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Factor analysis of barriers to the use of information technology in Department of Education in Khuzestan province

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ABSTRACT

Nowadays, the information technology can be utilized as a powerful tool for improving the quality and efficiency of education. Studies indicate that the educational innovation and changes in the educational system will not be achievable without employees' cooperation and acceptance. Therefore, the main objective of this study is to evaluate the use of information technology among the managers and senior experts in department of education in Khuzestan as well as identifying the barriers to the development of information technology application in this organization. The research has the descriptive correlative and analytical type which identifies the factors affecting the dependent variable (factor analysis). The statistical population covers the managers and senior experts in Department of Education in Khuzestan Province. The researcher-made questionnaire is the research instrument based on the studies on the barriers to the use of information technology. According to the results of KMO and Bartlett test, the data are suitable for factor analysis. Based on the survey results, the most important identified factors as the barriers to the development of enterprise-level information technology application are as follows:
First factor: Negative feeling towards the information technology and feeling of helplessness and failure in its application.
Second factor: the lack of senior management's support of information technology application and poor planning.
Third factor: the lack of incentive mechanisms and desire for stability and lack of change.
Fourth factor: The mere attention to the information technology hardware rather than culture building.
Fifth factor: The people's unfamiliarity with English language reduces the possibility of information technology application.

KEYWORDS: Factor analysis, Information Technology, Department of Education

INTRODUCTION

The importance and role of information technology as a powerful factor in economic and social changes (Winter and Taylor 2001, 1, 17; Freeman, 1994) have caused a great investment for its development (Feinberg and Tokic, 2004). These investments in the global market of ICT have predicted higher than 2.6 trillion dollars in 2004 and 3.2 trillion dollars in 2007 (WITSA 2004, 15). Paying serious attention to this technology in Iran was created since2002 in the form of Budget act and its executive regulations which made it possible to spend hundreds of billion dollars in this field particularly in the public sector (Budget Actof 2002, 42-44, 996; Budget Act of 2003, 56-58, 1055; Budget Act of 2004, 65-67, 998; Council of Ministers 2002; Council of Ministers, 2003).

Despite the volume of investments in this area and their benefits for its application (Peansupap and Walker, 2005), the evidence indicates that the successful application of this technology has not been satisfactorily (Luna- Reyes et al, 2005). However, what does the Information Technology mean?

The most general information technology definition, which a large number of scholars and scientists such as Andolsen (1999), Campbell (1999), Edwards (1999), Geram (1999), Schober (1999), and Wildstrom (1999), etc, have consensus on it, is explained as follows: "The information technologies include a wide range of inventions and communication media which link the information systems and people including the voice mail, Electronic mail, Voice conferencing, Video conferencing, the Internet, Software, Hardware, and so on. The information systems and information technologies are often integrated and they are often called as the information technologies" (Tsang, 2002, p. 837).

In recent years, the costs of information technology in organizations, whether large or small, service or manufacturing, for-profit or non-profit, are increased throughout the world. The costs of office and production automation, which include the computers, applied packages, Software development according to the need,

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communications, computer networks and the Internet, are considered as the investment and is usually done as the development of efficiency, improved efficiency, maintenance, and upgrading the competitive status of organization. Unfortunately, all investments and information technologies will not lead to the expected results. This reality along with the rapid pace of changes in information technology obsolescence in the dimensions of hardware and software platforms force the managers to pay attention to the long-term planning in information technology management (Gandhi, 2004, p. 268). The identification of barriers to the use of information technology in the organization in one of the main cases which should be considered in this planning in order to take steps in overcoming them. Therefore, this study seeks to identify the barriers to the use of information technology in the Department of Education in Khuzestan province as the main responsible for education in the province with an emphasis on the earlier research.

Research Background

The factors affecting the IT application are classified into the inhibiting factors or barriers and the driving or success factors. The barriers to the use of information technology are the factors which lead to the complete failure of applying this technology or abandon and stop it. The barriers may lead to the unattainable goals or created unwanted consequences. In contrast, the success factors make successful use of information technology and its continuity or prevent its unintended consequences. The previous studies indicate that some of the factors influencing the use of information technology have mutual impact. In other words, their existence leads to the success and their lack prevents the application of this technology. There are the factors, which their "existence" leads to the success of applying this technology, but "their lack" does not necessarily cause the failure. There are the factors which their "existence" leads to failure in the application of this technology, but their "lack" does not necessarily lead to their success. The results of previous studies often refer to these differences and sometimes does not explicit it. Despite it, the barriers to the use of information technology in organizations have been investigated in terms of various forms and aspects so far. Some of the studies have investigated the factors affecting some of the information technology applications. The other studies have paid attention to these factors in the especial subject, organizational, or environmental domain. Some studies have provided the models to combine and explain these factors by investigating the results of conducted studies. In these studies, various methods have been utilized according to the research subject and area. Table 1shows a summary of these studies.

In a quantitative study with survey method,"Ewusi-Mensah" and "Przasnyski" investigated the unfinished factors of IS project abandonment (Ewusi-Mensah and Przasnyski, 1991). In this study, the factors, which abandon the ongoing projects, are investigated. The results of this study indicate the importance of most of the organizational factors in the failure of projects in terms of technical and economical factors.

In a" qualitative research, "Clegg et al" investigated the role of human and organizational factors in the successful application of information technology (Clegg et al. 1997). Based on the results of this study, the important and non-technical barriers to the effective use of information technology were retrieved from the professionals' knowledge participating in the study.

Analyzing the success of information technology in small enterprises in New Zealand, was the subject of research by "Igbaria", "Zinatelli" and "Cavaye"(Igbaria, Zinatelli, and Cavaye, 1998). The purpose of their study was to study the use of computers in small enterprises as well as investigating the relationship between the organizational factors and success determinants of this technology in these organizations. Based on the findings of this research, the experience of working with computer, technical support, perceived ease of use, intrinsic rewards, perceived usefulness, and management support are the factors which have impact on the success of information technology.

In the research by "De Boer" and "Walbeek", the ways of improving the use of information technology are investigated in developing countries (De Boer and Walbeek, 1999). In this study, the current status of telecommunications by computer (Telematics) was studied in 20 developing countries by conducting a quantitative study. At the next stage, six countries were selected from these countries for deeper study. These countries were as follows: Bangladesh, Costa Rica, Ethiopia, Burkina Faso, Peru, and Zimbabwe. According to the analyses, two restrictions of "Technology level" and "level of use" on the use of information technology were found in developing countries.

Table1-Summary of conducted studies on the barriers to the use of IT application

Research Subject	Approach	Method/Tool	Domain	Main findings	Source
IS project abandonment factors	**Quantitative**	**Survey/Questionnaire**	***Types of Organizations *America**	***More important organizational factors than the economic and technical factors in the failure of projects**	**Ewusi-Mensah and Przasnyski, 1991**
Non-technical factors affecting the use of information technology	Qualitative	Interview	*Differentunits * England	* Important factors of success and failure	Celgg et al. 1997
Success factors of IT application	Quantitative	Survey/ Questionnaire	*Small enterprises *New Zealand	*Success Factors	Igbaria, Zinatelli, and Cavaye, 1998
Application of Information Technology in Developing Countries	Quantitative/ Qualitative	Survey/ questionnaire/ interview	*Developing Countries	*Application Restrictions	De Boer and Walbeek, 1999
Success and failure factors of information systems	Qualitative	Theoretical/ case study/ Meta analysis	* Developing Countries * Reinvented government * Department of Health	* Effect of geographical domainon the effective factors *7 types of factors	Heeks, Mundy, and Salazar, 1999. Heeks and Bhatnagar, 2000. Heeks 2002
IT projects failure	Quantitative	Survey/ Questionnaire	* Private organizations *Canada	*key factors * Failure	Whittaker, 1999
The main barriers to the use of information technology	Qualitative	Meta-analysis	* Developing Countries	* Main barriers	Kunda and Brooks, 2000
Barriers to the use of information technology	Quantitative	Survey/ Questionnaire	*Federal agencies *Nigeria	* Main barriers	Tiamiyu, 2000
Differences between manufacturing and service organizations in terms of information technology	Quantitative	Survey/ Questionnaire	*Manufacturing and service organizations. * Australia	* The same barriers in two types of organizations * Differences in success factors	Sohal, Mass, and Ng, 2001
Information systems planning problems	Quantitative	Survey/ Questionnaire	*Private organizations * Singapore	Key Problems * Classification of problems based on the planning processes	Teo and Ang, 2001
Factors influencing the adoption of information technology	Quantitative	Survey/ Questionnaire	* Types of Organizations * Saudi Arabia	* Effect of five innovation attributes (Rogers model)	Al-Gahtani, 2003
Successful application of information technology	Quantitative	Survey/ Questionnaire	* Large construction organizations *Australia	* Success factors and barriers	Peansupap and Walker, 2005
Human Factors ofestablishing theManagement Information Systems	Quantitative	Survey/ Questionnaire	*Management Information System * Iranian state organizations	* Success factors and barriers * Model for classification of factors	Ghazizadeh, 1996

By investigating several cases in the field of information systems in the health domain (Heeks, Mundy, and Salazar, 1999), reinventing government (Heeks and Bhatnagar, 2000) and developing countries (Heeks, 2002), "Heeks" et al concluded that the success or failure of these systems depends on the design-actuality gaps or Conception-reality gaps. Accordingly, if the design-actuality or Conception-reality gaps are decreased in designing and establishing these systems, their probability of success will be enhanced and vice versa, by increasing this gap, their probability of failure will be increased. On the other hand, the success and failure of information systems depend on the gap between the "existing realities" and "planning assumptions". By applying this model in various fields, "Heeks" et al provided three Archetypes for this gap and the information systems failed in them.

By conducting the quantitative research and a survey method, "Whittaker" investigated the common causes of failure in IT projects in Canada (Whittaker, 1999). Based on the obtained results, three key factors including the poor project planning, poor link of project with organizational requirements, and the lack of top management support and commitment have contributed to the failure of IT projects.

By investigating the relevant literature,"Kunda" and "Brooks" considered four major obstacles to the application of information technology in developing countries (Kunda and Brooks, 2000). These four factors include: The lack of skilled human resources, economic constraints, deficiencies in infrastructure, and wrong and misplaced applications.

"Tiamiyu" investigated some of the issues associated with the information technology in Nigerian federal agencies (Tiamiyu, 2000). The main barriers to the effective use of this technology in such organizations were

among these issues. The results of this study indicate that the factors such as the costs of information technology application and the continuing failure of equipment are considered as the key barriers to the use of information technology in such these organizations.

Modir Amani (2005) and the Research Council of learning experience change (2009) suggested the improved facilities and equipment related to the information technology and the Internet for development of information literacy.

"Teo" and "Ang" defined the information systems planning at three launching phases of planning development and implementation and investigated its problems according to each of these phases in Singapore (Teo and Ang, 2001). The results of this research indicate the obtained problems in each phase.

Saudi Arabia's government investigated the issue of information technology adoption in this country by carrying out a project. Within this framework, "Al-Gahtani" studied the technical factors affecting the adoption of information technology in developing countries by conducting a quantitative research and a survey method (Al-Gahtani, 2003). The aim of this study was to investigate the relationship between the innovative features of this technology and its acceptance by users. Therefore, five innovative features were adapted by "E.M. Rogers". The results of this study indicated thatall five features were related to the adoption of information technology in this country.

To explore the factors influencing the adoption and use of ICT in large construction organizations of Australia, "Peansupap" and "Walker" conducted a quantitative research. These researchers found two barriers in their work (Peansupap and Walker, 2005).

Mahdian and Shahbazi (2012) conducted a research entitled as the "Obstacles and challenges of utilizing the new technologies in the field of information literacy from the perspective of faculty members. Based on the findings of this research, the faculty member of Borojerd University expressed that the shortage of skills in searching the electronic information by modern technology was the main obstacle. Furthermore, the studies indicated that the most significant barriers to information literacy included the lack of familiarity with electronic information research skills, lack of English proficiency in searching information and lack of full access to electronic information databases and digital libraries.

"Ghazizadeh" investigated the human factors affecting the establishment of information systems management in state organizations of Iran and paid attention to the effects with positive and negative effects. Based on the findings of this study, the highest human barriers to planning and implementation occurred in five phases of detecting the need, planning, analysis and design, implementation and operation, and system maintenance and improvement, system design and implementation phases and they were primarily associated with the leaders' personal and organizational characteristics (1996). "Davarchenaneh" also identified several infrastructural barriers to the successful use of information technology in Iranian academic libraries (2002).

Bagher-Abadi (2009) indicated in his research that there was a significant difference between the current and ideal status of information literacy skills in terms of faculty members' viewpoint at Shahed University.

Perrine et al. (2008) concluded that neglecting the education of skills required for information literacy based on the technology was one the main obstacles to its development and educating these skills as an approach in academic courses was essential for improved quality of graduate students' education. (Perrine et al, 2008)

RESEARCH METHOD

This study is applied in terms of classification based on the objective, and descriptive-survey based on the research method using the factor analysis technique. In descriptive study, the researcher seeks to describe and explain the subject. In this method, the data is collected through the library study of field methods and the obtained findings are described through the frequency, percentage, mean and variance. In this study, the Department of Education in Khuzestan province was selected as the case study. The statistical population in this study included all managers and senior experts and 50 individuals were considered as the target population. The "panel of experts" method was utilized to determine the validity of research instrument. Thus, several versions of designed questionnaire were provided for professors, experts and specialists working in the application of information technology and they were asked to give their viewpoints on the content of questions, form and appearance of questionnaire. Then the questionnaires were collected and revised using the obtained results of experts and analysts' views. In the next step, a number of revised questionnaires were completed by some of the research subjects and they were asked for the content and length of questionnaires. To determine the reliability of questionnaire, first the versions of questionnaire were completed in another organization, and then the reliability of questionnaire was assessed using Cronbach's alpha coefficient by SPSS 16 software. According to the obtained results, the reliability of questionnaire was at an acceptable level of 0.86.

CONCLUSION AND DISCUSSION

The managers 'characteristics in the organization were initially described and then the inferential statistics were provided.

The results of study indicated that about 80 percent of studied managers were bachelor and 20 percent master in terms of educational levels.

Investigation of obtained results about the work experience of statistical population indicated that 30% were put in the group with 1 to 10 years of experience, 20% in the group of 10 to 15 years, 20% in the group of 15 to 20 years, 14% in the group of 20 to 25 years, and 16 percent in the group of 25 to 31 years.

Afterwards, the factor analysis was used to determine the barriers to the use of information technology. This study evaluated the relationship between the research variables in the correlation matrix. Bartlett's test and Kaiser-Mayer-Olkin (KMO) test was utilized to investigate the suitability of data for factor analysis. The obtained results indicated that the data was suitable for factor analysis.

(Sig= 0.000, Bartlett test= 378.43 and KMO= 0.548)

The Scree Test Criterion curve was drawn according to the estimated eigenvalues and the number of factors. 5 factors with eigenvalues of greater than 1 were significant statistically and applied for interpretation and analysis and they explained 68.9% of the total variance. These 5 factors were as follows:

First factor: Negative feeling towards the information technology and feeling of helplessness and failure in its application.

Second factor: the lack of senior management's support of information technology application and poor planning.

Third factor: the lack of incentive mechanisms and desire for stability and lack of change.

Fourth factor: The mere attention to the information technology hardware rather than culture making.

Fifth factor: The people's unfamiliarity with English language reduces the possibility of information technology application.

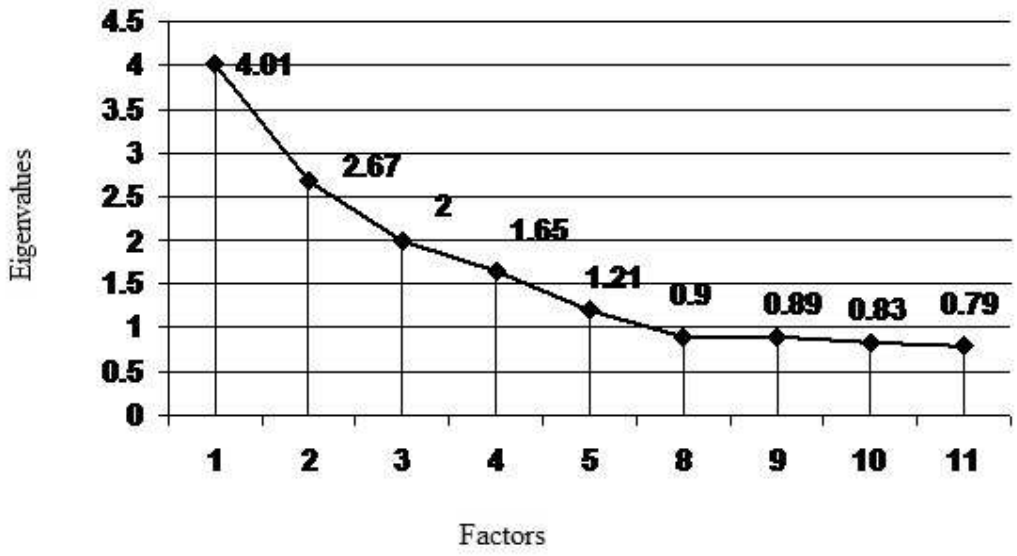

Figure 1-Scree Test Criterion Graph for determining the number of factors

Table2-Investigating the status of eigenvalues in factor analysis

Factor	Eigenvalues	Percentage of Eigenvalues	Cumulative percentage
1	4.01	23.7	23.7
2	2.67	17.5	41.2
3	2.00	11.9	53.2
4	1.65	8.3	61.5
5	1.21	7.4	68.9

Suggestions

Based on the obtained results of factor analysis, it was found that the mentioned 5 factors generally expressed 68.9% of variations in the variable of barriers to the use of information technology in the Department

of Education in Khuzestan. In other words, if these five factors are considered in the policies and programs of this organization, it can be concluded that the barriers to the application of information technology will be overcome to a large extent and the necessary infrastructure will be provided for promoting the culture of innovation and risk-taking. Therefore, this study suggests the Department of Education in Khuzestan the proper planning along with the motivational stimuli and culture building in support of information technology application and considers it as the viable solution for development and positive changes.

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