How Security Issues Can Influence on Usage of Electronic Services

HAMED TAHERDOOST[1], SHAMSUL SAHIBUDDIN[2], NEDA JALALIYOON[3]
[1]Faculty of Computing, Universiti Teknologi Malaysia, MALAYSIA
[2]Advanced Informatics School, Universiti Teknologi Malaysia, MALAYSIA
[3]Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, MALAYSIA
hamed.taherdoost@gmail.com

Abstract: - Due to the fast growth of Information Communication Technologies, many traditional services already moved to the electronic environments. In order to achieve the success in implementation of e-services, service providers need to pay attention to customers' needs and concerns. 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. This paper is going to evaluate the security factors affecting on e-service acceptance. The security factors of Web-based service are extracted and the measurement tool will be developed. In final step, an adoption model will be proposed from the perspective of e-service security.

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

1 Introduction

Internet revolution is the main result for the appearance of many online based businesses, where significant impact took place on how businesses are implemented in new era. This revolution has caused an appearance of electronic services (e-services). 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 are many definitions 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).

It is proven that Internet has changed the people lifestyle nowadays however, 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).

The goal of this research is to explore the security factors affecting on e-services adoption and then propose an acceptance model from the perspective of security issues. To achieve this goal, in first step, the security factors of Web-based services are extracted from literature and after that the new model is proposed using Exploratory Factor Analysis.

2 Research Background

Transaction security and personal information protection have been highlighted by (Balfour, Farquhar et al. 1988) as vital factor for assessment on electronic environment security. Thus, security has been known as one of the most significant factors affecting on technology acceptance (Taherdoost, Sahibuddin et al. 2011; Taherdoost, Sahibuddin et al. 2013) and it is extremely significant in customers' trusting that Web-based technology will perform their intended and requested functions (Hoffman, Jenkins et al. 2006; Lai, Tong et al. 2011).

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). Freedom from danger, risk, or doubt is defined as security by (Santos 2003). In current research, 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 Security Factors

Several security factors should be taken into consideration to increase the whole security of electronic service (Zhang, Deng et al. 2012). Thirteen antecedents of e-service security has been extracted from literature which are presented in Table 1 with their definitions.

Table 1: Security Factors with Their Sources and Definitions

Factor	Source(s)	Definition
Accountability	(Dritsas, Gymnopoulos et al. 2006; Charney 2008; Gantz 2008; Todorov 2011)	… is a proper mechanism to keep users accountable for their actions.
Audit and Logging	(Dritsas, Gymnopoulos et al. 2006; Yee 2006; Charney 2008; Dzemydienė, Naujikienė et al. 2010; Todorov 2011)	… is an appropriate procedure to record actions in the system.
Authentication	(Merz 2002; Lebanidze 2004; Linck, Pousttchi et al. 2006; Yee 2006)	… is a process to validate the identity of user.
Authorization	(Merz 2002; Linck, Pousttchi et al. 2006; Yee 2006; Charney 2008; Dzemydienė, Naujikienė et al. 2010)	… is a process to granting of permission to users for accessing to particular resource, application and information.
Availability	(Lebanidze 2004; Turowski and Pousttchi 2004; Linck, Pousttchi et al. 2006)	… refers to the accessibility and usability of the service and system to operate.
Confidentiality	(Lebanidze 2004; Weippl 2005; Yee 2006; Lean, Zailani et al. 2009; Dzemydienė, Naujikienė et al. 2010)	… is an appropriate means to prevent access to users' information by unauthorized person.
Configuration Management	(Dritsas, Gymnopoulos et al. 2006; Dzemydienė, Naujikienė et al. 2010)	… refers to how the security issues related to the system will be handled.
Input Validation	(Dritsas, Gymnopoulos et al. 2006)	… is a process to determine the input errors and prevent for additional processing by filtering, scrubbing or rejecting input.
Integrity	(Yee 2006; Gantz 2008; Lean, Zailani et al. 2009; Taherdoost, Sahibuddin et al. 2011)	… is a procedure that ensures information is not altered by unauthorized person and the message will be transmitted correctly.
Minimum Benefits	(Dzemydienė, Naujikienė et al. 2010)	… is a mechanism ensures that users are able to take advantages of functions which they are allowed to perform.
Non-Repudiation	(Merz 2002; Lebanidze 2004; Linck, Pousttchi et al. 2006; Yee 2006; Lean, Zailani et al. 2009)	… Repudiation is a process to ensure that no one can deny his/her performed action.
Privacy	(Friedman, Batya et al. 2000; Lean, Zailani et al. 2009; Al-Ghaith, Sanzogni et al. 2010; Zhou 2011)	… 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	(Charney 2008; Taherdoost, Sahibuddin et al. 2011)	… is procedure to verify the user identity before using the system.

4 Research Structure

In order to propose a model to evaluate the security factors affecting of acceptance of e- service, first thirteen security dimensions has been extracted from literature. In second step, the Exploratory Factor Analysis (EFA) which is the theory generating procedure (Taherdoost, Sahibuddin et al. 2014c) is applied. In brief, EFA identifies representative variables from a much larger set of variables for use in subsequent multivariate analysis (Maamri and Triki 2013). Students were chosen as a group of respondent 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 Data 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 range from 0.84 to 0.91, 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. As it is shown in Table 2, 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).

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.821
Bartlett's Test of Sphericity	Approx. Chi-Square	3033.697
	df	630
	Sig.	.000

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 3 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 4 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.

Table 4: Rotated Component Matrix and Components Loading on Constructs.

	Items	Cronbach's alphas	Component									
			1	2	3	4	5	6	7	8	9	10
V1	Authentication 1	.844	.569									
V2	Authentication 2	.844	.629									
V3	Authorization 1	.844	.673									
V4	Authorization 2	.845	.602									
V5	Verification1	.842	.715									
V6	Verification 2	.842	.794									
V7	Minimum Benefit 1	.842	.355	.447						.441		
V8	Minimum Benefit 2	.843	.693									
V9	Audit and Logging 1	.842		.554								
V10	Audit and Logging 2	.845		.700								
V11	Audit and Logging 3	.843		.649								
V12	Config Management 1	.845		.614								
V13	Config Management 2	.840		.548								
V14	Privacy 1	.847			.612							
V15	Privacy 2	.846			.758							
V16	Privacy 3	.844			.583							
V17	Adoption 1	.849				.716						
V18	Adoption 2	.847				.761						
V19	Adoption 3	.846				.611						
V20	Security 1	.845					.731					
V21	Security 2	.846					.816					
V22	Security 3	.843		.433					.391			
V23	Security 4	.844						.471	.371			
V24	Availability 1	.847						.672				
V25	Availability 2	.850						.616				
V26	Availability 3	.844						.527				
V27	Confidentiality 1	.847							.639			
V28	Confidentiality 2	.845							.709			
V29	Integrity 1	.845								.726		
V30	Integrity 2	.845								.565		
V31	Accountability 1	.845									.622	
V32	Accountability 2	.844			.491							.375
V33	Non-Repudiation 1	.848									.780	
V34	Non-Repudiation 2	.844		.387	.364							
V35	Input Validity 1	.910										-.775
V36	Input Validity 2	.845										.550

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

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6 Discussion

People use Web-based service because it brings them convenience by saving time and minimizing efforts (Taherdoost, Sahibuddin et al. 2012a; Taherdoost, Sahibuddin et al. 2013; Taherdoost, Sahibuddin et al. 2013a) although at the same time there are still some who reject to use 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 model has been proposed which is shown in Figure one 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.

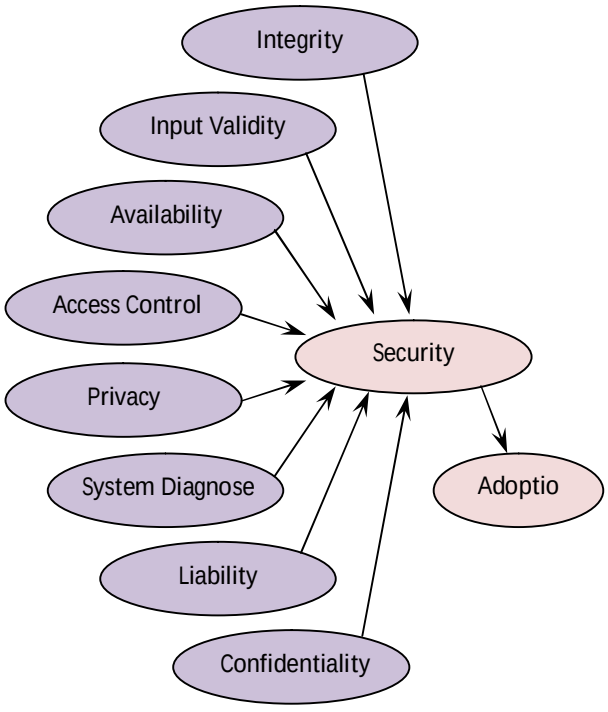

Figure 1: Proposed Model

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