analysis. KMO test is an index for sampling adequacy estimating partial correlation between variables. This index can

range from zero to one. If the index is close to one, the data (sample size) are sufficient to factor analysis if not (usually smaller than 0.50), factor analysis results of the data may not be much adequate. If the value is 0.50-0.69, the data are average and they must be more cautiously extracted. Values above 0.70 indicate sampling adequacy.

The **table 3** shows that KMO value (sampling adequacy) is 0.79 and the significance level of Bartlett sphericity test is 0.0001. Therefore, both sampling adequacy and performance of factor analysis based on studied correlation matrix will be justified. Initial statistical specifications obtained through major components analysis are shown in the following **Table 4**.

Prior to developing models and conducting hypotheses test, the variables are symbolized in the following **Table 5**.

❍ Research question 2: How can integration barriers of information systems be prioritized and ranked?

To rank integration barriers of information systems, two-step confirmatory factor analysis is used. The following table shows the data of LESERLS application output (**Table 6**).

Table 2: Test of variable normality due to questionnaire

Variable	Kolmogorov-Smirnov T-test	Sig.	Test Result
Design barriers	0.834	0.491	Normal
Human barriers	1.023	0.246	Normal
Technical barriers	1.304	0.067	Normal
Governmental barriers	0.768	0.596	Normal
Strategic barriers	1.202	0.111	Normal
Integration of information system	0.573	0.898	Normal

Table 3: KMO value and result of Bartlett sphericity test of lean management questionnaire

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.790
Bartlett: Test of Approx. Chi-square		3963.171
Sphericity	df	703
Sig.		0.000

Table 4: Variables of casual model of the research

Variable	No.
Indigenous	5
Exogenous	1
Observations	134

Table 5: Symbols of research variables

Casual variable	Symbol	Index No.	Index sign
Design barriers	Design	8 questions	Q1-Q8
Human barriers	Human	8 questions	Q9-Q16
Technical barriers	Technical	8 questions	Q17-Q24
Governmental barriers	Governmental	7 questions	Q25-Q31
Strategic barriers	Strategic	7 questions	Q32-Q38
Information systems integration	INT_IS	4 casual variables	Design , Human, Technical, Governmental, strategic

Table 6: Status of integration barriers variables of information systems

Sub-dimension	Factor load	t Value	Coefficient	Result	Priority
Design barriers	0.35	3.15	0.12	significant	5th
Human barriers	0.45	3.97	0.20	significant	4th
Technical barriers	0.45	4.15	0.20	significant	3rd
Governmental barriers	0.54	4.14	0.29	significant	2nd
Strategic barriers	0.57	4.83	0.32	significant	1st

1. The factor coefficient of design barriers to explain barriers and challenges of information systems integration is 0.35 and t value equals 3.15 that is bigger than 1.96. It can be concluded that the component of design barriers may affect the barriers and challenges of information systems integration (a significant factor to explain the barriers and challenges of information systems integration), thus, this component receives fifth rank due to the value of standard factor load.

2. The factor coefficient of human barriers to explain barriers and challenges of information systems integration is 0.45 and t value equals 3.97 that is bigger than 1.96. It can be concluded that the component of human barriers may affect the barriers and challenges of information systems integration (a significant factor to explain the barriers and challenges of information systems integration), thus, this component receives fourth rank due to the value of standard factor load.

3. The factor coefficient of technical barriers to explain barriers and challenges of information systems integration is 0.45 and t value equals 4.15 that is bigger than 1.96. It can be concluded that the component of technical barriers may affect the barriers and challenges of information systems integration (a significant factor to explain the barriers and challenges of information systems integration), thus, this component receives third rank due to the value of standard factor load.

4. The factor coefficient of governmental barriers to explain barriers and challenges of information systems integration is 0.54 and t value equals 4.14 that is bigger than 1.96. It can be concluded that the component of governmental barriers may affect the barriers and challenges of information systems integration (a significant factor to explain the barriers and challenges of information systems integration), thus, this component receives second rank due to the value of standard factor load.

5. The factor coefficient of strategic barriers to explain barriers and challenges of information systems integration is 0.57 and t value equals 4.83 that is bigger than 1.96. It can be concluded that

that the component of strategic barriers may affect the barriers and challenges of information systems integration (a significant factor to explain the barriers and challenges of information systems integration), thus, this component receives first rank due to the value of standard factor load.

CONCLUSION

The data analysis indicates that integrating e-government information systems confront barriers and challenges. According to the research findings, from the most to the least basic barriers of integrating information systems are:Strategic barriers (3.94), design barriers (3.55), governmental barriers (3.46), technical barriers (3.42), and human barriers (3.36) respectively.The data indicate that "strategic barriers" are the most serious problem to integrate information systems and among the obstacles of strategy and planning, the sub-component of "unavailable mutual goals dealing with uncertainty, conflicts, and contrasts to assign functions and responsibilities", with standard factor load 0.99, matters most to the respondents. Additional sub-component due to the importance and standard factor load includes; "inaccurate estimates of time and costs of information systems projects" with standard factor load 0.87. Prolonging the time of conducting integrated systems and making turbulent circumstances in organizations might

change strategic targets as far as projects will be ignored strategically. Other sub-component rankings are "lack of supervision and possession" and "lack of instructions to interpret true perspectives of e-government" with standard factor loads 0.83 and 0.79 respectively.Full success in effective development and usage of integrated information systems requires focusing on planning, defining working strategy, avoiding considering too much design operation and application choice, centralizing system developers, and adapting applications with national environment and standards. Despite the importance of developing these systems, the outcomes have not been accurately estimated yet. However, the organizations involving information systems integration are seeking prompt results but this view will be incorrect because the structure of united information systems and their operations are quite different from traditional ones and transition from former situation to a new situation and developing operational processes due to integrated information systems and systematic thinking cannot be very convenient.

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