E-Service Security; Acceptance Perspective

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Abstract: - In today's competitive marketing environment, many service/product providers have already or planning to extend their business using online environment. In order to get success in this expansion, it is important to consider client's expectations and needs. According to the studies in the field of information system, one of the main issues that e-service users are concern about it is security. In this regard, this paper is going to extract the security factors of e-services and then propose a theoretical framework using Exploratory Factor Analysis for further study.

Key-Words: - Web-based Service, E-Service, Security, Acceptance and Exploratory Factor Analysis

1 Introduction

The immense growth of Information and Communication Technology in past few years has seen the emergence of movement from Traditional Service to Web-based Service. E-service includes two main long-term trends which are switching economy from goods to services and the massive information economy together with electronic networks (Taherdoost, Sahibuddin et al. 2014d).

There is no unique definition for Web-based service or e-service. According to (Taherdoost, Sahibuddin et al. 2012) web-based service is defined as the provision of interactional, content-centered and electronic-based service Web. For this study the Web-based service and e-service are used interchangeably (Reynolds 2000).

Nowadays the people lifestyle has been changed by using Internet although this era may also contribute on massive cyber-crime (Charney 2008). As the Web-based consumer activity is set on the edge of dramatic growth, the fear on security issues can limit the development by arousing shoppers' concern about the electronic environment (Salisbury, Pearson et al. 2001). Furthermore, one of the biggest concerns of electronic service users is security; therefore, it is critical to understand how security issues can effect on usage of e-services.

The main purpose of this research is to explore the security factors of e-services and then propose a theoretical framework to assess the influence of security factors on e-service acceptance. To achieve this aim, in first step, the security factors of Web-based services are extracted from literature and after that the theoretical framework is proposed using Exploratory Factor Analysis.

2 Literature Review

Despite the fact that majority of the Web sites are offering the security protection particularly for access control such as user names and passwords, there is still uncertainty on security of Internet (Santos 2003). Hence, it can be summarize that, though on-line security is still anticipated as the main challenge in electronic environment, user confidence can be heightened and managed using encryption and digital signatures (Santos 2003). Transaction security and personal information protection have been highlighted by (Balfour, Farquhar et al. 1988) as vital factor for assessment on electronic environment security.

Furthermore, (Kaur and Rashid 2008) mentioned that security and privacy concerns have the negative effect on e-service adoption. Moreover, (Aladwani 2001) stated that security is one of the most significant barriers to the acceptance of e-banking, and technology acceptance (Taherdoost, Sahibuddin et al. 2012c; Taherdoost, Sahibuddin et al. 2014; Taherdoost, Sahibuddin et al. 2014b).

Since security is one of the vital obstacle and concern of information technology users (Richardson 2007), consumers' perception to information security is affecting their decisions making and behavior towards using Web-based services (Yenisey, Ozok et al. 2005).

(Vijayasarathy 2004) defined security as "the extent to which a consumer believes that making payments on-line is secure" in online environments. Moreover, the ability of the Web-based service providers to protect users' information and their financial transactions information from being stolen during transmission is another definition of security (Hua 2009). In current study, the definition

presented by (Taherdoost, Sahibuddin et al. 2014d) is adapted that defined security as the extent to which users feel that security is significant in a particular application and consumers believe they can safely use the application.

3 E-Service Security Factors

According to (Zhang, Deng et al. 2012), several security factors should be taken into consideration to increase the whole security of electronic services. According to the literature, thirteen antecedents of security namely; Confidentiality (Lebanidze 2004; Weippl 2005; Yee 2006; Lean, Zailani et al. 2009; Dzemydienė, Naujikienė et al. 2010), Privacy (Friedman, Batya et al. 2000; Lean, Zailani et al. 2009; Al-Ghaith, Sanzogni et al. 2010; Zhou 2011), Integrity (Yee 2006; Gantz 2008; Lean, Zailani et al. 2009; Taherdoost, Sahibuddin et al. 2011), Input Validation (Dritsas, Gymnopoulos et al. 2006), Authentication (Merz 2002; Lebanidze 2004; Linck, Pousttchi et al. 2006; Yee 2006), Accountability (Dritsas, Gymnopoulos et al. 2006; Charney 2008; Gantz 2008; Todorov 2011), Minimum Benefits (Dzemydienė, Naujikienė et al. 2010), Non-Repudiation (Merz 2002; Lebanidze 2004; Linck, Pousttchi et al. 2006; Yee 2006; Lean, Zailani et al. 2009), Authorization (Merz 2002; Linck, Pousttchi et al. 2006; Yee 2006; Charney 2008; Dzemydienė, Naujikienė et al. 2010), Availability (Lebanidze 2004; Turowski and Pousttchi 2004; Linck, Pousttchi et al. 2006), Audit and Logging (Dritsas, Gymnopoulos et al. 2006; Yee 2006; Charney 2008; Dzemydienė, Naujikienė et al. 2010; Todorov 2011), Verification (Charney 2008; Taherdoost, Sahibuddin et al. 2011), Configuration Management (Dritsas, Gymnopoulos et al. 2006; Dzemydienė, Naujikienė et al. 2010) were extracted. Table 1 presents thirteen antecedents of e-service security with their definitions.

Table 1: E-Service Security Factors

Factor	Definition
Accountability	is a proper mechanism to keep users accountable for their actions.
Audit and Logging	is an appropriate procedure to record actions in the system.
Authentication	is a process to validate the identity of user.
Authorization	is a process to granting of permission to users for accessing to particular resource, application and information.
Availability	refers to the accessibility and usability of the service and system to operate.
Confidentiality	is an appropriate means to prevent access to users' information by unauthorized person.
Configuration Management	refers to how the security issues related to the system will be handled.
Input Validation	is a process to determine the input errors and prevent for additional processing by filtering, scrubbing or rejecting input.
Integrity	is a procedure that ensures information is not altered by unauthorized person and the message will be transmitted correctly.
Minimum Benefits	is a mechanism ensures that users are able to take advantages of functions which they are allowed to perform.
Non-Repudiation	is a process to ensure that no one can deny his/her performed action.
Privacy	is a mechanism to provide users the ability to control over the flow of their personal information in terms of collection, usage, disclosure and subsequent access.
Verification	is procedure to verify the user identity before using the system.

4 Research Methodology

After identifying thirteen security dimensions from literature, in next step, in order to propose a theoretical framework to assess the influence of security factors on e-service acceptance, the Exploratory Factor Analysis (EFA) which is the theory generating procedure (Taherdoost, Sahibuddin et al. 2014c) is applied. Exploratory Factor Analysis identifies representative variables from a much larger set of variables for use in subsequent multivariate analysis (Maamri and Triki 2013). The survey has been distributed among students. University has been chosen because in the context of Web-based services they are savvier than elder people, furthermore, Internet is a part of their daily life and they frequently use Web-based service such as online shopping and online banking (Taherdoost and Masrom 2009; Taherdoost, Namayandeh et al. 2009).

5 Results and Analysis

In order to ascertain scales internal consistency, Cronbach's alphas method is applied which is known as most proper measure of reliability for Likert-scale instrument (Whitley 2002; Robinson 2009). As the Cronbach's alphas are above 0.7 the constructs are deemed to have adequate reliability (Nunnally 1978; Hair, Anderson et al. 1998; Whitley 2002; George and Mallery 2003; Robinson 2009).

According to (Wu 2009), for survey studies, the most significant validity issue is to determine how well the survey items measured the factors as proposed in the research model (Wu 2009). In order to measure the sampling adequacy, KMO and Bartlett test was performed. The Bartlett has a significant value (p = .000) and the KMO overall (0.821) is higher than the conventional cut-off point (0.60). This indicates that the correlations observed in the variables are likely to contain common variance and the data are likely to factor well (Wu 2009).

With the intention of explore the main variables to create a theory or model from a relatively large set of latent dimensions often represented by a set of items, Exploratory Factor Analysis is applied (Pett, Lackey et al. 2003; Swisher, Beckstead et al. 2004; Thompson 2004; Henson and Roberts 2006). Table 2 presents the eigenvalues and explained total variance for the extracted components.

K1 - Kaiser's method is the best known and most used in practice (Fabrigar, Wegener et al. 1999) because of its theoretical basis and ease of use (Gorsuch 1983; Taherdoost, Sahibuddin et al. 2014c). It suggests that only constructs which has the eigenvalues greater than one should be retained for interpretation. The eigenvalue criterion indicates that twelve factors should be retained and 65.60% of the variance has been explained.

Table 2: Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.238	25.661	25.661	9.238	25.661	25.661	4.300	11.943	11.943
2	2.514	6.983	32.644	2.514	6.983	32.644	3.288	9.134	21.077
3	2.152	5.978	38.622	2.152	5.978	38.622	2.615	7.265	28.342
4	2.020	5.611	44.233	2.020	5.611	44.233	2.555	7.096	35.438
5	1.673	4.646	48.880	1.673	4.646	48.880	2.046	5.682	41.120
6	1.428	3.966	52.846	1.428	3.966	52.846	2.010	5.584	46.704
7	1.275	3.543	56.389	1.275	3.543	56.389	1.937	5.381	52.085
8	1.246	3.460	59.849	1.246	3.460	59.849	1.704	4.733	56.818
9	1.043	2.898	62.746	1.043	2.898	62.746	1.654	4.595	61.414
10	1.030	2.861	65.607	1.030	2.861	65.607	1.510	4.194	65.607
11	.979	2.720	68.327						
36	.136	.379	100.000						

Extraction Method: Principal Component Analysis.

Table 3 shows the rotated component matrix and the components loaded on their corresponding construct. In order to provide the construct validity including both convergent validity and discriminant validity, the items with loading factor less than 0.5 and cross-loading greater than 0.35 are eliminated (the colored rows) (Igbaria, Iivari et al. 1995b; Yang, Cai et al. 2005). Therefore, a total of five items are deleted. In next step, the interpretation process is carried out for allocating a name for that each of ten remained constructs. It is significant that labels of constructs reflect the theoretical and conceptual intent.

ISBN: 978-1-61804-312-2

Table 3: Rotated Component Matrix and Components Loading on Constructs.

Items	Component									
	1	2	3	4	5	6	7	8	9	10
Auth 1	.569									
Auth 2	.629									
Authz 1	.673									
Authz 2	.602									
Ver1	.715									
Ver 2	.794									
MinBen 1	.355	.447						.441		
MinBent 2	.693									
Audit 1		.554								
Audit 2		.700								
Audit 3		.649								
Config 1		.614								
Config 2		.548								
Privacy 1			.612							
Privacy 2			.758							
Privacy 3			.583							
Adp 1				.716						
Adp 2				.761						
Adp 3				.611						
Sec 1					.731					
Sec 2					.816					
Sec 3		.433					.391			
Sec 4						.471	.371			
Avail 1						.672				
Avail 2						.616				
Avail 3						.527				
Conf 1							.639			
Conf 2							.709			
Integ 1								.726		
Integ 2								.565		
Account 1									.622	
Account 2			.491							.375
Non-Rep 1									.780	
Non-Rep 2		.387	.364							
Input Val 1										-.775
Input Val 2										.550

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 16 iterations.

6 Discussion

Web-based services are used because it brings convenience by saving time and minimizing efforts for users (Taherdoost, Sahibuddin et al. 2012a; Taherdoost, Sahibuddin et al. 2013; Taherdoost, Sahibuddin et al. 2013a) although at the same time there are still some people who reject to utilize electronic services because they are worried about their privacy and security.

As mentioned earlier security is one of the main obstacles for electronic service acceptance. Results of the study show that security has the significant and direct effect on adoption of e- service.

In this research, eight security factors have been generated and labeled as; (1) Access Control, (2) System Diagnose, (3) Privacy, (4) Availability, (5) Confidentiality, (6) Integrity, (7) Liability, (8) Input Validity, with two other factors of (9) Security and (10) Adoption. Then a theoretical framework has been proposed which is shown in Figure 1 to evaluate the effect of security factors on e-service acceptance. For further studies, it is suggested to

apply Structural Equation Modeling (SEM) as a confirmatory approach (Byrne 1994) to test the measurement model and the path model simultaneously.

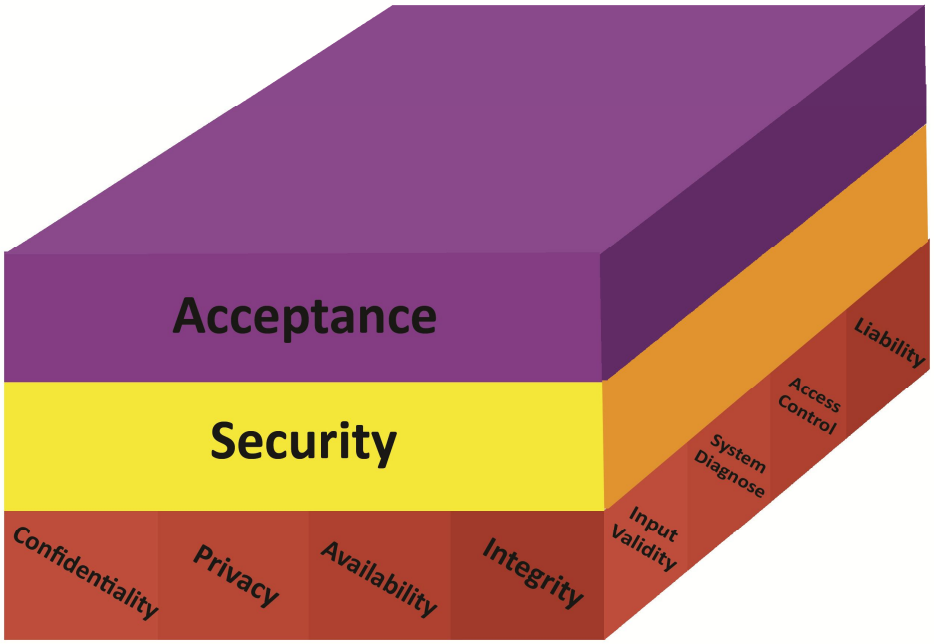

Figure 1: Proposed Theoretical Framework

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