Research Journal of Applied Sciences, Engineering and Technology 6(15): 2747-2756, 2013
DOI:10.19026/rjaset.6.3781
ISSN: 2040-7459; e-ISSN: 2040-7467

Submitted: December 12, 2012 Accepted: January 17, 2013 Published: August 20, 2013

Research Article

The Impact of Application of Information Technology on E-Service Quality

[1]Nadia Eizi, [1]Behrouz Lari Semnani, [2]Khaled Nawaser and [3]Seyed Mahdi Vesal
[1]Department of Management, Payam Noor University, Iran
[2]Marketing Management (SIOM) and International Business (AIMS), University of Pune, India
[3]Department of Management, University of Nooretouba, Iran

Abstract: With rapid growth of the Internet and the globalization, companies accepted and adopted the new information and communication technology to offer e-services to their customers, service organizations in the third millennium are trying by accelerating the development process of information technology in various sectors, avoiding from traditional patterns and creating new standards to suit the requirement of the information age. In this regard, providing IT-Based services poses a way to control costs, satisfy and fulfill users' expectations and facilitate the use of these services. The aim of this research is to investigate the impact of IT application on e-services quality and identify the relationship among dimensions of these two variables. The population was the Members of Tehran Civil Servants Pension Fund in October 2011. Hypotheses have been proposed in the form of a conceptual model and results achieved using Structural Equation Modeling (SEM) methodology. In this case, we used the model of Parasurman *et al*. (2002) to determine dimensions of e-services quality and the Classical Technology Acceptance Model (TAM) for dimensions of IT application (Perceived usefulness, Perceived ease of use and Intention to use Computer). The results show that these variables are associated together. Therefore, to improve strategic goals it is recommended that senior managers should consider the linkage of these two variables.

Keywords: Electronic service quality, information technology, information technology applications

INTRODUCTION

Customers' needs determine the expected quality levels of services. Today, customers' expectations are increasing in parallel with their heightening awareness of services provided by organizations and related standards (Hashemzadeh et al., 2011). Service quality contains a level of features that can satisfy customer needs and demands and be consistent with the expectations of customers (Khaksar et al., 2010). On the other hand, customer expectations are related to his/her desires, interests, feelings and needs. Both concepts of E-service and E-service quality have become increasingly important issues in research. E-service is different from traditional service, which is based on interactive information flow between customers and service providers.

Despite the enormous investments made in the field of application of information technology in electronic services (E-services) delivery, researches show that some users, with access to technology, do not use it sufficiently and have no good understanding of the quality of electronic services (Afshar *et al*., 2011). This matter identifies the essence of examining a study to point the effects of information technology acceptance and application, stemmed from users' comprehension of the perceived convenience and usefulness of applying information technology and their intention to use computers, on e-services quality.

Exploring the Effect of Information Technology Acceptance and Application (EITAA) model on E-service quality provides a basis to implement attitudes and desires in E-service quality.

Plenty of researches have been done in this area and different scenes formed. Based on the application of information technology, (Belanger and Carter, 2008; Azmi and Bee, 2010; Lee and Lin, 2005), Studies illustrated the importance of perceived amenity and usefulness on service quality. On the other hand, researchers such as: (Belanger and Carter, 2008; Park and Gretzel, 2007; McKinney *et al*., 2002) considered the willingness of using E-services and examined its importance in various industrial, commercial and public sectors. With a glance at these three important factors in delivering E-services, the competitive advantage of organizations in capability of employing information technology to provide services is traceable.

Tehran Civil Servants Pension Fund (CSPF) organization, as one of the most important organizations providing services to a large range of retired persons, is one of these organizations. In recent years, this organization has been able to provide their services electronically by using information technology

Corresponding Author: Nadia Eizi, Department of Management, Payam Noor University, Iran

deployment policy. Therefore, this study has attempted to achieve the following goals while addressing the literature of service quality based on IT indicators.

Cognition of factors constituting the E-services quality in State Pension Fund:

- Identifying the factors effecting the quality of provided E-services to Pension Fund users
- Providing the Effect of Information Technology
- Acceptance and Application (EITAA) model

In order to comprehensively investigate whether or not users' comprehension of the perceived ease of use and perceived usefulness of applying information technology and their intention to use computer, does have effect on electronic services of the organization, researchers are looking for answer to this question:

"Which of the information technology factors is effective on the quality of provided electronic services to CSPF organization users?"

INFORMATION TECHNOLOGY APPLICATIONS

The main objective in information technology is its application in a wide range of services to increases efficiency and productivity in many different aspects of society (Yaghoobi *et al*., 2011). As the use of ICT in all aspects of human life, the world is rapidly becoming an information society. Effective use and understanding the role information technology playing and knowledge of its optimum usage are essential for any organization that wants to score more points in service delivery area (Hashemzadeh *et al*., 2011). Understanding the factors affecting users' behaviors and their attitudes to E-services quality (ease of use, usefulness and etc.), encourages managers to develop E-services quality programs. By this view, previous works in the field of application of information technology in service delivery are criticized and the hypotheses offered.

Hamner and Raza (2009) studied the relative advantage of the versatility, perceived ease of use, as well as users' images of provided services. According to their research results in 2005, perceived ease of use of services, adaptability and also confidence in the effectiveness of services were considered as the motivation predictors of e-services employment (Colesca and Lilrana, 2009). Azmi and Bee (2010) conducted a research in relation to the adoption of electronic tax systems and concluded that usefulness and perceived deftness of system usage have positive effect on intention to use electronic tax systems services, while feeling danger has a negative effect. Belanger and Carter **(**2008) studied the impact of trust and perceived risk on intention to use E-government services. Their results show that having tendency to trust and trust in internet increase the trust in government and thus escalate the movement to use E-government services. On the other hand, trust in government reduces the perceived uncertainty of using E-government services (Belanger and Carter, 2008).

The use and acceptance of electronic services for citizens of Malaysia showed that trust, usefulness perception and relative advantage recognition, on one side and complexity apprehension on the other side, have respectively positive and negative relationship with the tendency to use E-government services (Lin and Wu, 2002). Furthermore, having strong sense of privacy in online services positively impresses the citizens' confidence in using E-government services (Lee and Lin, 2005).

Ramlah Hussein, Norshidah Mohamed, Abd Rahman Ahlan and Murni Mahmud studied the factors influencing citizens' intention to use e-filing service in Malaysia, that Perceived ease of use and perceived usefulness, trust of the government, image, compatibility and service quality are found to be significant predictors of citizens' intention to use e-filing.

Zhang and Tang (2006) examined the quality of electronic services and investigated E-services quality literature. The general dimensions of services quality are: reliability, responsibility, competence, access, courtesy, communication, credibility, security, understanding and being palpable. Collier and Bienstock (2003) offered another discrete set of electronic services: timely orders and orders accuracy and conditions. Yang and Jun (2002) identified fourteen dimensions for application of information technology in services quality: Accountability, credibility, ease of use, reliability, convenience, communication, access, competence, courtesy, personalization, continuous improvement, collaboration, security/privacy and aesthetic.

Lee and Lin (2005) categorized the main effective factors on customers' perspective about the online shopping services quality as fallow: Website design, reliability, accountability, trust and privatization. In his study, Joseph (1999) has identified six dimensions of services quality in E-banking: Convenience, accuracy, feedback, complaint management, efficiency, queue management, availability and privatization. Barnes and Vidgen (2001) identified seven aspects of services quality: Reliability, competence, accountability, access, credibility, communication and people understanding. Cox and Dale (2001) declared that traditional dimensions of services quality, such as: competence, courtesy, clarity, Convenience and friendly online retailing, are not valid, but factors such as,

Table 1: Important indicators of using IT for electronic services

Authors	Indicators
Gnarys, Dymytryadys	Customer orientation and the benefit of reducing risk: giving attention to the user, simple relationship with services personnel, transactions security, demands responses and electronic mails, personnel information security Information benefits: Reliable information, perfect information, covering personal interests, security, update information, character information Interaction facilitating benefit: Technology, design, speed and performance
Long, Mgmlun	Recognition, content, services, location, management, utility, feasibility
Field, Sin and Hym	Being palpable, physical evidence of services, assurance, trust, reliability, performance, purchase process, ordering, delivery, packaging, accountability individual attention
Mazen, Gradyny, Davry	Web site design, full reliability, security/privacy, customer support services
Zhang and Prybung	Based performance, high performance, utility, availability, efficiency, maintenance and acceptance capability Guidance, complete information, sufficient information, availability and interaction
Peter, Mynucha and Roberts	Accommodation of presence shopping experience, supporting user experience, confidence increasing, providing quality information
White	Availability, utility, navigation, aesthetics, security
Ruly	Web site features, security, communication, reliability, user support, accountability, information, availability, delivery, personalization

communication, credibility, understanding, appearance and availability are critical for being successful in online businesses. Table 1 shows important indicators of using IT for electronic services.

Loiacono *et al.* (2002) considered these twelve dimensions for evaluating WEB-QUAL e-services quality: Appropriate information, interaction, trust, timely response, design, visual appeal, innovation, amenity, comprehensive communication and changeability (Parasurman *et al*., 2005). Different criteria were considered by Barnes and Vidgen (2001) for commercial organizations. Among them the following five aspects are more important for customers and helpful to measure the quality of electronic services: usability, design, information, trust and empathy (Parasurman *et al*., 2005). Zeithaml *et al.* (2005) created the A.SEROQUAL tool to evaluate the quality of electronic services. This process consists of seven factors: Efficiency, Fulfillment, System availability, contact, privacy, responsiveness, compensation, providing a main and recovery scale for electronic services (Parasurman *et al*., 2005).

E-SERVICE QUALITY

Davis (1989) model is one of the most widely used to predict Information technology adoption. TAM is also used to understand the customer behavior while using Information Systems. TAM is basically a modified form of Theory of Reasoned Action (TRA) that incorporates technology into the model to explain the usage behavior of Technology. TRA (Fishbein and Ajzen, 1975) suggest that Behavioral Intention is the primary determinant of an individual's behavior. TAM identifies the causal linkages between an individual user's attitudes and perceptions toward technology and the actual adoption of technology. The theory emphasizes that perceptions about 'how useful is this for me' and 'how easy it is' to use are the determinants that influence technology adoption. Thus, the two constructs of TAM: 'Perceived Usefulness,' and 'Perceived ease of use' may help in this study to explore the assessment of e-governance online services by users. The first construct, Perceived Usefulness, is defined by Davis (1989) as "the prospective user's subjective probability that using a specific application system will increase his/her job performance." The second construct, Perceived Ease of Use, was conceptually defined as the "degree to which the prospective user expects the target system to be free of effort." The use of online-services can be viewed as similar to the new technology adoption, therefore, the two constructs: 'Perceived Ease of Use' and 'perceived usefulness' seem important in assessing online-services quality (Yang and Fang, 2004). Several key dimensions of online-services quality such as: customization, content, reliability and response are found to have significant effect on perceived ease of use and perceived usefulness, which in turn influence attitude towards usage and re-usage of websites as well (Lin and Wu, 2002) (Fig. 1).

The followings are the previous researches and findings of the different researchers in the field of E-service Quality.

Using the means-end framework as a theoretical foundation, this study conceptualizes, constructs, refines and tests a multiple-item scale (E-S-QUAL) for measuring the service quality delivered by web sites on which customers shop or purchase online.

Based on the multi-item scales of SERVQUAL, researchers and practitioners have conducted research to examine customer's perceptions of service quality on the internet environment, either to test the scale on specific study (e.g., e-commerce, web services, etc) or to extend the scale which then fit with overall online services (Zeithaml *et al*., 2005;

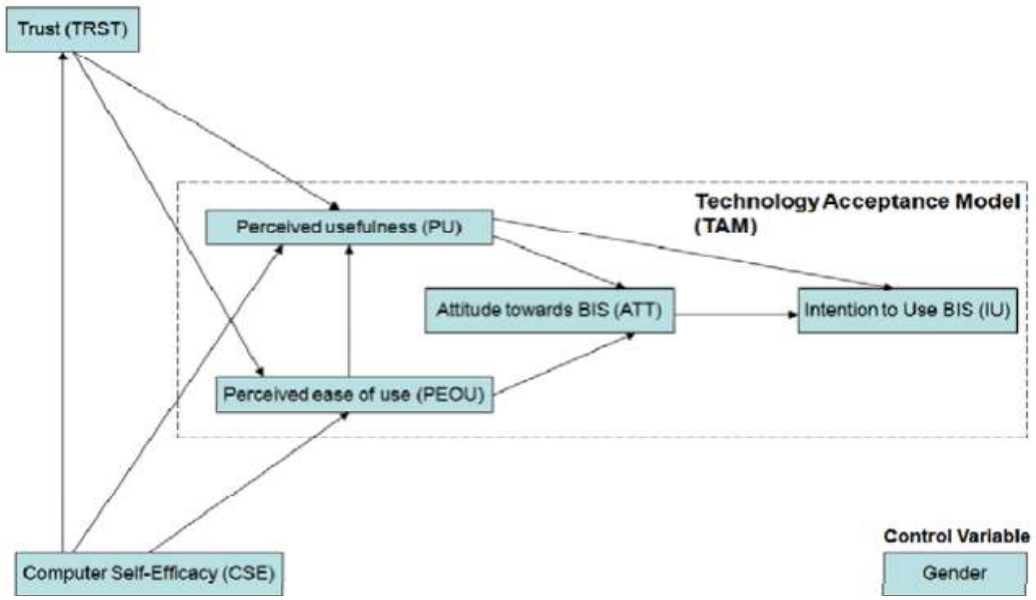

Fig.1: Lin and Wu (2002)

Parasurman *et al*., 2005). Several aspects need to be taken into account before adopting the SERVQUAL scale considering the interactions and transactions through online are different from the traditional way. Thus, some researchers have developed their own model to study about online service quality.

As the first who initiated SERVQUAL scale, Parasurman *et al*. (2005) have also conducted the same study on online shopping by adopting the original SERVQUAL scale. They conceptualized two different scales to capture user's perceptions of electronic service quality. The first scale which they named as E-S-QUAL contains of 22 items reflecting four dimensions: efficiency, fulfillment, system availability and privacy. The second scale was labeled as E-RecS-QUAL (e-recovery service quality) consisting of 11 items representing three dimensions: responsiveness, compensation and contact. Both scales have been tested empirically in different research settings concerning online service quality.

RESEARCH CONCEPTUAL MODEL

The basic concept in this research is the examination of the influence of information technology employment on the quality of provided services to members of Tehran Civil Servants Pension Fund. Figure 2 shows the Adoption and Application of Information Technology model (Davis, 1989) and E-service Quality model (Parasurman *et al*., 2005) has been combined for the first time.

Research hypotheses:

H1: Perceived usefulness of application of Information Technology is effective on e- services quality.

H2: Perceived ease of use of application of Information Technology is effective on e-services quality.

H3: Intention to use the computer is effective on e-services quality.

Methodology of research: In this study, because of dealing with testing the effect of application Information Technology variables on e-services quality and developing practical knowledge about the quality of relation and effectiveness between these three variables, this research is applied from the aiming view point and from the method of data collection and analysis view point is descriptive and is of correlative type (Kumar, 2005; Yin, 2011).

Data collection and analysis: The Questionnaire comprises of four different sections. The first section consists of 4 questions which are related to personal information of the respondents. The second section contains 12 statements measuring the three IT applications: Perceived Usefulness (PU), Perceived Ease of Use (PEU) and Users' Intention (UI). These statements are formulated by Davis (1989). Respondents were asked to indicate their extent of agreement using a five point likert scale (with 5 = completely agree, to 1 = completely disagree). The third section also contains 15 statements measuring the five e-Services Quality (eSQ) dimensions (Table 2): Efficiency, Fulfillment, System availability, contact and responsiveness. These statements are formulated by Parasurman *et al*. (2005). Respondents were asked to indicate their extent of agreement using a five point likert scale (where 5 = extensively covered, to 1 = weakly covered). For analyzing data derived from questionnaire Structural Equation Modeling/Path

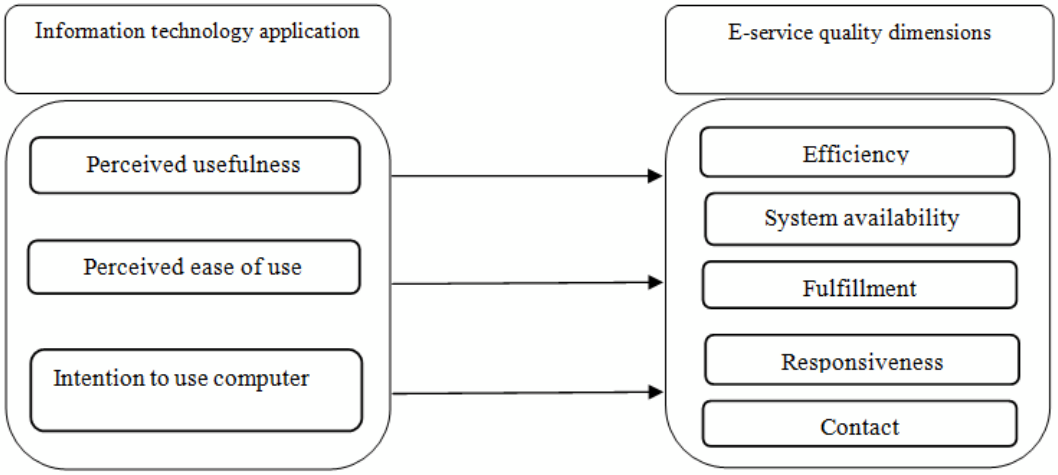

Fig. 2: Research model

Table 2: Proposed Dimension of E-Service Quality by previous Researchers

Kaynama and Black (2000) "E-QUAL"	Zeithaml *et al*. (2005)	van Riel *et al*. (2001)	Loiacono *et al*. (2002) "WEBQUAL"
Responsiveness,	• Reliability	• User Interface	• Information fit to task
Content and purpose	• Responsiveness	• Responsiveness	• Interaction
Accessibility	• Access	• Reliability	• Trust
Navigation	• Flexibility	• Customization	• Response time
Design	• Ease of navigation,	• Assurance	• Design
Presentation	• Efficiency		• Intuitiveness
Background	• Assurance/trust		• Visual appeal
Personalization customization	• Security/privacy		• Innovativeness
	• Price knowledge		• Flow (Emotional appeal)
	• Site aesthetics		• Integrated communication
	• Customization /personalization		• Business processes
			• Substitutability
Lin and Wu (2002)	Zeithaml *et al*. (2005) "e-SQUAL"	van Riel *et al*. (2001)	Yang and Fang (2004)
Information content Customization Response rate	• Tangibility		
	• Reliability	• Usability	• Reliability
	• Responsiveness	• E-scape	• Responsiveness
	• Integration of Communication	• Customization, assurance	• Competence
	• Assurance		• Product portfolio
	• Quality of information	• Responsiveness	• Security
	• Empathy		
Yoo and Donthu (2001) SITE-QUAL	Li *et al*. (2002)	Agrawal *et al*. (2011)	
Ease of use	• Website design	• Information	
Processing speed	• Customer service	• Interaction	
Aesthetic design	• Reliability	• Integration	
Interactive Responsiveness	• Privacy	• Access Corporate image	
		• Emotional engagement	
		• Active service recovery	
		• Assurance	

Table 3: Reliability of the study

Gnarys, Dymytryadys	
Using IT	0.88
E-services quality	0.89
Total	0.92

Diagram were used and the software which was used for analyzing the data was LISREL 8.54 and SPSS 18.

For determining reliability of the study Cronbach's Alpha method was used. Table 3 shows reliability of the study.

Table 4: Goodness of fit tests

χ^2 /df	Root mean square residual (RMR)	Goodness of fitness index (GFI)	Adjusted goodness of fit index	Root mean square error of approximation	Normed Fit Index (NFI)	Non-Normed Fit Index	Comparative Fit Index (CFI)
	0.042	0.96	0.96	0.066	0.90	0.90	0.92

For determining validity of the questionnaire content credit was used (Kumar, 2005; Yin, 2011).

Content credit of this questionnaire was justified by guide professors and co-guides and also initial distribution of the questionnaire among number of experts, scholars and its credibility was confirmed by considering their corrective comments as well.

STATISTICAL POPULATION AND SAMPLE

The data were collected from retirees of Tehran Civil Servants Pension Fund (CSPF). All respondents were full-time employees and volunteered to participate in the study. Total number of retirees according to report of Human Resource Management department is about 9800 people. To raise the accuracy and correctness of the analyses population samples were estimated 379 people based on Morgan's table. Therefore 400 questionnaires were delivered to retirees by a researcher and 380 useful questionnaires were returned. Usable questionnaires entered into Excel datasheet and analyzed using SPSS 18 and Lisrel 8.54. Male retirees accounted for 75.3% of the total participants, while female retirees accounted for 24.7%. From 380 respondents, 82 people under high school graduation, 86 people high school graduated, 78 people had associated diploma, 81 with bachelor degree, 49 people with master degree and finally 4 people hold PhD degree.

GOODNESS OF FIT TESTS

Structural Equation Modeling (SEM) with LISREL 8.54 (Petroutsatou and Lambropoulos, 2007) was used to test and analyze the hypothesized relationships of the research model. SEM aims to examine the inter-related relationships simultaneously between a set of posited constructs, each of those is measured by one or more observed items (measures). The goodness of fit of a statistical model describes how well it fits a set of observations. Measures of goodness of fit typically summarize the discrepancy between observed values and the values expected under the model in question. Such measures can be used in statistical hypothesis testing. Generally, in this study to assess the goodness of fit of the entire model measures such as χ^2/df, RMR, GFI, AGFI, RMSEA, NFI, NNFI, CFI were used. The relative chi-square (chi-square/degree of freedom; χ^2/df), standardized root mean square residual (standardized RMSR), Goodness-of-Fit Index (GFI), Adjusted Goodness-Of-Fit Index (AGFI), Normed Fit Index (NFI) and Comparative Fit Index (CFI) were used as goodness-of-fit measures. Due to the sensitivity of the chi-sqare test to sample size, the relative chi-square was used (it should be 3 or less for an acceptable model (Tomer and Pugesek, 2003), Standardized RMSR should not be greater than 0.10 and GFI, AGFI, NFI and CFI should exceed 0.90 to be acceptable (Hair *et al.*, 2006). The rate of each index has come in the Table 4.

Table 5: Factor loading and t-values of the measurement model

Construct/indicator	Factor loading	t-value
Perceived usefulness		
	0.65	12.24
	0.70	12.67
	0.61	11.05
	0.60	10.51
Perceived ease		
	0.52	9.85
	0.62	6.05
	0.50	9.82
	0.65	13.22
Users' intention		
	0.64	13.61
	0.67	13.26
	0.60	10.26
	0.58	11.61
E-services quality		
	0.49	4.13
	0.99	4.42
	0.58	5.22
	0.54	4.99
	0.62	5.12

The measurement model with all four constructs was applied for confirmatory factor analysis (Petroutsatou and Lambropoulos, 2007). Table 5 presents factor loading and the corresponding t-values of indicators in the measurement model. All loading exceed 0.5 and each indicator is significant at 0.05 levels. The measurement model exhibits a good level of model fit.

TESTING HYPOTHESES

The specification of the model consists of the translation of the verbal hypotheses into a series of equations previously represented in the form of a causal or a path diagram. The path diagram shows the causal relationships among all variables in the system. It should be based upon a priori knowledge of such relationships which are ultimately related to previous experience or theoretical basis (Fox and Glas, 2003). Thus, the path diagram represents the working hypotheses about the causal relationships among variables.

Figure 3 shows structural model of the study for confirming hypotheses of the study in standard estimation state.

Figure 4 also shows significance and resulted parameters from testing hypotheses. Significance values of 1.40, 2.95 and 4.14 were determined,

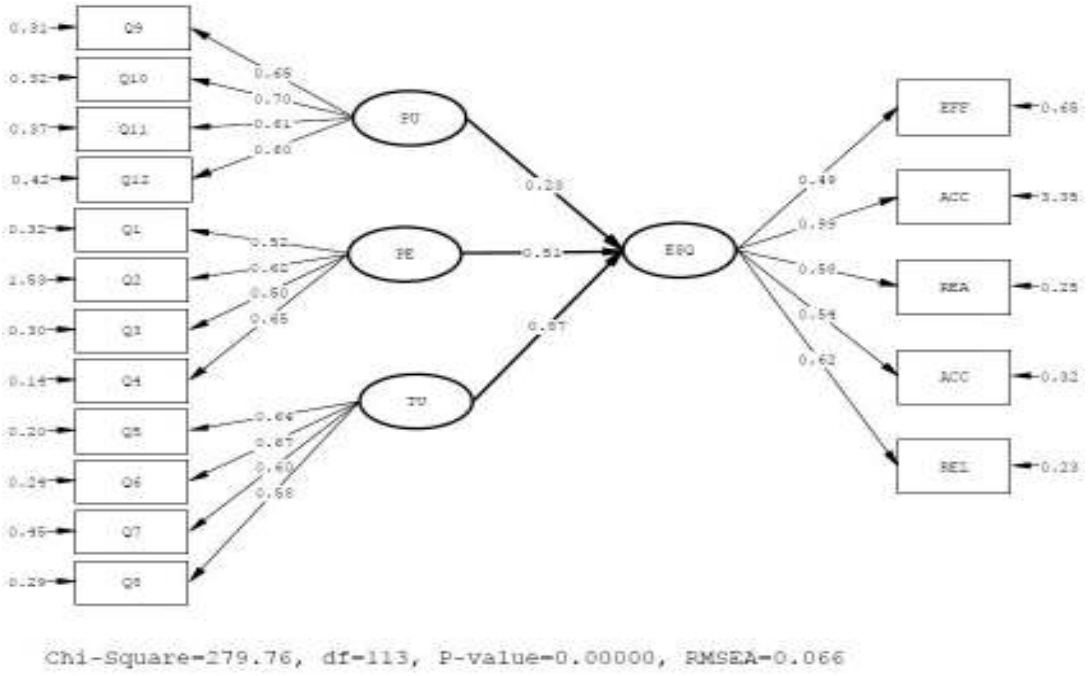

Fig. 3: Structural model of study for confirming hypotheses in standard estimates state

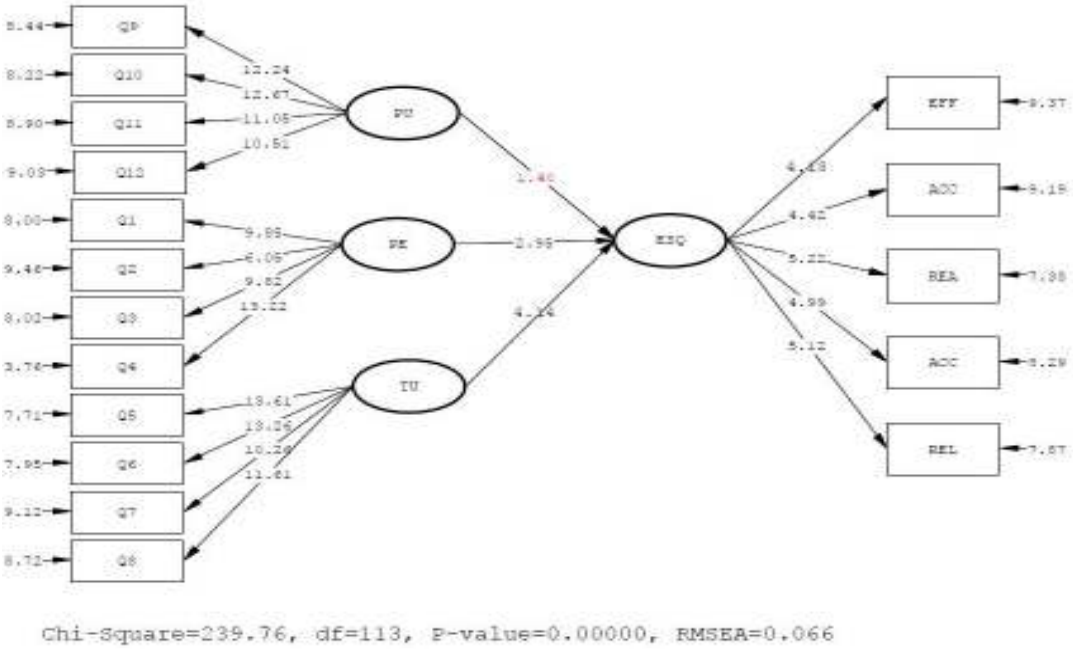

Fig. 4: Structural model of study for confirming hypotheses in t-value state

Table 6: Results of testing the hypotheses of the study using path analysis

Hypotheses of the Study	Path	Standardized estimated	Significance of parameters	Testing of hypotheses	
First hypothesis	Perceived Usefulness	e-SQ	0.23	1.40	Rejected
Second hypothesis	Perceived ease of Use	e-SQ	0.57	2.95	Confirmed
Third hypothesis	Intention to use Computer	e-SQ	0.78	4.14	Confirmed

Table 7: Comparison of results of this study to previous works

Research model	Effect on electronic services	Information technology application factors	Model
Convergence	Has	Perceived ease of use	Agrawal *et al*.(2011) and Belanger and Carter (2008)
Convergence	Has	Perceived ease of use	Spacey *et al*. (2003)
Convergence	Has	Perceived ease of use	Al-Dala'in (2010)
Convergence	Has	Perceived ease of use	Agrawal *et al*.(2011)
Convergence	Has	Perceived ease of use	(Ramlah *et al*.(Year) and Belanger and Carter (2008)
Convergence	Has	Intention to use computer	Goulding and Murrary (2004a,b)
Convergence	Has	Perceived use fulness	Belanger and Carter (2008)
Divergence	Has	Perceived use fulness	Al-Hawari and Ward (2006)
Divergence	Has not	Perceived ease of use	Al-Hawari and Ward (2006)
Divergence	Has	Perceived use fulness	Gefen and Detmar (2000)
Divergence	Has not	Perceived ease of use	Gefen and Straub (2004)

respectively are for the hypotheses. Significance value of the hypotheses 2 and 3 is placed out of (-1.98, 1.98) interval, therefore, the formed relation is out of the null hypothesis and indicates the ratification of the hypotheses of the research.

Based on the analysis done using path analysis, results of testing hypotheses of the study can be seen in Table 6. Standard estimation test and significance value were used for confirming or rejecting the hypotheses (Significance of hypotheses).

CONCLUSION

Electronic services have many potential advantages. For successful deployment of e-services systems giving attention to its acceptance and application is very important. In order to increase the possibility of using these services by citizens it is essential and inevitable, for government, to consider effective factors and develop and implement appropriate policies. Tehran Civil Servants Pension Fund (CSPF), as one of the most important organizations providing services to a wide range of retired persons, is one of these organizations. This organization, as one of the largest services provider, must afford all of its activities in a way that the application of information technology can reduce complicated administrative obstacles and facilitate services delivery and also offer convenience, usefulness and tendency to use computer (as the primary means of information technology). If services given through the website be well-designed they can beget interest and enthusiasm. Doing so, restoring and rebuilding the minds of user's and consequently their cognitive structure formation is more likely, resulted in new user's understanding and knowledge and finally favorable outcome. (Gronroos, 2000). Table 7 shows the findings of other researchers concerning the variables of the research.

Based on researchers studies "Perceived ease of use" has the least impact on "communication structure" that has been due to the lack of appropriate users' access to the communication section of Pension Fund. This matter has dissatisfied users and unless essentially, they had no enough incentive to re-use its electronic services and as long as possible refused to go to the site and believed that face-to-face visiting has better outcomes. To improve the electronic services quality it is proposed that services and support unit be better equipped and more time allocated and quick responses given to meet the users' need in case of trouble. "Tendency to use computer" has the most and least effect on the "efficiency structure" and "accountability and communication structure", respectively, indicating users' dissatisfaction of not quick and timely responsiveness. Furthermore, the lack of suitable options, guidance and promptly support staff accountability come from little influence of tendency to use computer variable on accountability and communication structure. Ineffectiveness of "perceived usefulness" on electronic services can be pointed as the lack of useful Pension Fund services explained in the following: incomplete information and unclear guidelines and maps of SPF organization site, also, low speed, low attractive and not being updated site.

RECOMMENDATION

Hence, Tehran Civil Servants Pension Fund (CSPF) has to take into consideration that, users will continue to use e-services that will provide them benefits and advantages. The e-servicing in CSPF context has proven that users are willing to use reliable online system which provides them comfort at their office or home rather than queuing up at the service counters and spending their time on the road to get to the CSPF.

To provide the necessary infrastructures, so that being easily accessible for everyone, Tehran Civil Servants Pension Fund (CSPF) organization should attempt to create required mechanisms in a way that users can easily practice organization e-services. On the other hand, public office of CSPF organization can take effective steps to inform and promote public awareness and also educate computer handling to retired people by creating and developing appropriate training programs. Doing so, they can familiarize users with variety of available services and their potential benefits.

Perceived Ease of Use construct was important to impact e-services quality provided to users which eventually relate to satisfaction. In general, customers

will be satisfied if they received quality services from their online service provider. Timely information, accurate, relevant, well-organized are among the criteria for a good web service quality, thus, in promoting the use of online services to the public, CSPF should ensure that these criteria should be taken into consideration.

In the context of the CSPF service, the efforts made to provide a detailed and informative web site is well received by the users. The web site provides useful information and provides step-by-step guide for the users to fulfill their need online.

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