Security & Privacy Model for Analyzing the Consumer Awareness with regards to Electronic Banking Services in Udaipur City

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***Abstract*— The Internet has significantly changed the way we communicate with other people and the way we do business today. Thanks to the Internet, electronic commerce has emerged, enabling businesses to better communicate with their customers and other industries within and outside their industries. The banking industry is the industry that uses this new communication channel to reach its customers. The e-banking system recognizes a myriad of emerging trends: customer demand, when and where they are used, which is important during product sales and the complex challenges of workplace integration. The challenges facing the electronic bank are issues of data security and privacy. This paper first discusses e-banking drivers; Second, it addresses concerns about various e-banking. Third, security and privacy issues are discussed; Fourth, e-banking attacks and their solutions.**

***Index Terms*— Internet, e-commerce, e-banking, security, privacy, and attacks.**

I. Introduction

Internet banking is an easy way to check your business conditions, allowing you to see payment and deposit requirements. This easy access to financial accounts makes the Internet banking a common target for hackers and other online criminals. By understanding the security issues associated with Internet banking, you can protect your accounts and businesses from attackers.

The Indian banking system continued until the country became independent. There is evidence that it has moved from a slow-moving business center to an aging and vibrant company. This change is a result of a democratic and financial revolution that allows banks to explore new business opportunities without raising money from traditional lending and debt advances. These financial reforms introduced in the early 1970s bring about a completely new situation for banks. Banks are now offering innovative and attractive technologies based on multiple channels for providing their services and services. The process began in the 1970s as a 'leader' of computers. The technology is used in a variety of applications inside and around the computer. In the early 1980s, the Western Bank of India established two committees to speed up the automation process in the banking sector. Dr. Kapoor was instrumental in developing a computer program for the banking industry. C. A high level committee was formed under the leadership of Rangarajan. Focus on customer service. For this purpose, two types of branch automation are developed and implemented. Launched in 1988, the Rangarajan Secondary Committee comes with a system of automated activities such as money transfers, email, bank net, swift, ATMs and banks.

Over the years, electronic banking platforms have been used as a more efficient channel through which banking operations can be performed without effort. These e-banking platforms are web-based programs that are presented on the Internet, making their customers more targeted towards unintended people. A major challenge for e-banking financing is the need for more sophisticated means of eliminating the effects of rapidly increasing cyber-crime. If security issues are not resolved properly, security risks can rob the benefits of Internet banking. Other weaknesses are identity theft, which may be using unusual attacks: phishing, hacking, robbery, key logging, screen entry, Trojan horses, other malicious code or transactions.

Another major problem is currently presented by mainstream schemes, which base their visibility on end-user decisions, which are completely vulnerable to social engineering attacks.

II. Review of Literature

(Syeda & Prasad, 2012) examines the need for online banking security. It suggests that in planning for the Internet banking system to continue to grow, privacy and security concepts should be enhanced. Once security and privacy issues are resolved, the future of electronic banking can be a special strategy. The long-term viability of digital banks will be the framework through which clients can communicate with their banking institution without worry and with banks operating under a single system. The types of online security control systems in the account currently in use are strongly supported by visible website design techniques and verification processes, which are in addition to the most common Internet Banking fraud detection.

(Lallmahamood, 2007)to measure the effect of thoughtful protection and privacy for the purpose of using the online banking system. He has found that tangible help may be the main basis for intentionally exposing users to Internet Banking. It is important to take into account the safety and security of Banking net users. The expanded Technology Acceptance Model (TAM) is used to identify known security and privacy relationships, as well as TAM two concepts:

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usability detection, ease of use for the purpose of using the Internet banking. Other variables such as the level of password security and financial institution as an e-commerce payment alternative will improve the level of customer confidence and benefit within the industry.

(Gyamfi, Mohammed, Nuamah-Gyambra, Katsriku, & Abdulah, 2016)distinguishing the modification of existing ATM structures to financially integrate fingerprint tests Increase blood group; and, it tracks points that are focused on using such a framework. It should be noted that customer insights cannot be generalized because they are heavily influenced by the meeting or customer culture included.

(Jahangir & Begum, 2008)The purpose of this study is to propose a conceptual framework that examines the efficiency, convenience, and security of customer-directed customer experiences in the context of e-banking. To evaluate the framework, use the assessment strategies for data collected from 227 clients of private commercial banks in Bangladesh. Specifically, the purpose of this study is to test theoretical models for use, convenience, safety, and privacy and to identify customer scenarios that enhance customer resilience. Preliminary results of the study indicate that good customer experience, ease of use, security and privacy, and customer attitude are strongly associated with customer loyalty and resilience. Discusses the impact of relevant authorities and future research.

(Wan-Rung Lin, 2020)The main purpose of this study is to propose a research design to explore the key factors that influence consumers' willingness to use online banking. This study has two parts. Earlier online bank managers used the decisions of Testing and Evaluation Laborator (Details) and Analytical Network (ANP) to determine the company's strategic objectives. Second, Structural Equation Modeling (SEM) was used to identify the most important real-time items of online banking customers. The results make a difference in accepting those companies and customers. Based on the results, companies can change their business strategies and improve customer commitment through online banking. The bottom line is the value of companies and consumers. Therefore, in the online banking business, companies need to strengthen sectors such as wealth management, data security and financial compliance.

III. Importance of the Study

Today all banking sectors offer a wide range of services to their customers. Although all banks offer e-banking services, there is a need to learn whether all bank customers are aware of the security and privacy issues of e-banking services. There is a lot of satisfaction in e-banking channels. The customer should have a thorough knowledge and understanding of the various products and services and the security and privacy features provided by banks and bankers are essential to be able to show and demonstrate customer types. The researcher urged the Udaipur banking industry to educate consumers on security and privacy issues in e-banking. This research will be an important contribution to the banking industry in identifying security and privacy issues when they receive banking services from customers. It is also helpful to note the differences in the level of awareness among consumers about the security and privacy of electronic banking services. This study provides a powerful model for identifying key issues affecting consumers by looking at security and privacy issues in electronic banking services.

Objectives of The Study

- Developing a model that takes into account the important factor that affects consumer perception when using electronic banking services in relation to factor security and privacy.
- The model fitted amidst consumer awareness regarding privacy in electronic banking services in Udaipur city.
- The model fitted between consumer awareness regarding security in electronic banking services in Udaipur city.

Population, sampling and Sample size

The population for the study included Udaipur city banking customers. More specifically the target population of the study is defined as .bank customers. The main objective of this study is to measure the awareness among bank customers about security and privacy in electronic banking services. The total number of respondents contacted is 1500, but the final responses due to non-use of electronic banking services and other deficiencies are subject to 550 data analysis.

❖ **Sampling Unit**

Individual electronic banking consumers of Udaipur City.

❖ **Sample size**

In the present research work, the sample size will be up to 1500 respondents and will be selected using Simple Sampling.

❖ **Sampling Technique**:

In the current study, respondents were selected using consensus samples (using a category design) for different demographics profiles. For a sample of the present study, it was representative of the population in terms of geographic size i.e. gender, age, occupation and income. Care was taken to make a sample representative of the actual population.

Factor Analysis

Factor analysis is a mathematical method used to explain the differences between recognition, related variables depending on the minimum number of variables not known as factors. Factor analysis searches for such variability in response to latent nonlinear variance. The variances identified are classified as sequential combinations of elements, and the terms "error". The data obtained with respect to the correlation between the variables identified can be used over time to reduce the set of variables in the dataset. In this study, Factor Analysis is used to identify factors that have a significant impact on respondents' awareness level regarding security and privacy in electronic banking services. To further refine all aspects of the factor analysis, the measurement models are estimated using the standardized measurement model (AMOS). It is a way of examining how well-measured variants represent a small number of constructors.

Model Fit For Security And Privacy In Electronic Banking Services

Structural equation modeling (SEM) is a widely used method for estimating and estimating causal relationships

using a combination of statistical data and observational equations. This theory of SEM is formally defined by geneticist Sewell Wright (1921), economist TriveHavelmo (1943) and cognitive scientist Herbert Simon (1953), and Judia Pearl (2000) to use conflicting calculations.

SEM allows for a validation and evaluation model, which means that it is suitable for theory testing and theory development. Frequency validation begins with having the concept presented in the model implementation model. The concepts used in the model should be allowed to explore the relationships between the concepts in the model. The model is tested against the measurement data obtained to determine how well the data is obtained. The ump halo derived from the input to the model usually has confusing results, which are obtained with respect to the data.

In the first sense, SEM can be mistakenly used to define the model directly and to use the data to estimate the free parameter values. The frequency of the actual shapes must be changed by showing the model evidence. When used for SEM testing purposes only, it is common in the field of theory such as analytical analysis.

Two types have been developed for the consideration of the current structure (AMOS 23).

The CA model is ready to ensure the level of awareness among e-banking customers on security and privacy. These good things include privacy, technology, malpractice, awareness, sensory systems, online clarity, risk for banking services, security, risk and financial loss (measured separately and deducted when assets are reduced). e1, e2, e3, e4, e5 and e6 are the error names (residues) of these items.

➢ **Model No. 1 with regards to Privacy**

H_{01} "The model fitted among Consumer Awareness with regard to Privacin Electronic Banking Services in Udaipur City is good"

$H_{01.1}$ Consumer awareness is positively associated with regard to "confidentiality" in e-banking services in Udaipur city is good.

$H_{01.2}$ Consumer awareness is positively associated with regard to "technicality" in e-banking services in Udaipur city is good.

$H_{01.3}$ Consumer awareness is positively associated with regard to "safety" in e-banking services in Udaipur city is good.

$H_{01.4}$ Consumer awareness is positively associated with regard to "sense of lost money" in e-banking services in Udaipur city is good.

$H_{01.5}$ Consumer awareness is positively associated with regard to "alertness" in e-banking services in Udaipur city is good.

The model is a combination of five elements (confidential), technology (technical errors), security (free), lost money (online fraud), alertness (Internet connection), and consumer. There is a good understanding of the five factors mentioned in electronic banking services in Udaipur city.

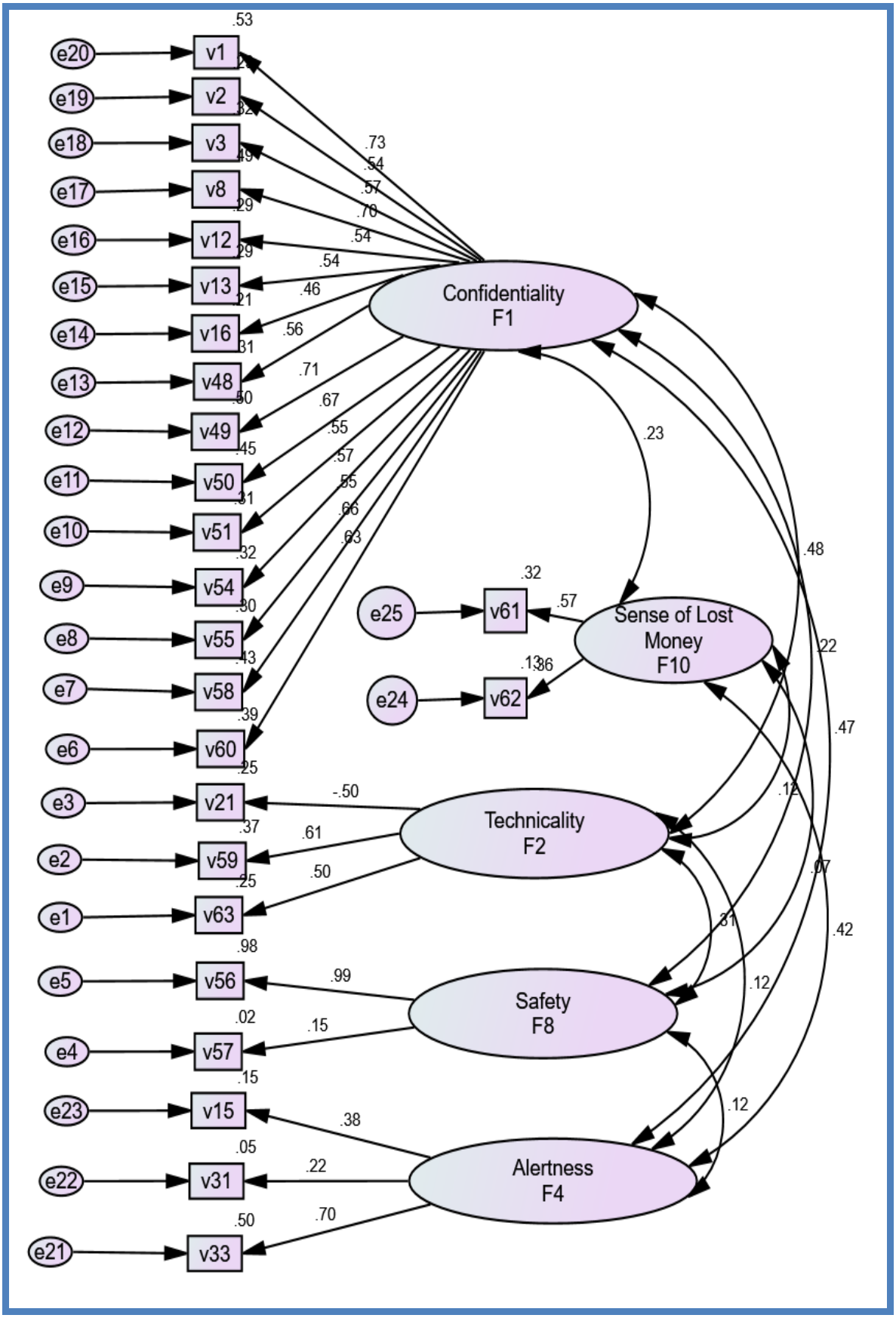

Figure1: Standardized Model - for Consumer Awareness with regard to Privacy in E- Banking Services.

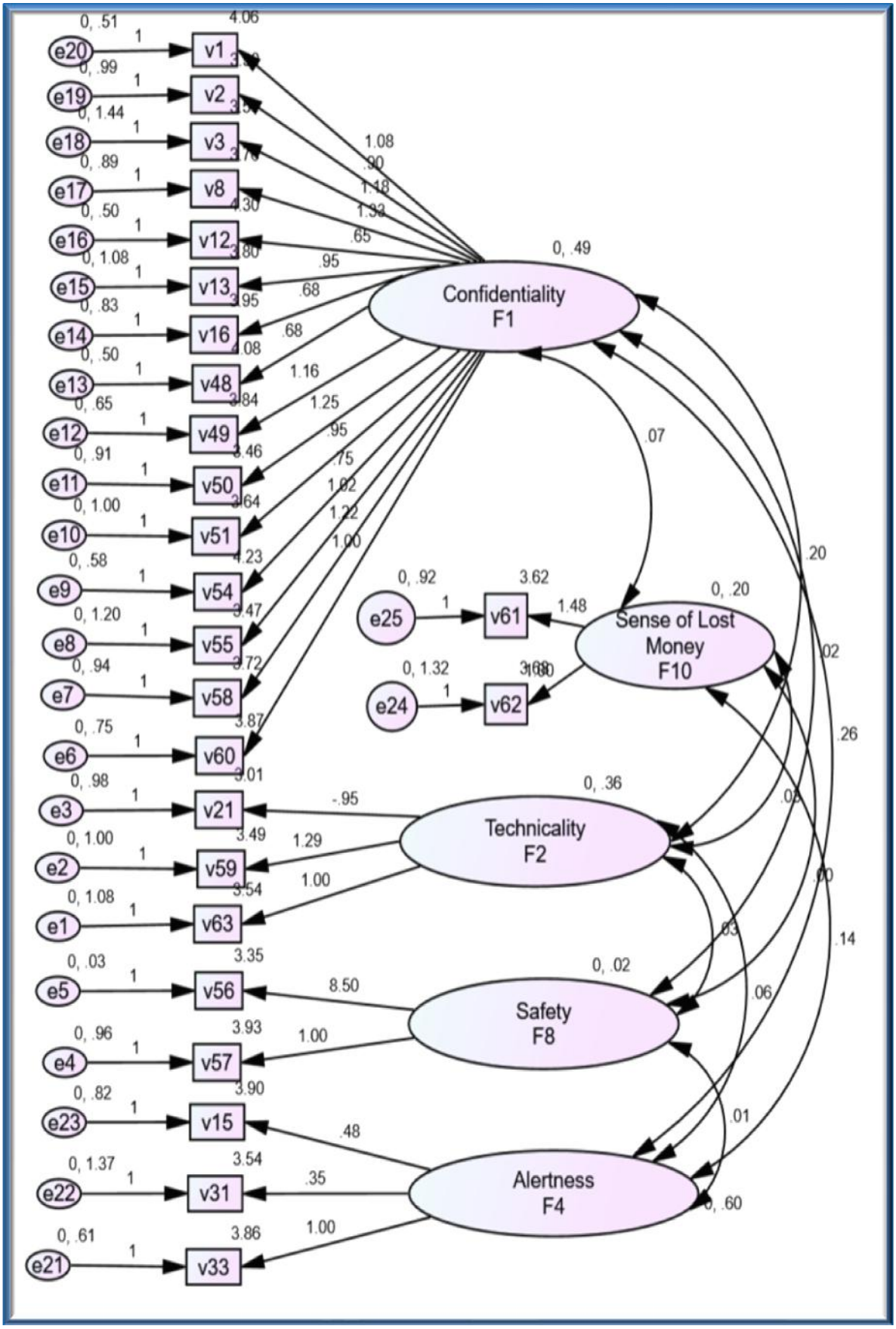

Figure2: Unstandardized Model - for Consumer Awareness with regard to Privacy in E- Banking Services.

Model -Privacy for Consumer Awareness with regard to confidentiality (confidential issue), technicality (technical fault), Safety (general), sense of lost money (online fraud), alertness (exposure with internet) in Electronic Banking Services in Udaipur City is good.

Table 1Computation of degrees of freedom for Privacy Model

Computation of degrees of freedom	
Number of distinct sample moments:	350
Number of distinct parameters to be estimated:	85
Degrees of freedom (350 - 85):	265
Result	
Chi-square	800.895
Degrees of freedom	265
Probability level	.000

Table 2 : Regression Weights for Privacy Model

			Estimate	S.E.	C.R.	P	Label
v63	<---	F2	1.000				
v59	<---	F2	1.285	.183	7.023	***	par_1
v21	<---	F2	-.946	.146	-6.462	***	par_2
v57	<---	F8	1.000				
v56	<---	F8	8.501	10.362	.820	.412	par_3
v60	<---	F1	1.000				
v58	<---	F1	1.216	.093	13.139	***	par_4
v55	<---	F1	1.022	.092	11.150	***	par_5
v54	<---	F1	.748	.065	11.588	***	par_6
v51	<---	F1	.952	.084	11.336	***	par_7
v50	<---	F1	1.245	.094	13.302	***	par_8
v49	<---	F1	1.159	.084	13.853	***	par_9
v48	<---	F1	.677	.060	11.344	***	par_10
v16	<---	F1	.678	.070	9.691	***	par_11
v13	<---	F1	.946	.086	11.011	***	par_12
v12	<---	F1	.647	.059	11.048	***	par_13
v8	<---	F1	1.328	.097	13.747	***	par_14
v3	<---	F1	1.176	.102	11.530	***	par_15
v2	<---	F1	.900	.081	11.107	***	par_16
v1	<---	F1	1.079	.076	14.140	***	par_17
v33	<---	F4	1.000				
v31	<---	F4	.345	.098	3.508	***	par_21
v15	<---	F4	.482	.122	3.940	***	par_22
v62	<---	F10	1.000				
v61	<---	F10	1.482	.623	2.378	.017	par_26

Note: n = 550; C. MR. (Critical Ratio) c. R. SEM with values is the most commonly recommended basis for testing the statistical significance of components that determine significance at the p <0 .01 level beyond 0 2.58.

Accordingly, consumer awareness of privacy (confidential issues), technology (technical flaws), security (common fraud), loss of money (online fraud), standardized estimates of vigilance (risk with the Internet) and critical retrievals. (Above regression table 2) are within the range of accepting the hypothesis. All of the above hypotheses are accepted.

Table 3 Covariances for Privacy Model

			Estimate	S.E.	C.R.	P	Label
F2	<-->	F1	.199	.033	5.993	***	par_18
F8	<-->	F1	.023	.027	.844	.399	par_19
F2	<-->	F8	.027	.035	.781	.435	par_20
F8	<-->	F4	.014	.018	.771	.441	par_23
F2	<-->	F4	.057	.041	1.401	.161	par_24
F1	<-->	F4	.258	.041	6.265	***	par_25
F10	<-->	F1	.072	.034	2.095	.036	par_27
F10	<-->	F4	.145	.056	2.581	.010	par_28
F10	<-->	F2	.031	.026	1.199	.231	par_29
F10	<-->	F8	.005	.006	.759	.448	par_30

Model fit Summary

The model equals Chi-square χ2 =, degrees of freedom = 800.895 and is equal to P-mode's .000 significance level of 5%, the null hypothesis states "Consumer awareness of electronic banking services in the city of Udaipur. -fit (GFI) for the model is .984, which shows good agreement and the fit (AGFI) has its corrected value. (ECVI) is 1.768, which indicates that it is within the permissible range of the optimized model. freedom. = 265 and P value = 0.000 show that the model is similar to the data I live in. However, since chi-square reporting is more sensitive to sample size, it is worth looking at other methods. a suitable.

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	85	800.895	265	.000	3.022
Saturated model	350	.000	0		
Independence model	50	3748.280	300	.000	12.494

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.883	.695	.746
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	535.895	454.619	624.790
Saturated model	.000	.000	.000
Independence model	3448.280	3254.532	3649.349

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.459	.976	.828	1.138
Saturated model	.000	.000	.000	.000
Independence model	6.827	6.281	5.928	6.647

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.061	.056	.066	.000
Independence model	.145	.141	.149	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	970.895	979.346		
Saturated model	700.000	734.799		
Independence model	3848.280	3853.251		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.768	1.620	1.930	1.784
Saturated model	1.275	1.275	1.275	1.338
Independence model	7.010	6.657	7.376	7.019

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	209	221
Independence model	51	53

- **Model No. 2 with regards to Security**

H_{02} "The model fitted among Consumer Awareness with regard to Securityin Electronic Banking Services in Udaipur City is good"

$H_{02.1}$ Consumer awareness is positively associated with regard to "Scared with system"in e-banking services in Udaipur city is good.

$H_{02.2}$ Consumer awareness is positively associated with regard to "Exposure withinternet" in e-banking services in Udaipur city is good.

$H_{02.3}$ Consumer awareness is positively associated with regard to "Exposure withbanking instruments" in e-banking services in Udaipur

city is good.

$H_{02.4}$: Consumer awareness is positively associated with regard to "Procedural risk" ine-banking services in Udaipur city is good.

$H_{02.5}$ Consumer awareness is positively associated with regard to "Misappropriation" in e-banking services in Udaipur city is good.

This model is combination of five factors i.e. scared with system (threat related to data lost),exposure with internet (threat related to website), exposure with banking instruments (threatrelated to personal information), procedural risk (threats applying for e-banking instruments),misappropriation (leak of confidential information) are inter correlated with each other andfitted among consumer awareness with regard to all mentioned five factors in electronic bankingservices in Udaipur city is good.

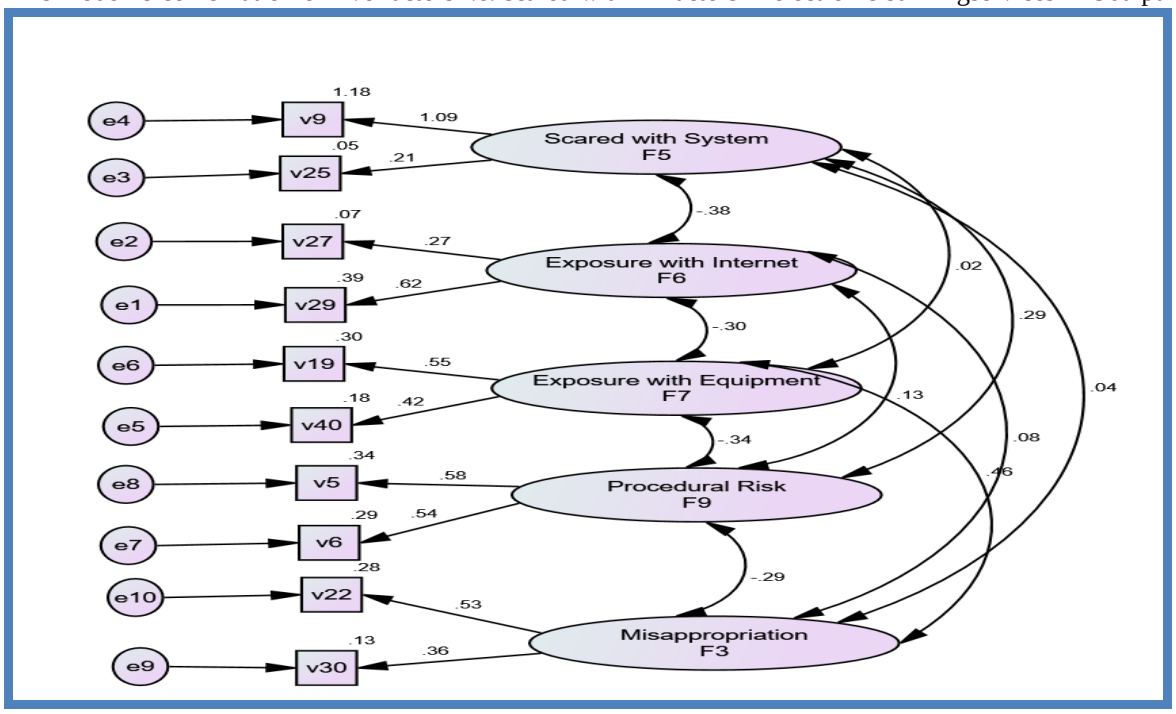

Figure3:Standardized Model - for Consumer Awareness with regard to Security in E- Banking Services.

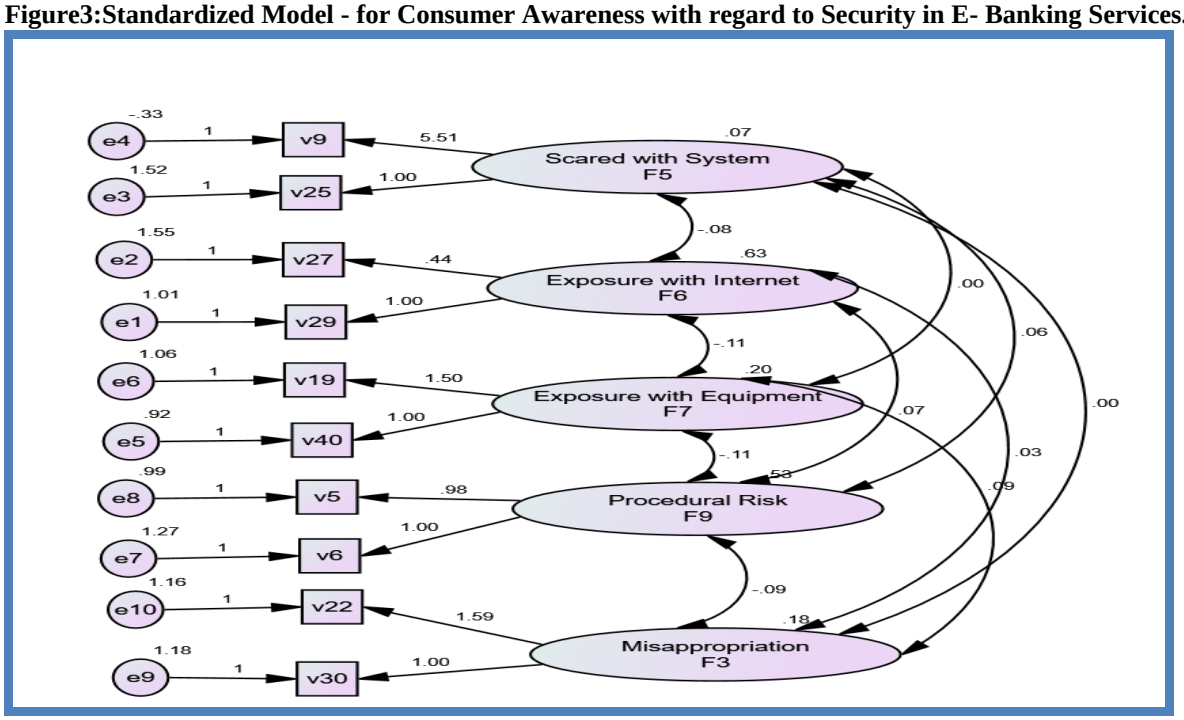

Figure4: Unstandardized Model - for Consumer Awareness with regard to Security in E- Banking Services.

Consumer security awareness model on "scared with system" (threats related to lost data), "Exposure with internet" (website-related threat), "exposure with equipment" (threat related to private data), "procedural risk" (threats to software tools (Banking), "improper use" (leak of confidential information) at Electronic Banking Services in Udaipur City is good.

Table 4Computation of degrees of freedom for Privacy Model

Computation of degrees of freedom	
Number of distinct sample moments:	55
Number of distinct parameters to be estimated:	30

Degrees of freedom (55 - 30)	25
Result	
Chi-square	43.175
Degrees of freedom	25
Probability level	.013

Table 5 : Regression Weights for Security Model

			Estimate	S.E.	C.R.	P	Label
v29	<---	F6	1.000				
v27	<---	F6	.436	.156	2.798	.005	par_1
v25	<---	F5	1.000				
v9	<---	F5	5.513	3.552	1.552	.121	par_2
v40	<---	F7	1.000				
v19	<---	F7	1.502	.476	3.158	.002	par_3
v6	<---	F9	1.000				
v5	<---	F9	.977	.204	4.796	***	par_7
v30	<---	F3	1.000				
v22	<---	F3	1.587	.858	1.849	.065	par_10

Note: n = 550; C. MR. (Critical Ratio) c. R. SEM with values is the most commonly recommended basis for testing the statistical significance of components that determine significance at the p <0 .01 level beyond 0 2.58.

Accordingly, consumer awareness reiterates "threats with systems" (data loss threats), "risks with the Internet" (threats to websites), "risks with banking tools" (threats to personal information), very simply and positively, "procedural risk" (Threatening to apply for e-banking tools), "miscalculation" (secret Y information leakage) criterion of standard assumptions and proportions (range of accepting the concept of regression table up to 5). All of the above hypotheses are accepted.

Table 6 Covariances for Security Model

			Estimate	S.E.	C.R.	P	Label
F5	<-->	F7	.002	.009	.209	.834	par_4
F6	<-->	F7	-.108	.046	-2.345	.019	par_5
F6	<-->	F5	-.081	.056	-1.448	.148	par_6
F5	<-->	F9	.057	.038	1.518	.129	par_8
F6	<-->	F9	.073	.062	1.179	.238	par_9
F7	<-->	F3	.086	.037	2.313	.021	par_11
F6	<-->	F3	.026	.058	.445	.656	par_12
F7	<-->	F9	-.111	.040	-2.815	.005	par_13
F9	<-->	F3	-.090	.039	-2.275	.023	par_14
F5	<-->	F3	.005	.009	.539	.590	par_15

Model Fit Summary

The model chi-squared $\chi 2$ =, degrees of freedom = 43.175, and the model's p-value is .013, which is significant at the 5% level, indicating that the null hypothesis is "a model that fits in with consumers' perceptions of safety." . The "five elements of Udaipur City's electronic banking services are good" model shows good fit to the data.) .036, a smaller value indicates a better model, and the cross-validated cross validation ((ECVI) 0.188, which indicates the good model fit within the acceptable range. Values = 0.013 This is sufficient to indicate that the model has a lot of data, well, although chi-square is very sensitive to statistical sample size. The so, looking for other suitable measures may be more appropriate.

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	43.175	25	.013	1.727
Saturated model	55	.000	0		
Independence model	10	317.669	45	.000	7.059

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.059	.984	.966	.447
Saturated model	.000	1.000		
Independence model	.170	.890	.865	.728

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.864	.755	.938	.880	.933
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.556	.480	.519
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	18.175	3.763	40.437
Saturated model	.000	.000	.000
Independence model	272.669	219.848	332.981

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.079	.033	.007	.074
Saturated model	.000	.000	.000	.000
Independence model	.579	.497	.400	.607

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.036	.017	.054	.888
Independence model	.105	.094	.116	.000

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.188	.162	.228	.190
Saturated model	.200	.200	.200	.204
Independence model	.615	.519	.725	.616

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	479	564
Independence model	107	121

IV. Conclusion

In the current situation technology is having a huge impact on consumers and encouraging them to use electronic banking services in a positive way. Many financial strategies such as ATMs, credit cards, Internet Banking, debit cards, mobile banking etc. have completely changed the face of the Indian bank. In addition to the various benefits that electronic consumers provide to their customers, there are also several security issues with consumers in an online banking company. Therefore, in this study, an attempt was made to measure and analyze the level of awareness of the sample respondents on e-banking products and services.

According to the results of the analysis, it has been identified that consumers are well aware of the use of bank products delivered i.e. ATM / Cards (debit / Credit), Internet banking and mobile banking. This study also reveals that aspects of human conflict i.e. gender, age, education and occupation play an important role in balancing the level of awareness (Social, Ethical, Legal and Technical) among consumers regarding security and privacy in electronic banking services.

In addition it was noted that besides the groups gender and age, other geographical features i.e. education and employment have a direct impact on the level of information security and privacy in electronic banking services. The study shows that highly educated consumers know more compared to consumers with lower levels of education. In addition, work-related findings revealed that the level of social, ethical, technological and legal awareness among consumers varies with the electronic banking products offered by banks.

The study also identifies ten factors such as confidentiality, technology, malfunction, alertness, systemic fear, Internet exposure, machine exposure, security, systemic risk and a sense of lost capital that influence consumers' awareness of their security and their electronic banking services. An additional 10-item analysis was performed using AMOS in another section. The results of the analysis propose a model that ensured that five factors such as privacy, Feelings of lost money, technology, security and awareness are the most important things consumers think about their privacy while using electronic banking services. Similarly the results have shown that the other 5 variants of Program intimidation, online exposure, machine exposure, process risk and inadequacy are the most important consumer considerations for their safety while using electronic banking services.

The findings will provide useful information to banks that help them understand consumers when they are serious about

their security and privacy while using electronic banking services.

V. Further Studies

The issues examined at the border point should be considered as a starting point for continuity in this region. Consumer awareness research on E-banking security and privacy is just beginning in India so there is so much to think about and to explore a few ways to further explore in the existing sector as discussed below.

- The research model developed in this study provides sufficient effect of awareness on security and privacy in the maintenance of electronic savings services but has a modifying effect on the model. The feature adopted in the study may be applicable and other aspects of the feature may be considered for better model awareness. In this way, more research could look at this which would be mathematically correct.
- Further research can be done on security and privacy in the area of online e-wallet services such as Paytm wallet, BHIM, Citrus, Pay etc.
- Investigate the differences between users and non-users regarding their awareness of security and privacy in electronic banking services.

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