Pak. j. life soc. Sci. (2024), 22(2):10670-10689 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences
www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2024-22.2.00806

RESEARCH ARTICLE

Assessing The Customers' Behavioral Intention to Adopt Internet Banking Services

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ARTICLE INFO

Received: Sep 15, 2024

Accepted: Oct 23, 2024

Keywords

Internet Banking

Sudan, customer attitudes

Usability

Security, trust,

Education

Adoption

Branding

Growth

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ABSTRACT

Several aspects are liable for the way balloters view online banking (IB). They are inclusion, ease of use, safety, and privacy issues. This research analyzes these business factors in relation to the level of IB adoption, showing that the end-users of the IoT devices require simple and easy-to-use interfaces to interact with the devices, educational campaigns on security measures, and established friendly relationships with clients. Results showed that an IB that was easy to use combined with well-targeted customer education would probably boost the adoption of the browser. Sudanese banks will boost IB applications by means of answering customer requests, letting systems work easily, and emphasizing security features and practical goodness. Educating and nurturing customers in the long run will provide a rock-solid foundation to accelerate IB's adoption in the long-term future. In this way, when the company realizes the interactions between this and the digital banking activities, it can result in greater branding performance and higher growth.

INTRODUCTION

Through the Technology Acceptance Model (TAM) toward Internet banking uptake in Sudan, we will be able to provide information on factors influencing the adoption of digital products, increase technology awareness of users, and provide data to policymakers on readiness for digital transformation. Along with this, the paper provides the academic literature on technology acceptance in emerging markets like Sudan being a previous experience, helping to widen our knowledge regarding Internet banking adoption. Information and communication technology is transforming the banking industry, transforming services like automated teller machines, phones, the internet, credit cards, and electronic cash. Traditional branch-based retail banking remains prevalent in Sudan, but banks are investing in technology to maintain a competitive edge. Understanding customer preferences and factors influencing traditional and unconventional banking instruments is crucial for forecasting the future. Sudan's electronic banking systems are underutilized, despite

efforts to improve accessibility. Understanding user acceptance and factors influencing their intention to use Internet banking is crucial for developers to create user-friendly systems or identify potential user aversions.

Electronic banking offers retail banking services like balance reporting, inter-account transfers, and bill payments through telecommunication networks, allowing customers to access their accounts through the internet, without leaving their homes or organizations.

The process of offering electronic banking systems involves three stages: pre-development, development, and post-development, with the predevelopment stage focusing on the creation of an online service.

E Marketers suggest that banks should develop new products and services to fully utilize EB capabilities, while customers need to be aware and comfortable with Internet banking services. Studying factors influencing customer adoption is crucial for better marketing strategies and understanding acceptance in the technology acceptance model (TAM) (Davis and Venkatesh, 1996).

LITERATURE REVIEW

Internet Banking in Sudan: Adoption, Challenges, and Opportunities

E-Banking is a crucial aspect of the future banking industry, enabling the handling of various banking activities via the internet. It is cost-effective, facilitates swift fund movement domestically and internationally, and allows anytime, anywhere banking to customers (Khan, 2021). A study in Sudan found that factors like farming experience, friends, labor, land, irrigation, and extension services significantly influence farmers' credit accessibility from banks. The Farmer's Commercial Bank (FCB) showed a stronger correlation with credit accessibility and input adoption (Nasereldin et al., 2023). Factors influencing mobile payment adoption in Sudan, focusing on technical culture, facilitating conditions, and gender, age, and education. Data from 453 customers was collected through an online questionnaire. The study found that these factors significantly influence the adoption of mobile payment in Sudan (Sleiman et al., 2021). The relationship between Islamic banks' governance bodies and corporate governance disclosure (CGD) in Sudanese banks. Results show low CGD levels, with 39% on average. Advanced qualifications-holding SSB members provide more information on CGD. However, banks with multiple board members have lower CGD. Establishments with audit committees, internal audit functions, and low government ownership have higher CGD levels (Sulub et al., 2022). Sudan's internet banking scene is gaining popularity due to improved connectivity and technology, but rural residents face challenges like internet access, security issues, and privacy concerns. However, internet banking has its downsides such as lack of direct contact, a security concern, and potential role of credit crunch constraint. In spite of this, internet banking offers opportunities for diverse, quick and effective contact, financial inclusion, and innovation. Mobile banking apps and digital wallets revolutionize financial management, but financial institutions must invest in trustworthy IT, ensure data security, and prioritize user experience. Regulations for ensuring user rights, protecting privacy, establishing cyber security standards, and a good environment for promoting digital finance are also high priorities.

Information technology innovations have revolutionized the banking industry, enabling online banking for efficient, convenient financial management, but countries like Sudan have yet to effectively adopt this innovative approach (Alam et al., 2010). Khattab explores the benefits and challenges of e-banking in the Sudanese banking sector, revealing a positive correlation with job security but highlighting challenges like infrastructure and technological upgrading (Khattab et al., 2020).

Factors Influencing Customer Attitudes and Usage of Internet Banking in Sudan

Most Sudanese retail banking customers use e-banking services, with ATMs being the most popular. Factors influencing adoption include current accounts, income, internet literacy, ATM malfunctions, technical issues, slow response, and high fees (Ismail and Osman, 2012). The rise in internet usage and funding for electronic banking has shifted researchers' focus from technological infrastructure to user-focused studies, particularly in African and Arab countries like Sudan (Khater et al., 2016). Sudan found that factors like farming experience, friends, labor, land, irrigation, and extension services significantly influence farmers' credit accessibility from banks. The Farmer's Commercial Bank (FCB) showed a stronger correlation with credit accessibility and input adoption (Nasereldin et al., 2023). The Central Bank of Sudan (CBS) initiated electronic banking in the 1990s, establishing the Electronic Banking Services Company (EBSC) to develop and build the Sudanese e-banking industry (Khater et al., 2020). Electronic banking increased profits, reduced costs, and improved customer satisfaction in 31 commercial banks in Juba, South Sudan. However, it suggested that banks should expand internet infrastructures (Kordit, 2022). The factors influencing mobile banking adoption in Sudan's microfinance sector, using UTAUT and TOE models, and collects primary data from MFPs and customers to improve outreach and alleviate poverty (Ahmed and Ammar, 2020). Based on the adopted literature it has been observed that the adoption of e-banking services in Sudan is increasing that has been driven by the factors like current accounts, income and internet literacy. Further challenges included ATM malfunctions, technical issues, slow response times and high fees.

Perceived Usefulness of Electronic Banking in Sudan: Examining Customer Perspectives

Modern technology, like mobile banking, can enhance the efficiency and outreach of microfinance in Sudan, despite the exclusion of 8 million low-income individuals (Ammar and Ahmed, 2016). Sudan's regulators and bankers are urged to design and implement technology-based banking systems, focusing on customer-centric features for secure adoption (Mansour et al., 2016). Electronic banking in Sudan, highlighting its challenges and opportunities, emphasizing interest-free principles and its role in economic growth and efficient resource transfer (Adam, 2013). The rapid advancement of information technology is transforming global lifestyles, with smartphone payment systems enabling secure electronic value transfer through a regulatory framework and widespread public understanding (Sleiman et al., 2022). The adoption of E-Banking in Afghanistan, focusing on technological innovation, regulatory frameworks, and customer dynamics, offering valuable insights for policymakers and financial institutions (Hakimi et al., 2024).

Exploring the Relationship between Perceived Ease of Use and Attitudes towards Internet Banking in Sudan

Investing in information system technologies enhances business efficiency and service quality, particularly in the banking industry, which significantly impacts performance, reputation, and competitiveness (Magboul and Abbad, 2018). Improved financial systems, like mobile payment, can enhance economic activities and positively impact stakeholders, particularly in developing countries, enabling decision-makers to set realistic plans (Omer and Adam, 2020). The use of the technology acceptance model (TAM) in marketing development, in which new technological products and services, thereby aiding marketers in designing effective strategies for maximum adoption and usage rates (Musa et al., 2024). The impact of electronic banking services on customer satisfaction in Sudanese banks. Data from internet users was collected and analyzed. The findings suggest significant differences in electronic banking services and suggest that bank management should focus on spreading technological awareness and developing suitable infrastructure for electronic banking services to improve customer satisfaction (Kordit, 2022). The development of information technology has significantly impacted various aspects of life, including the banking industry. Electronic banking offers benefits like improved service quality and competitive advantage but also

presents challenges that may hinder its success, causing concern for financial institutions and customers (Ghandour, 2015).

Security and Privacy Concerns in Internet Banking: A Review of Customer Perceptions in the Sudanese Context

The factors influencing the adoption of Mobile Banking (M-banking) in Sudan, focusing on integrated Technology Acceptance Model constructs like perceived usefulness, ease of use, perceived risk, and perceived trust. Results show that perceived trust, ease of use, and perceived risk strongly influence customers' intention to use M-banking, while perceived usefulness has no significant impact (Karma et al., 2014). Customers prefer m-banking apps for their speed and convenience, but they face security and privacy challenges due to data transmission and storage vulnerabilities (Cavus et al., 2023). The rise of electronic banking, utilizing the internet and mobile services, has revolutionized banking by improving service delivery, reducing transaction costs, and enabling anytime, anywhere service demand. However, this has raised concerns about fraud, and this paper provides an overview of electronic banking, examining challenges and risks, and proposing solutions (Chaimaa et al., 2021). Customer satisfaction partially impacts on the relationship between IT, E-banking service quality, and purchasing intentions. This research contributes to behavioral finance and provides implications for academicians and practitioners (Khatoon et al., 2020). Data security is crucial in the digital age, especially for cloud-based datasets. Machine learning, biometric recognition, and hybrid approaches can enhance security. A proposed banking system model uses biometric impressions and digital signatures for transactions (Ghelani et al., 2022).

Socioeconomic Factors and Internet Banking Adoption in Sudan

Data security is crucial in the digital age, especially for cloud-based datasets. Machine learning, biometric recognition, and hybrid approaches can enhance security. A proposed banking system model uses biometric impressions and digital signatures for transactions (Ammar, 2017). The factors that prime internet bank use in Sudan include socio- economic factors, with education being very influential. Tuning up educational levels in Sudan, gives the Sudanese consumers an opportunity to get the digital literacy required, which saves them in the time spent to select and navigate the online banking platforms, which is highly hoped to come through (Martí Revillo, 2023). The users of internet banking in Sudan who are richer have a bigger prevalence of internet banking adoption partly because the modern devices and dependable internet connection are available to them. Technology Infrastructure that comprises needed a powerful telecommunication network and low data rate plan is very essential for adoption, so areas that lack infrastructure may experience a slow rate (Skafi et al., 2020). Cultural and social factors (like the trust that people have in digital financial services, security concerns, and the desire to do transactions physically), are the ones that will be the limiting factors when people are adopting internet banking (Inder et al., 2022). Clients should be informed in detail, means of security should be worn out, and convenience should be pointed out by banks. Government policies and regulations are also involved in the sphere of the grant of adoption, (Cashore et al., 2021).

METHODOLOGY

Research Strategy

The study aims to investigate customers' behavioral intention to adopt IB services in Sudan using the original TAM framework. A questionnaire was designed, adapted to include perceived security and privacy construct, and adapted to demographic differences in EB use, such as age, educational qualifications, and treatment period.

Sample Size

The study investigates customers' intention to use Internet Banking (IB) in Sudan, using data from 300 bank customers. A questionnaire was filled in five different banks and branches, focusing on background, factors affecting IB acceptance, and use of IB services. The Likert scale was used, with a neutral option in most questions. The questionnaire was developed and tested with a focus group of professionals from Sudan University and the banking sector.

The Questionnaire Rate of Return

Table I: Questionnaire rate of return

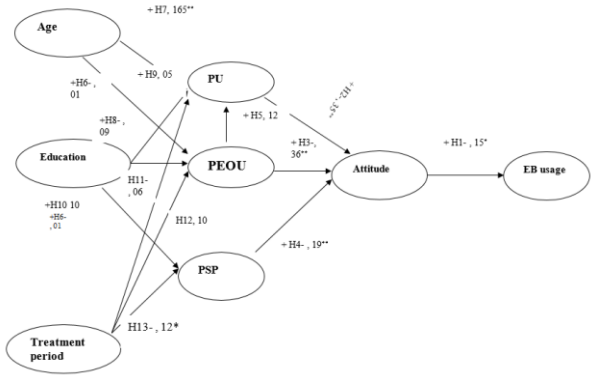
Total questionnaires delivered to respondent	300
Returned questionnaires not filed-up	5
Potential respondents for the study	250
Returned questionnaires (completed)	236
Questionnaires partially answered	3
Questionnaires not returned	17
The response rate	72%
Usable response rate	71%

Measurement and operationalization of the constructs

The study adapted the instrument and scales from studies on perceived usefulness and ease of use (TAM) and perceived web security (Salisbury et al). The researchers used question items with a 5-point Likert scale to measure constructs, ensuring validity and reliability. The TAM instrument has been widely used in other studies. The study measures perceived ease of use (PEOU), usefulness (PU), electronic banking security and privacy (PSP), attitude (ATT), and intention to use (INT) in a banking system. PEOU is the degree of ease of use a system provides, PU is the degree of usefulness it enhances job performance, PSP is the security of sensitive information transmission, ATT is an individual's positive or negative feelings about a behavior, and INT is the intention to use the service.

Table 2 considered 35-item questionnaire developed based on literature on user acceptance of technology and new technology diffusion. It assesses customers' readiness to use internet banking methods like internet banking. The questionnaire was translated into English and tested by professionals from Sudan University and the banking sector. Factor analysis confirmed the results.

A Model of internet banking use in Sudan based on technology acceptance model.



Demographic characteristics of the respondents

The study analyzed demographic characteristics of respondents, revealing that 81% were males and 18% were females, with 38% being single and 54% married. Banks cater to both genders, with some opening special branches for women. Most respondents were aged 25-30, with a significant percentage aged 34-44. Most customers complete secondary school, with 70% having a university degree. The study found that 54% of customers were using computers, while 45% were not.

Table II: Demographic

	Demographic profile	**Frequency**	**Percent %**
- F M	Sex male female Total	 79 18 97	 81,4 18,6 100
- A B	Marital status single married Total	 38 54 92	 41,3 58,7 100
- A B C D	Age Less than 25 25-34 35-44 45-54 More than 55	 4 50 29 10 4	 4,1 51,5 29,9 10,3 4,1
- A B C D	Education (qualification Sudanese secondary University degree Graduate Postgraduate	 8 70 19 2	 8,1 70,7 19,2 2 1
- A B C D E	How long have you been treated with a bank Less than one year 2-4 5-7 8-10 More than ten years Total	 26 59 56 32 76 249	 10.4 23.7 22.5 12.9 30.5
- A B C D E	Occupation Employee Businessman Technician Professional Others Total	 122 59 12 29 18 240	 50,8 24.6 5.0 12.1 7.5

-	Your level of English language Excellent		
A	Very good	10	4.0
B	Good	59	23.6
C	Medium	74	29.8
D	Weak	72	29.0
E	Total	33	13.3
		240	100.0
-	Do you have a personal computer? Yes		
A	No	130	54.9
B		107	45.1
-	If you don't have, where do you use it? A friend's PC		
A	Internet café	5	3.2
B	Office	8	5.1
C	School or university	102	65.0
D	I don't use	5	3.2
E		33	21.0
-	Do you use the internet		
A	Yes	161	71.2
B	No	65	28.8
-	If you use a computer, why? work		
A	Education	128	64.6
B	Entertainment and fun	22	11.1
C	Others	7	3.5
D	Work and education	16	8.1
E	Work and entertainment	17	8.6
F	Total	8	4.0
		198	100.0

Reliability and validity of data

The study used several criteria to assess measurement reliability and validity. Cronbach's alpha values, composite reliability, and average variance extracted measures were used to evaluate reliability. Convergent validity was supported by composite reliability and high standardized loadings. The Cronbach alpha values for perceived ease of use, perceived usefulness, perceived EB security and privacy, attitude, and intention to us were high and significant. The overall reliability of the factor analysis was reasonable and acceptable, and the standard loadings of the model's construct values were high and significant.

Measurement of properties for multi- items constructs:

Table III: Multi-Items Constructs

Q	Construct	Standard Loading	mean	Standard deviation
	Perceived Ease of Use	**,66***	**2,54**	**1,11**

B1	The bank implements several guidelines and directions for IB usage.			
B2	When using IB technologies you need not ask the assistance from any person inside or outside the bank.	,57*	2,40	1,00
	It is easy for me to become skillful at using banking technology.			
B3		,64*	3,18	1.17
B4		,62*	2,67	1,14
-	Perceived usefulness (PU)			
	Sudan is witnessing an increase of importance of IB			
B5	The banking services that depend upon electronic transactions are more appropriate for you.	,73*	1,36	,51
	Internet banking usage is more convent by meeting all your needs.			
B6		,72*	1,82	,83
	You prefer internet banking service than traditional banking service.			
	IB usage reduces the time you carry out your transaction.			
B7		,63*	1,92	,90
	You always require a timely (quick) banking service.			
	IB service cost is higher than the service cost applied before.			
B8		,57*	1,46	,66
	After implementation, banking services are available all the time.			
	You are in drastic need for IB availability for a long period of time.			
B9	Using IB services led to multiple means of getting service.	,79*	1,68	,79
	IB is more efficient for doing banking transactions according to time factor.			
B10	I would like to use and get the most benefits of IB.	,56*	1,43	,62
B11		,80*	2,99	1,80

B12		,66*	2,17	1,06
B13		,53*	1,60	,71
B14		,53*	1,67	,70
B15		,80*	1,64	,76
B16		,70*	1,37	,55
	Perceived EB security and privacy (PSP).			
	You find difficulty in IB usage due to lack of legal regulations.			
B17	The condition that regulates the customer and banker relationship is satisfactory.	,65*	2,21	1,06
B18	The absence of IB regulations (law) does not affect the customers' satisfaction.	,80*	2,57	1,13
	There are dangers to using IB without security procedures.			
B19	Using IB compared with traditional banking services gives a scene of security.	,83*	2,76	1,21
B20		,75*	1,72	,87
B21		,62*	1,79	,87
	Attitude (74 - ,54)			
B22	The reason you chose your bank is too due to the electronic services it provides.	,65*	1,75	,81
	I would like to use and get the most of IB.			
B23		,70*	1,37	,55
-	**Intention to use (,77)**			
B23	Sudan is witnessing an increasing of importance of IB.	,73*	1,92	,90

The study used five-point Likert-type scales for scale items and analyzed for discriminant validity. Clean exploratory factor analysis and AVE values were found to be larger than shared variance with other latent constructs. A chi-square difference test between constrained and unconstrained measurement models provided strong evidence for discriminant validity, with significant correlations for research model constructs.

Post Hoc Analysis

The study aimed to understand the relationship between demographic variables and the basic Theory of Management (TAM) and how it extends TAM to explain electronic banking usage in Sudanese commercial banks. The research created six subgroup sample data sets and found that customer perceptions about electronic banking tools vary based on demographic variables. Older and less educated individuals had lower perceived ease of use, while more educated and younger customers had higher ease of use.

The tests revealed significant differences in attitudes towards electronic banking usage and the dependent variable based on age and education, but not for the banking treatment period.

Subgroup composition

Table IV: Subgroup Composition

Demographic group	Subgroup 1	Subgroup2
Age*		
Definition	Younger	Older
Cutoff	Less than 50	50+
Sample Size	N= 237	N=22
Education*		
Definition	Less educated	More educated
Cutoff	Some college or below	College or above
	N= 200	
Sample size		N=49
Banking treatment period*		
Definition	Less than 1 year	
Cutoff		More than 10 years
Sample size	N= 173	N=76

The analysis excluded respondents aged 36-50, those with banking treatment 2-8, and only considered less educated and highly educated respondents.

Additional tests of mediation

The study tested the mediating effects of perceived ease of use, usefulness, security, and privacy on electronic banking usage in Sudan, incorporating age, education, and treatment period into the model. The study model constructs found that age, education, and treatment period were insignificant in influencing attitudes towards e-banking usage. Perceived ease of use, usefulness, security and privacy were found to be the full mediating effect for these demographic variables. Perceived security and privacy were a significant partial mediator, not a full mediator.

Construct Inter-correlations and measurement properties for multi-item constructs:

Table V: Construct Inter Correlation

Categories	1	2	3	4	5	6	7	8
Age	1							
Education	.05*	1						
Treatment Period	.64**	.27**	1					
PEOU	0.01	0.09	0.1	1				
PU	.17**	.05*	.06*	.17**	1			
PSP	,09	0.1	0.12	,25**	.33**	1		

Attitude	.19**	-0.07	,11*	.36**	.35**	.19**	1	
Intention to Use	-0.02	-.23**	.13*	-0.09	.41**	.18**	.15**	1

The correlation matrix reveals complex connections between variables influencing support for treatment or technology adoption. The dissemination approach positively influences perceived usefulness and subjective norms, while utility probability influences attitude and intention to use. Education negatively correlates with intention to use, indicating higher education levels' engagement and skepticism.

Factor Analysis

A confirmatory factor analysis was conducted on the items PEU, PU, PSP, and attitude towards electronic banking usage in the case study banks. The analysis used principal axis factoring with Varimax rotation. The identified factors represented 60% of the variance. The first factor, ease of use (EOU), explained most of the total variance, explaining 30%. The second factor, perceived usefulness (PU), perceived security and privacy (PSP), attitude (AT), and intention to use (IOU) also explained significant variance. The overall reliability of the factor analysis was between 74-72%. The dependent variable was the intention to use (internet banking usage). The independent variables were the perceived ease of use, the perceived usefulness and the perceived security and privacy. The regression analysis was conducted to reveal how different factors affect the use of electronic banking in Sudan. A multi correlation analysis was conducted table 3.5 above. Although the explanatory variables and their coefficient are statistically significant p<, 0005, the overall model was statistically significant R square =, 13, p< 000). The results of the regression analysis are presented table 3.6, 3.7, 3.8, 3.9.

Confirmatory Factor Analysis

Table VI: Confirmatory Factor Analysis

CONSTRUCT	PEOU	PU	PSP	ATTI	USAGE
It is not flexible for you to use IB technologies.	,663				
The bank implements several guidelines and directions for IB usage.		,730			
When using IB technologies you need not ask the assistance from any person inside or outside the bank.	,565				
It is easy for me to become skillful at using banking technology.		,720			
Sudan is witnessing an increase of importance of IB	,635				
The banking services that depend upon electronic transactions are more appropriate for you.	,619				
Electronic banking usage is more convent by meeting all your needs.		,789			

You prefer an electronic banking service to a traditional banking service.		,561			
IB usage reduces the time you carry out your transaction.		,804			
You always require a timely (quick) banking service.		,659			
IB service cost is higher than the service cost applied before.		,530			
After implementation, banking services are available all the time.		,531			
You are in drastic need for IB availability for a long period of time.		,808			
Using IB services led to multiple means of getting service.		,634			
IB is more efficient for doing banking transactions according to time factor.		,569			
I would like to use and get the most benefits of IB.		,704			
You find difficulty in IB usage due to lack of legal regulations.			,647		
The condition that regulates the customer and banker relationship is satisfactory.			,801		
The absence of IB regulations (law) does not affect the customers' satisfaction.			,828		
There are dangers to using IB without security procedures.			,746		
Using IB compared with traditional banking services gives a scene of security.			,619		
The reason you chose your bank is to due to the electronic services it provides.				,652	
I would like to use and get the most out of IB.				,704	
Sudan is witnessing an increasing in the importance of IB.					,730
1) Eigenvalues	1,501	1,231	1,934	1,752	1,582
2) Percentage of total variance	30,014	24,615	18,686	15,049	11,637

The data pertains to Sudan's perception and usage of Internet banking services. It underscores the distinct advantages of electronic banking services that are fast, convenient, and easy to use, check against a branch banking process that would require walking to the branch offices and standing in queues. The IB services cater to the issue of speed of transactions and focus on time-sensitive issues, however, they may not be very cost-effective. The data in my case refers to the importance of IB to be efficient in providing different/multiple means of service at a proper time. However, the missing laws governing partnership can cause some difficulties, but servicing our customers is yet to fall

below customer satisfaction. In addition to the unearthed security flaws observed in IB by the data, it also presents a safe mode of banking services when compared to traditional financial services. As an illustration, IB data reflects the centrality of IB in the banking industry and the responsibility to maximize its profits side by side, threading on the pitfalls it may be exposing to the industry.

Regression Analysis

Table VII: Model Summary

Model summary	R	R square	Adjusted R square	Standard error of the estimate
EOU	0.965	0.932	0.932	0.4698
ATT	0.828	0.686	0.683	0.93
PU	0.962	0.926	0.925	0.7535
PSP	0.964	0.929	0.928	0.6096

The summary of regression models for items such as Ease of Use, Attitude, Perceived Usefulness and Perceived Security and Privacy provides a breakthrough in verification of their explanatory power. EOU is articulatory on a high note and allows us to find 93.2% variability of the variation. In addition, we do find that attitudes perceived usefulness, and PSP all show a strong explanatory power regarding the variance. Statistically significant numbers evidence a strong relationship between the variables in this study or survey.

Model Coefficients

Table VIII: Model Coefficient

Constant	B	St. error	beta	T	Sig
PEOU	2,519	,155	.08	16,231	000
PU	,633	,011	,965	57,470	000
PSP	,389	,054	,347	7,199	000
ATT	,422	,560		10,525	000
USAGE	,669	,045	,828	14,705	000

The table is of a regression analysis where we find Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Perceived Security and Privacy (PSP), Attitude (ATT), and Usage (USAGE) as the independent and dependent variables. Our findings indicate that independent variables (PUR, PSP, ATT, and USAGE) are significantly correlated with the dependent variable (PEOU) with coefficients of 0.633, 0.389, 0.422, and 0.669 respectively. The following implications indicate that functionalities, such as perceived usefulness, security, attitude, and usage, significantly affect the system perceived as being easy to use in the applied technology or system.

Hypothesis

H^1: A significant positive correlation between Sudanese bank customers' attitude towards IB usage and their use of IB p= 19**.

H^2: Customers in Sudanese banks who perceive electronic banking as useful have a more favorable attitude towards its use, with a significant and positive correlation P=, 35**.

H^3: The more that Sudanese bank customers perceive the IB as easy to use p=, 36**, the more favorable their attitude toward the use of IB.

H^4: Bank customers' perception of security and privacy positively impacts p=, 18** with their acceptance of Internet Banking (IB), with higher perceptions affecting less favorable attitudes towards IB usage.

H^5: The more that Sudanese bank customers perceive IB as easy to use p=, 17**, the more that they will perceive it as useful.

H^6: Age is negatively associated with perceived ease of use of IB with p=, 01 the two items are weakly correlated.

H^7: Perceived usefulness associated with the EB is lower for older individuals p=, 17**

H^8: Perceived ease of use associated with IB is lower for Sudanese bank customers who are less educated p=, 09 positively correlated.

H^9: The perceived usefulness of IB is less for Sudanese bank customers who are less educated, p=, 05* significantly correlated.

H^{10}: Security and privacy associated with IB usage is higher for the educated customers of Sudanese banks. (Security and privacy have a positive effect on educated consumers' acceptance of IB p=, 10.

H^{11}: The perceived usefulness of IB usage of Sudanese bank customers is higher for those who have been customers for a long time (treatment with the bank period) p=, 06 the two items are correlated.

H^{12}: Perceived ease of use associated with IB usage of Sudanese commercial bank customers is lower for those customers who have been with a bank for a short treatment time p=, 10 the two items are weakly correlated.

H^{13}: Security and privacy associated with IB are higher for individuals who have been customers with banks for a long treatment time p=, 12 the two items are weakly correlated.

Parameter Estimates of re-specified model:

Table IX: Parameter Estimates

Regression	estimates	Standard error	Critical ratio	Probability value
1. Usage-Attitude	,82	,045	14,71	,000
2.PU- Attitude	,42	,036	10,52	,000
3.PEOU- Attitude	,45	,053	11,44	,000
4.PSP- Attitude	,35	,054	7,19	,000
5. PU-PEOU	,96	,011	57,47	,000
6.Age-PEOU	,09	,047	1,75	,081
7.Age-PU	,27	,032	4,96	,00
8.Educ-PEOU	,42	,038	10,26	,00
9. Educ- PU	,39	,026	9,45	,00
10.Educ-PSP	,45	,034	8,95	,000
11.Period-PU	-,08	,025	-1,68	,095
12. Period- PEOU	,048	,04	,85	,393

13.Period-PSP	,007	,039	,122	,903

The study also showed a constructive attitude between knowing and readiness for technology usage. It also demonstrates a clear link between usefulness assessed (PU) and attitude, convenience assessed (PEOU) and attitude, and perception of security and privacy (PSP) and attitude. In this case, the emergency response process largely relies on the cooperation and communication between different agencies, government officials, first responders, and communities involved.

Correlation Analysis

	Age	**education**	**Period**	**usefulness**	**Ease of use**
Age	1	0.048	.643**	.165**	.001*
Education	0.048	1	.272**	.052*	0.091
Period	.643**	.272**	1	.061*	0.102
Usefulness	.165**	.052*	.061*	1	.117*
Ease of ease	.001*	.091*	.102*	.117*	1
Security	.092*	.105*	0.123	.329**	.241**
Intention to use	0.002	.228**	.131*	.408**	.092*

The correlation has shown that age is positively correlated with the period of usage which is r = 0.643 whereas perceived usefulness is (r = 0.1605). This has suggested that the older individual tends to use technology for a longer period and perceives it as more useful. Whereas education is also positively correlated with the perceived ease of use (r = 0.991) and intention to use (r = 0.228) has shown higher education levels associated with funding the technology easier to use and high intention to use it. Moreover, the period of usage is positively related to the perceived usefulness (r = 0.061) and intention use is (r = 0.131) as this has suggested that the longer usage periods are associated with a higher perception of usefulness and intention to continue in using the technology. Perceived usefulness is positively correlated with the perceived ease of use (r = 0.117), which has shown individuals who find the technology useful to find it easy to use. Moreover, it has been also found that security is positively correlated with age (r = 0.092) as well as education (r = 0.105), showing higher education levels tend to perceive the technology as more secure.

	security	**attitude**	**Intention to use**
Age	0.092	.188**	.002*
Education	0.105	0.071	.228**
Period	0.123	0.114	.131*

Usefulness	.329**	.347**	.408**
Ease of ease	.241**	.359**	0.092
Security	1.000.	.190**	.177**
Attitude	.190**	1	.146*
Intention to use	.177**	.146*	1

The correlation has shown patterns as this has included positively correlated with age is

(r = 0.092) and education (r = 0.105), showing that individuals with higher education levels tend to perceive technology as more secure. Whereas security also shows a positive correlation with attitude (r = 0.190) and intention to use (r = 0.177), the study suggests that a positive perception of security is linked to a higher intention to use the technology. However, there is perceived usefulness that is strongly correlated with security and attitude (r = 0.329), attitude (r = 0.347), and intention to use (r = 0.408), highlighting the importance of the perceived usefulness in influencing the attitude and intentions towards the adoption of technology. Moreover, the perceived ease of use also showed a significant relation with the attitude (r = 0.359) and intention to use (r = 0.092), showing the ease of use plays a role in shaping individual attitudes and intentions towards technological adoption.

DISCUSSION

According to Rogers and David Attitude towards using a system is a critical intervening variable in the innovation adoption decision. Thus, attitude towards a specific information technology is conceptualized as a potential user's assessment of the desirability of using that technology and according to TAM, predicts an individual use of technology (Rogers et al., 2014). Rogers (1995) argues that attributes like relative advantage and complexity significantly influence an individual's attitude towards a new technology, aligning with the main constructs of TAM, namely perceived usefulness and perceived ease of use (Davis, 1993). Innovativeness, enjoyment, ease of use, reliability, and usefulness positively influence mobile banking usage intention, suggesting that banks should focus on these factors (GOKMENOGLU and Kaakeh, 2022). The usage of electronic banking services in a multi-channel context, finding low usage. It suggests that banks can further promote technology and reap its benefits, while also recognizing the importance of employees. However, simpler and more secure electronic banking is needed to overcome the inhibitors of complete reliance on electronic media (Sandhu and Arora, 2022).

To test the statistical significance of the parameter estimates, the test statistic is the critical value (C.R.), which represents the parameter estimate divided by its standard error (S.E.). Based on a significant level of 0.05, the C.R. needs to be more than ≥ 1.96. Below this level, the parameter is unimportant to the model. The factor loading on (AGE- PEOU) table 3-6 was 09 (with C.R. = 1, 75, P=, 08) and thus H6 was not supported. The factor loading on (PERIOD – PU) was -, 08 (with C.R. -1, 68, p=, 09) which did not support hypothesis H11. The factor loading on (PERIOD- PEOU) was 048 (with C.R., 85, P=, 39) which did not support hypothesis H12. The factor loading on (PERIOD- PSP) was, .007 (C.R. =.122, p=.90) which did not support hypothesis H13. The study suggests that attitudes towards information technology usage can be influenced by perceived characteristics. Sudanese bank customers' age is not negatively correlated with technology usage, and their bank relationship duration does not directly affect technology usefulness, ease of use, and security consideration (Nyeko et al., 2014). The ease of use in internet banking in Sudan positively impacts customer

attitudes towards the service, as user-friendly interfaces, clear navigation, and clear instructions build usability (Mansour et al., 2016). Positive customer perception of 'IB' (internet banking) directly impacts their actual usage of the technology (Rahi and Abd Ghani, 2021). Sudanese bank customers who perceive IB positively are more likely to actively use the services offered, emphasizing the importance of maintaining a positive customer experience and addressing any barriers that may prevent adoption (Takieddine and Sun, 2015). The utility of IB is a key factor in determining customer attitudes towards it. Clients are more likely to use web banking if it offers practical benefits and essential features, thereby influencing their perception of the service (Yousafzai and Yani-de-Soriano, 2012). Furthermore, the study highlights that the ease of use, in turn, is another main point which influences people's attitudes toward the IB. Improvement of the IB's interface design with consequent user experience upgrading would serve to improve the customers' attitudinal disposition and increase IB adoption rates (Ranganathan and Briceño-Garmendia, 2011). Through deployment of simple and user- friendly platforms, banks can demote possible hurdles to using IB and hence increase customer's ease and assurance to use these services. Factors influencing customers' intention to use mobile banking services, as the number of smart phone users and internet popularity increases (Akhter et al., 2020). The banking industry is rapidly adopting e-banking to provide faster, reliable services to customers. However, the main challenge is customer satisfaction, which is crucial for banks to maintain their competitive advantage (Li et al., 2021). The security of e-banking applications, analyzing potential attacks and recommending mitigation measures like access control and SQL injection updates (Mogos and Jamail, 2021).

The paradox of security and privacy, revealing that enhanced security methods may not always be favored, potentially decreasing positive attitudes towards Information and Broadcasting (IB) (Zhou et al., 2021). IB's resistance to robust security measures and customer concerns despite their perceived security concerns is causing a positive attitude among the public. The trial demonstrates that simplicity and usefulness in a system positively impact users' mindset and usage of International Bank services (Zhou et al., 2021). It also highlights the importance of education, customer retention, and the development of long-term customer relationships.

CONCLUSION

Customer attitudes in Sudan towards Internet banking may be influenced by relevance, simplicity, safety, and privacy concerns, leading to increased caution and usage. Based on this survey, the customers highlight the value of IB having a simple and user-friendly interface and clear layout of the product after using it. Education campaigns that may enhance consumers' knowledge of security measures as they perceive protection and security systems maintained within IB could be the key to that. Established relationships and trust aid the clients in having positive perceptions of value and safety. This is mainly because the clients feel at home' after an extended stay.

The Sudanese banks can do more to foster IB usage by coming up with inquiries about the banking service from the market, putting in place an easy-to-use system, and taking the word out about the security features and the practical benefits. Putting customers' minds at ease and establishing professional relationships with them may be possible by simplifying the interface, educating them to the level of fully understanding security standards, and by long-term relations. Bankers in Sudan, in simple words, may contribute to making digital banking services better by understanding and responding to the determinants that beat the consumers' attitudes toward internet banking. This will result in stronger branding, with more numbers picking up and more growth rate.

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