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Popularity of Mobile Transaction Services in the Banking Sector

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ABSTRACT

The study endeavors to analyze the factors driving the adoption and application of Internet-based bank services in the Sudan with a special emphasis on e-banking. Utilizing TAM's structure, this research explains the usage of customers on the internet banking world by focusing on these features: utility, user-friendliness, trust management, and cultural considerations. It was revealed that, although security and reliability remain one of the most significant concerns in banking, end users are also looking for a bank with good design, enjoyable features and which is socially ideal. The study highlights the increasing popularity of mobile transaction services in emerging markets, highlighting the need for better understanding of user behavior and optimizing their usefulness and establishment in Sudan. The case study of this research consists of five major Sudanese commercial banks in Khartoum chosen because they are the pioneers in developing and starting the application of EB services in Sudan namely Sudanese French bank, Albaraka bank, Omdurman national bank, Faisal Islamic bank and Tadamon Islamic bank. The time limit covered is the 2019-2023. Data for this study was collected by means of a survey conducted in Khartoum. A total of 300 questionnaire forms were delivered to respondents of which 233 were returned giving a response rate of 71 percent. Questionnaires were filled in five different banks and in different branches by selected customers with different banking treatments. This results in a sample that was well distributed in terms of demographic information e.g. age, education, income, and treatment period. The questionnaire consisted of questions that related to background, possible factors affecting acceptance of IB and use of IB services. Likert five point scales ranging from "strongly agree" to "strongly disagree" were used as a basis of questions. The scale has been used in previous TAM related researches e.g. Igbaria et al; 1995; Teo et al; 1999, Tero and Kari; 2005. Additionally, the "neutral" option was allowed in almost all questions. The questionnaire was developed and tested with a focus group consisting of professionals from Sudan University and the banking sector. The focus group finally verified that the hypotheses might be an affective factor explaining IB acceptance. Based on this information the questionnaire was modified and finalized.

INTRODUCTION

The factors influencing Internet banking acceptance in Sudan using the Technology Acceptance Model (TAM), a widely used model for understanding and predicting technology adoption. It focuses on perceived usefulness and ease of use as key determinants of an individual's attitude and intention to use a particular technology (Prastiawan *et al.*, 2021). In the context of Internet banking in Sudan, PU refers to the degree to which customers believe that using Internet banking will enhance their banking experience, such as convenience, efficiency, and accessibility (Chauhan *et al.*, 2022). In contrast, PEOU measures how simple clients find it to use and comprehend online banking (Kavitha & Gopinath, 2020). Several factors may influence the perceived usefulness and ease of use of Internet banking in Sudan (Omer & Adam, 2020). The emergence of smartphones and mobile internet services has contributed significantly to the dramatic growth in internet penetration in Sudan during the last several years (Ibrahim *et al.*, 2021). Internet banking has probably become more accessible to a greater portion of the public due to the increasing access to technology. Perceived security of online transactions is another aspect that can impact the adoption of Internet banking in Sudan (Khattab *et al.*, 2020). If consumers have faith that their financial and personal details will be safe while banking online, they are more inclined to use the service. Therefore, Sudanese banks must establish strong security protocols to reassure clients that their online banking is secure (Masad *et al.*, 2023).

Cultural factors may also play a role in shaping customers' attitudes toward Internet banking in Sudan (ElMassah & Abou-El-Sood, 2022). For instance, various demographic groups may have differing perspectives about the security of online transactions and the reliability of technology (Hossain *et al.*, 2020). Banks need to understand these cultural nuances and tailor their Internet banking services to meet the specific needs and expectations of Sudanese customers (Alhanatleh, 2021). It is widely believed that the rise of online banking and other financial services is a hallmark of the current economic renaissance and a crucial outcome of modern scientific and technology progress (Abad-Segura *et al.*, 2020). The rapid global adoption of information technology by businesses due to the technological revolution and rapid spread of the Internet has significantly impacted various industries and

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businesses (Rymarczyk, 2021). In order to stay ahead of the competition and create new, useful systems and apps to improve banking services, the banking industry has been using electronic technology (Subanidja *et al.*, 2022). Contemporary technology has become one of the biggest strategic issues in the field of banking, and this reality imposes great challenges on banks (Heffernan, 2005). New patterns of transactions and activities have emerged across numerous industries as a consequence of the exponential rise of information technology and the amount of data. As a result, the world is going through deep and fast alterations (Nordhaus, 2021). The banking industry has significantly shifted towards online and mobile banking due to increasing client expectations, fierce competition, cost reduction, improved efficiency, and increased service offerings (Wewege *et al.*, 2020). The development of electronic banking services in Sudan, their types, legislation, challenges, and future visions for electronic payment services (Leila & Fatiha, 2022).

The development of electronic payment services in Sudan, analyzing their components, advantages, obstacles, and risks, and proposing potential expansion solutions (Mokar *et al.*, 2021). The banking industry has made significant progress in enabling electronic banking services, which are expected to rapidly spread in Sudan (Mustafa, 2021). Study is needed to understand the factors affecting the spread of these services, which are primarily obtained through traditional branches.

The purpose of this research is to study the key elements determining the uptake and usage of internet banking services in Sudan among electronic payment systems. Specifically, the study aims to:

- Recognize the stimulants that have a chord in the customers' aspiration to embrace internet banking in Sudan.
- Explore to what extent the attitudes of the customers towards online banking are shaped by perceived usefulness, usefulness, trust, and culture
- Al factors.
- Analyze those variables and see if the people are consistently using the services internet banking is providing.

LITERATURE REVIEW

Adoption Factors and TAM in Developing Countries

The Technology Acceptance Model (TAM) is a widely applied theory which enables to understand how and why individuals willing to embrace a new technology and start using it (Davis, 1989). It has been widely useful in different circumstances, such as silver delivery system adoption on the internet (Marakarkandy *et al.*, 2017). On the other hand, the applying of the set communicational model to the developing countries, such as the Sudan one, could need perceptively to take into consideration all the nuances that is given their special socio-economic conditions and technology landscape. Internet banking development in less developed countries was the theme of several studies that addressed the reliability of the TAM features of relative usefulness and operability (Ly & Ly, 2022). Sudan could be a powerful example of how internet banking can bring financial inclusion and satisfy the banking needs of the population in places where traditional banking facilities are very limited (Omer & Adam, 2020).

Field studies carried out in different socio-economic settings have shown that the perception of usefulness plays an important role in the use of e-banking (Ahmad *et al.*, 2020). Customers from developing countries perceive online banking as a good choice for them; it provides a convenient and given model for conducting financial activities or using financial services if the physical bank branches are not accessible to them (Al-Harbi, 2020). In addition to being convenient, because of 24/7 availability, timesaving and the ability to perform banking operations anywhere, these services are attributed to the use of online banking (Kordit, 2022). The other factor which is also significant is the comfort level in usage that depends on the perceived difficulty for these users. Studies have pointed out that relatability comes first in the features category thus with a user-friendly interface and simple navigation, customers get value (Chaimaa *et al.*, 2021). Internet banking is likely to be utilized by individuals who are motivated, familiar with the process, and have low digital literacy levels (Sudirjo *et al.*, 2024). On the other hand, even though it is worthwhile to say that the TAM framework undoubtedly might require the adaptation to the huge cultural and contextual factors that have emerged in Sudan. Such as the described case of trust and safety with internet banking, lack of confidence in security is a big hindrance for internet banking adoption in the developing countries (Aldammagh *et al.*, 2021). Customers may not have any strong confidence in online purchases and all that because they believe their sensitive data and information is not protected enough (Usman *et al.*, 2020). Confidence can be created through robust security aspects, the use of open communication channels, and client education which aims to tackle these worries. Also, the infrastructure inadequacies, which include unstable internet connections and pocket-like-devices-availability, can be the impediments for the spread of internet banking in the developing world (Rajasulochana, 2022). In this process, these factors must have to be taken in account when the applicability of TAM framework is being considered for Sudan and neighboring countries.

Challenges and Opportunities of Internet Banking in Sudan

Internet banking in Sudan comes both with good and bad sides which might result from the mobile network and other things like the legal environment, the culture, and the attitude to the technical things (Hussein *et al.*, 2020). Knowing these factors is the key to developing an important strategy and thus being able to get rid of the objections and have widespread using of internet banking services in the country.

Sudan's Internet service capacity is inadequate, necessitating the provision of high-speed broadband and continuous flow services for widespread Internet banking use (Ahmed *et al.*, 2014). Sudan faces structural challenges such as inadequate internet networks and a lack of electronic devices in certain areas (Eltahir, 2019). The improvement of internet infrastructure is crucial for expanding network coverage and increasing Internet speed, enabling seamless and convenient access to Internet banking services across the country (Sahut, 2021). Another key aspect is also the environment of regulation which is also in the list of the factors that affect online banking adoption (Sekhar, 2020). Sudan's regulatory system must provide a favorable and nurturing environment for the ion and services of mobile banking (Renzaho *et al.*, 2022). Constraints will address the sectors of data privacy, safety, consumer protection, and attribution of law to virtual transactions (Mogos & Jamail, 2021). A transparent set of rules dealing with these issues must be provided in order to attract customers with a high level of trust and confidence in their use of are banks online (Malinka *et al.*, 2022). Cultural factors may influence Sudanese consumers' reluctance to adopt online banking due to concerns about security, trust, and the need for face-to-face financial assistance (Khater *et al.*, 2020). Raising the awareness of the public regarding benefits of internet banking, countering the doubts replaced by internet security and highlighting examples of the convenience and effectiveness of online transactions are some cultural attitudes that would be changed, and acceptance of the technology will be promoted (Indiani & Fahik, 2020). Banks and telecommunication companies can promote online banking in Sudan by launching eco-friendly product campaigns to overcome customer misconceptions and increase adoption rates (Khattab *et al.*, 2020). Mobile banking expands accessibility and convenience for many while enhancing security measures to ensure client safety (Jun & Palacios, 2016).

Trust and Security Concerns in Internet Banking Adoption

The adoption of Internet banking in Sudan is influenced by factors such as confidence and security beliefs, as highlighted in the literature stream (Salim *et al.*, 2016). Banks implemented measures to build trust and confidence by addressing data privacy, online fraud, and cybersecurity (Liyanaarachchi *et al.*, 2021). The main focus of ensuring the widespread acceptance of internet banking is the protection of personal data privacy (Rawwash *et al.*, 2020). Customers are definitely looking for confirmation that the entities holding their data are going to be reliable and protective and won´t abuse the information (Sasono *et al.*, 2021). Although clear privacy policies, data safety, and compliance with data protection regulations are crucial for banks to alleviate customer concerns and boost trust (Zhang *et al.*, 2020).

Internet banking faces significant fraud concerns, causing unauthorized access and threatening clients (Rossi *et al.*, 2021). The study aims to evaluate the effectiveness of security measures in banks to prevent cyber fraud (Datta *et al.*, 2020). Hence, these measures include multi-factor authentication, encryption technologies, real-time transaction tracking, and fraud detection systems (Karim *et al.*, 2023). Sudan recognizes the positive perception of security mechanisms among internet banking customers, emphasizing the importance of confidence in their acceptance of online banking services (Hassan *et al.*, 2020). Customers face issues with personal and security data during pilot online transactions, including database leaks, unauthorized logins, and online frauds (Mubarak Alharbi *et al.*, 2013). Electronic banking has improved efficiency and affordability in 31 commercial banks in Juba, South Sudan, it has also led to reduced profitability. The findings suggest that banks should focus on expanding internet infrastructures and developing new online banking services to meet customer needs (Kordit, 2022).

Cultural Factors and User Behavior in Internet Banking Adoption

Cultural elements as regards the internet banking adoption rather figure in the customers' perception-formation and their acceptability in Sudan as elsewhere (Sharma *et al.*, 2020). The knowledge of Sudanese culture norms, values, those here, and the views of society towards the technology are key for the understanding the effect on the Internet banking usage patterns in the Sudanese society (Sleiman *et al.*, 2021).

In Sudan, the most essential factor that influences the adoption of the innovations is traditional culture with the values attached with it, this includes internet banking (Deshayes, 2022). The country of Sudan attaches huge significance to the personal discussions, which are usually conducted in face-to-face mode as well as the building and maintaining of personal relationships in the world of finance (Ahmed & Ammar, 2020). Many clients prefer to transact money in physical bank branches due to the perceived safety and trustworthiness associated with such banks (Pavithra, 2021). For many, this strong cultural affinity for face-to-face interactions may serve as an impediment to the acceptance of internet banking by the general public, as some people would feel uneasy adopting virtual channels in place of the traditional banking networks which they are used to (Arif *et al.*, 2020). Besides, behaviors of social context can determine the number of online banking users in Sudan to a great extent (Sleiman *et al.*, 2022). The acceptance of technology varies across society, especially among older generations, due to their unfamiliarity with digital platforms and low technological exposure. To overcome attitudes towards internet banking, educate Sudanese about its advantages, safety, Islamic tenets, ease of interest transactions, and morality considerations, thereby broadening its acceptance and attractiveness (Mansour *et al.*, 2016). Customers with higher transaction demand and efficiency and those in areas with higher online banking adoption density adopt

online banking faster, increasing banking activity and transaction efficiency (Xue *et al.*, 2011)

MATERIALS AND METHODS

Data for this study was collected by means of a survey conducted in Khartoum. A total of 300 questionnaire forms were delivered to respondents of which 233 were returned giving a response rate of 71 percent.

Questionnaires were filled in five different banks and in different branches by selected customers with different banking treatments. This results in a sample that was well distributed in terms of demographic information e.g. age, education, income, and treatment period.

The questionnaire consisted of questions that related to background, possible factors affecting IB and use of IB services.

Likert five point scales ranging from "strongly agree" to "strongly disagree" were used as a basis of questions.

The scale has been used in previous TAM related researches e.g. Igbaria et al; 1995; Teo et al; 1999, Tero and Kari; 2005.

Additionally, the "neutral" option was allowed in almost all questions.

The questionnaire was developed and tested with a focus group consisting of professionals from Sudan University and the banking sector.

The focus group finally verified that the hypotheses might be an affective factor explaining IB acceptance. Based on this information the questionnaire was modified and finalized.

RESULTS AND DISCUSSION

Model 1

Table 1:

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.818[a]	.670	.658	.29312

The model, overall, is satisfactory, as an R^2 that the model could explain about 67% for Actual Usage. The unitary analysis of the independent variables that are considered as the factors such as the Perceived- Usefulness, Perceived -Ease-of- Use, Cultural-Factors, Trust, and Socio-economic Factors establish the significant relationship (and pattern) of the respondents' internet banking usage in Sudan. Though the adjusted R-squared of 0.658 is a bit lower than the R-squared value, it yet demonstrates good adjustment of the model. These adjustment values consider the number of any predictor variables in the model and render a more cautious estimate for how much the model explains considering it is possible that the model will have the said problems of an overfit. The standard effect of the estimate (este in short), which shows the average variation that the observed values have from the regression line, is below 0.29312. This implies that the model's accuracy in forecasting Actual Usage is on average relatively so close to the field values.

Table 2:

ANOVA						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	19.875	4	4.969	57.829	.000[b]
	Residual	9.795	114	.086		
	Total	**29.670**	**118**			

ANOVA table is the ground zero of all the results and confirming the overall significance of the modeling of variance in the actual usage of internet banking services among respondents in Sudan. The model is highly significant as is seen from the F-statistics of 57.829 which equals 0.000, denoted as "Sig." This shows that the model provides much better prediction than the null model that just picks data randomly. The total sum of squares for this regression model amounts to 19.875, it corresponds to the variation of Actual Usage which is attributable to any independent variables that are incorporated in this model. Having 4 of the total degrees of value points, while an average mean value of 4.969 denotes the variance breakdown by each dimension vector. On the contrary, total sum of squares (unexplained variance) equals 9.795 with several 114 degrees of freedom as well. In other words, the proportion of Actual Usage not explained by the model's independent variables is conveyed by this figure.

Table 3:

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.010	.488		4.120	.000

	Usefulness	.188	.089	.156	2.109	.037
	Perceived ease	-.198	.062	-.197	-3.219	.002
	Trust	.132	.079	.100	1.679	.096
	Cultural factor	.490	.051	.781	9.634	.000

The coefficients table presents the estimated regression coefficients for the independent variables included in the model, along with their standard errors, standardized coefficients (Beta), t-values, and associated significance levels (p-values). The constant term (Constant) indicates the expected value of the dependent variable when all independent variables are zero. In this case, the constant term is 2.010, with a standard error of .488 and a significant t-value of 4.120 ($p < .001$), suggesting that it significantly contributes to the model.

Perceived Usefulness (Usefulness) has an unstandardized coefficient (B) of .188, indicating that for every one-unit increase in perceived usefulness, there is a corresponding increase of .188 units in Actual Usage of internet banking. The standardized coefficient (Beta) is .156, suggesting a moderate positive effect on Actual Usage. The associated t-value is 2.109 ($p = .037$), indicating that perceived usefulness is statistically significant in predicting Actual Usage.

Perceived Ease of Use (Perceived ease) has an unstandardized coefficient of -.198, indicating that for every one-unit increase in perceived ease of use, there is a corresponding decrease of .198 units in Actual Usage. The standardized coefficient (Beta) is -.197, suggesting a moderate negative effect on Actual Usage. The associated t-value is -3.219 ($p = .002$), indicating that perceived ease of use is statistically significant in predicting Actual Usage. Trust has an unstandardized coefficient of .132, with a standardized coefficient (Beta) of .100. Although the standardized coefficient suggests a positive effect on Actual Usage, the associated t-value is 1.679 ($p = .096$), which is not statistically significant at conventional levels ($p < .05$). Cultural Factors have an unstandardized coefficient of .490, with a standardized coefficient (Beta) of .781. This indicates a strong positive effect of cultural factors on Actual Usage. The associated t-value is 9.634 ($p < .001$), indicating that cultural factors significantly predict Actual Usage.

Model 2

Table 4:

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.525[a]	.275	.250	.33913

The model's summary shows a moderate positive relationship between independent and dependent variables, with a R-squared value of 0.275 and an adjusted R-squared value of 0.250. The model's standard error of estimate is 0.33913, indicating some variability in predictions. However, the model's explanatory power may be enhanced by incorporating additional factors not accounted for in the model.

Table 5:

ANOVA						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	4.978	4	1.244	10.821	.000[b]
	Residual	13.111	114	.115		
	Total	**18.089**	**118**			

The ANOVA table reveals the significance of the regression model in explaining the variance in the dependent variable, Actual Usage of internet banking services. The model's F-statistics of 10.821 and p-value of.000 indicate that the independent variables significantly explain the variation in the dependent variable. The sum of squares is 4.978, with a mean square value of 1.244.

Table 6:

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	3.233	.564		5.727	.000
	Usefulness	-.331	.103	-.351	-3.204	.002

	Perceived ease	.128	.071	.162	1.794	.076
	Trust	.429	.091	.413	4.700	.000
	Cultural factor	.113	.059	.231	1.921	.057

These coefficients represent the estimated effects of each independent variable on the dependent variable (likely Actual Usage of internet banking services) in the regression model. The unstandardized coefficients (B) indicate the change in the dependent variable for a one-unit change in the independent variable, holding other variables constant. The standardized coefficients (Beta) allow for a comparison of the relative importance of each independent variable in predicting the dependent variable. The t-values represent the significance of each coefficient, with associated p-values indicating whether the coefficients are statistically significant. In this model, perceived usefulness, trust, and to a lesser extent, perceived ease of use, are significant predictors of actual usage of internet banking services, while cultural factors show a borderline significance.

The table reveals the impact of actual usage and behavioral intention models on internet banking adoption in Sudan. It reveals that understanding user decisions, prioritizing improvements, and developing targeted interventions can help banks understand and address the factors influencing adoption. The study also suggests that understanding these factors can help predict future trends, aiding in strategic planning and resource allocation. The findings highlight the importance of cultural understanding in the adoption of internet banking.

Correlation Analysis

Table 7:

Correlations							
		Usefulness	**Perceived ease**	**Trust**	**Behavioural**	**Actual usage**	**Cultural factor**
Usefulness	Pearson Correlation	1	.257**	-.135	-.208*	.627**	.685**
	Sig. (2-tailed)		.005	.143	.024	.000	.000
	N	119	119	119	119	119	119
Perceived ease	Pearson Correlation	.257**	1	.199*	.238**	.146	.361**
	Sig. (2-tailed)	.005		.030	.009	.114	.000
	N	119	119	119	119	119	119
Trust	Pearson Correlation	-.135	.199*	1	.431**	-.171	-.269**
	Sig. (2-tailed)	.143	.030		.000	.063	.003
	N	119	119	119	119	119	119
Behavioural	Pearson Correlation	-.208*	.238**	.431**	1	-.105	-.062
	Sig. (2-tailed)	.024	.009	.000		.256	.501
	N	119	119	119	119	119	119
Actual Usage	Pearson Correlation	.627**	.146	-.171	-.105	1	.790**
	Sig. (2-tailed)	.000	.114	.063	.256		.000
	N	119	119	119	119	119	119
Cultural Factor	Pearson Correlation	.685**	.361**	-.269**	-.062	.790**	1
	Sig. (2-tailed)	.000	.000	.003	.501	.000	
	N	119	119	119	119	119	119

The correlation matrix provides insights into the relationships among the variables under study. Notably, significant correlations ($p < 0.01$) are observed between several pairs of variables. Perceived usefulness demonstrates a strong positive correlation with both Actual Usage (0.627**) and Cultural Factor (0.685**), indicating that individuals who perceive internet banking as useful are more likely to use it frequently and are influenced by cultural factors. Similarly, Perceived Ease of Use exhibits a moderately positive correlation with Cultural Factor (0.361**) and a weak positive correlation with Actual Usage (0.146). Trust shows a moderately strong positive correlation with Behavioral Intention (0.431**) and a weak negative correlation with Actual Usage (-0.171). Actual Usage is strongly correlated with both Perceived Usefulness (0.627**) and Cultural Factor (0.790**), suggesting that individuals who use internet banking services frequently perceive them as useful and are influenced by cultural factors. Additionally, Cultural Factor demonstrates a strong positive correlation with Actual Usage (0.790**) and Perceived Usefulness (0.685**), indicating the significant influence of cultural

factors on internet banking adoption and perceived usefulness. These correlations collectively provide valuable insights into the interplay between perceived utility, ease of use, trust, cultural factors, behavioral intentions, and actual usage of internet banking services.

Discussion

The rapid growth of information technology and communication has significantly impacted global lifestyles, particularly in business conduct, with electronic payment becoming a key aspect (Sleiman *et al.*, 2021). The experimental Examination of Technology Acceptance Model (TAM) in e-payment system dimensions in Sudan is important since it affords insights on the determinants of internet financial engineering in the country (Uche *et al.*, 2021). The findings were concluded with the point to the high-level utility, user friendly, mutually trust management and cultural aspects that influence the customers' actual usage of the internet banking products (Lok, 2015). The growth of electronic payment systems, which involve electronic transactions between consumers and retailers, has been driven by the widespread use of internet-based banking and shopping, playing a crucial role in contemporary electronic commerce (Hassan *et al.*, 2020). Technological innovation is a key factor in promoting innovative electronic communications and transactions, making it an essential antecedent (Rahman *et al.*, 2022).

Overall, useful thinking and usability were found to be the necessary factors for internet banking to be successful, implying that it is vital to make the design and functions convenient for customers because good user experience is a key to keeping them satisfied and enhance their banking experiences (Chau & Lai, 2003). Furthermore, the study finds cultural variables as a very powerful predictor of the actual usage, thus banks should try to put their services in a par with the social cultural hues and choices of the customer in the Sudanese society (Keller & Brennan, 2007). There is a positive but statistically significant link between security and online banking usage with trust, but trust doesn't significantly influence adoption (Aribake & Mat Aji, 2020). Credibility influences internet banking perception, but security, reliability, and context limitations exist. TAM constructs in Sudan may not fully explain user behavior towards switching. Mobile technology is a crucial ICT financial instrument in emerging economies, offering fast, affordable, and secure finance to millions worldwide through the first mobile banking application (Sleiman *et al.*, 2022).

CONCLUSION

There are certain critical issues, such as compliance with electronic payment systems and the wider use of internet banking, that are pivotal to the issues of advancement and education. The Technology Acceptance Model (TAM) has played a significant role in a country's internet financial engineering by investigating the main predictive variables (determinants). First, the survey results reveal that features like venue, user-friendliness, trust management, and cultural factors play important parts in deciding customers' actual use of internet banking products. Important are the design and the functionality for the customers with the aim of reaching the highest satisfaction and enhanced banking experience. Socio-cultural factors are also factors that should be factored in, which increases the need for banks to package their services for them to be compatible with what the African Sudanese culture prefers. Security and credibility are important, but this does not surely impact adoption (the crafting of the block chain system cannot point to any factor but in the case of adoption). Through mobile devices use as digital commercial instruments are rising; millions worldwide can now receive quick, low cost and safe money services. Yet, there are some limitations that stop TAM constructs from fully understanding Sudanese behavior toward the switch. This study highlights the need for a deep knowledge of the non-traditional factors that fuel the growth of electronic payment systems particularly in Sudan. This information can strategically guide government, business, or other social parties in enhancing the effectiveness and acceptance of electronic payment systems in the future.

REFERENCE

Abad-Segura, E., González-Zamar, M. D., López-Meneses, E., & Vázquez-Cano, E. (2020). Financial technology: review of trends, approaches and management. *Mathematics, 8*(6), 951.

Ahmad, S., Bhatti, S. H., & Hwang, Y. (2020). E-service quality and actual use of e-banking: Explanation through the Technology Acceptance Model. *Information Development, 36*(4), 503-519.

Ahmed, A. A. W., Markendahl, J., & Ghanbari, A. (2014). The incentives and challenges of delivering linear broadcasting services over cellular networks in developing countries: Sudan as a case study. *The 25th European Regional Conference of the International Telecommunications Society,* Brussels, Belgium, 22nd–25th June 2014.

Ahmed, E. M., & Ammar, A. (2020). Achieving sustainability in Sudan through microfinance and mobile banking. In *Enhancing financial inclusion through Islamic finance* (Vol. 2, pp. 297–325).

Al-Harbi, A. (2020). Banks' profitability in an Islamized financial system: Comparative study between Iran and Sudan. *International Journal of Islamic Banking and Finance Research, 4*(1), 8-14.

Aldammagh, Z., Abdeljawad, R., & Obaid, T. (2021). Predicting mobile banking adoption: An integration of TAM and TPB with trust and perceived risk. *Financial Internet Quarterly, 17*(3), 35-46.

Alhanatleh, H. (2021). The effect of electronic banking services usage on clients electronic loyalty. *Int. J. Hum. Capital Urban Manage, 6*(4), 461-476.

Aribake, F. O., & Mat Aji, Z. (2020). The mediating role of perceived security on the relationship between

internet banking users and their determinants. *International Journal of Advanced Research in Engineering and Technology (IJARET), 11*(2).

Arif, I., Aslam, W., & Hwang, Y. (2020). Barriers in adoption of internet banking: A structural equation modeling-Neural network approach. *Technology in Society, 61,* 101231.

Chaimaa, B., Najib, E., & Rachid, H. (2021). E-banking overview: concepts, challenges and solutions. *Wireless Personal Communications, 117,* 1059-1078.

Chau, P. Y., & Lai, V. S. (2003). An empirical investigation of the determinants of user acceptance of internet banking. *Journal of organizational computing and electronic commerce, 13*(2), 123-145.

Chauhan, S., Akhtar, A., & Gupta, A. (2022). Customer experience in digital banking: A review and future research directions. *International Journal of Quality and Service Sciences, 14*(2), 311-348.

Datta, P., Tanwar, S., Panda, S. N., & Rana, A. (2020). Security and issues of M-banking: A technical report. In *2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO).*

Davis, F. D. (1989). Technology acceptance model (TAM). In M. N. Al-Suqri & A. S. Al-Aufi (Eds.), *Information seeking behavior and technology adoption* (pp. 205–219).

Deshayes, C. (2022). Authoritarian adaptation and innovative contestation in Sudan, 2009–2019. In *Routledge Handbook of the Horn of Africa* (pp. 327-340). Routledge.

ElMassah, S., & Abou-El-Sood, H. (2022). Selection of Islamic banking in a multicultural context: the role of gender and religion. *Journal of Islamic Marketing, 13*(11), 2347-2377.

Eltahir, M. E. (2019). E-Learning in developing countries: is it a panacea? A case study of Sudan. *Ieee Access, 7,* 97784-97792.

Hassan, M. A., Shukur, Z., Hasan, M. K., & Al-Khaleefa, A. S. (2020). A review on electronic payments security. *Symmetry, 12*(8), 1344.

Heffernan, S. (2005). *Modern banking*. John Wiley & Sons.

Hossain, S. F. A., Xi, Z., Nurunnabi, M., & Hussain, K. (2020). Ubiquitous role of social networking in driving M-Commerce: evaluating the use of mobile phones for online shopping and payment in the context of trust. *Sage Open, 10*(3), 2158244020939536.

Hussein, M. A., Ahmed, S. A., & Ahmed, H. M. S. (2020). Impact of financial development on economic growth in Sudan: Short-run and long-run analysis. *International Journal of Management (IJM), 11*(12).

Ibrahim, A. H., Mutiarin, D., & Purnomo, E. P. (2021). E-Services in Sudan during the Covid-19 pandemic as a model: A case study of University of Bahri-Sudan. *Journal of Governance and Public Policy, 8*(2), 165-183.

Indiani, N. L. P., & Fahik, G. A. (2020). Conversion of online purchase intention into actual purchase: the moderating role of transaction security and convenience. *Business: Theory and Practice, 21*(1), 18-29.

Jun, M., & Palacios, S. (2016). Examining the key dimensions of mobile banking service quality: an exploratory study. *International Journal of Bank Marketing, 34*(3), 307-326.

Karim, N. A., Khashan, O. A., Kanaker, H., Abdulraheem, W. K., Alshinwan, M., & Albanna, A. (2023). Online banking user authentication methods: A systematic literature review. *IEEE Access.*

Kavitha, J., & Gopinath, R. (2020). A study on perception of internet banking users' service quality: A structural equation modeling perspective. *International Journal of Management (IJM), 11*(8).

Keller, E. M., & Brennan, P. K. (2007). Cultural considerations and challenges to service delivery for Sudanese victims of domestic violence: Insights from service providers and actors in the criminal justice system. *International review of victimology, 14*(1), 115-141.

Khater, A. H. O., Omer, M. S., Khatarna, A. A. A., Osman, M. E. M. I., & Osman, I. Y. I. (2020). Customers Intention to Use Internet Banking: Age as a Moderator Variable. *International Journal of Scientific & Technology Research, 9*(3), 6541-6548.

Khattab, I., Ahmed, A. M., & Al-Magli, O. A. O. (2020). The implications of e-banking channels on job security and personal development. *Banking & Financial Studies, 35,* 9–39.

Kordit, J. M. (2022). *The impact of electronic banking on performance of commercial banks in Juba, South Sudan* [Master's thesis, University of Nairobi].

Leila, A., & FATIHA, B. (2022). The reality of financial inclusion in the Arab countries and the role of financial technology in promoting it (country experiences). *Journal of Research in Finance & Accounting, 7*(1).

Liyanaarachchi, G., Deshpande, S., & Weaven, S. (2021). Market-oriented corporate digital responsibility to manage data vulnerability in online banking. *International Journal of Bank Marketing, 39*(4), 571-591.

Lok, C. K. (2015). Adoption of smart card-based e-payment system for retailing in Hong Kong using an extended technology acceptance model. In *E-services Adoption: Processes by Firms in Developing Nations* (pp. 255-466). Emerald Group Publishing Limited.

Ly, B., & Ly, R. (2022). Internet banking adoption under technology acceptance model—Evidence from Cambodian users. *Computers in Human Behavior Reports, 7,* 100224.

Malinka, K., Hujňák, O., Hanáček, P., & Hellebrandt, L. (2022). E-Banking Security Study—10 Years Later. *Ieee Access, 10,* 16681-16699.

Mansour, I. H. F., Eljelly, A. M., & Abdullah, A. M. (2016). Consumers' attitude towards e-banking services in Islamic banks: the case of Sudan. *Review of International Business and Strategy, 26*(2), 244-260.

Marakarkandy, B., Yajnik, N., & Dasgupta, C. (2017). Enabling internet banking adoption: An empirical examination with an augmented technology acceptance model (TAM). *Journal of Enterprise Information Management, 30*(2), 263-294.

Masad, F. M., Nussir, N. A., Eid, A. A., Aldoulat, T., & Alsheikh, G. A. (2023). Electronic Banking and its Impact on Job Security in Jordanian Banking Sector: Profitability is an Intermediate Variable. *Journal of Namibian Studies: History Politics Culture, 33,* 363-383.

Mogos, G., & Jamail, N. S. M. (2021). Study on security risks of e-banking system. *Indonesian Journal of Electrical Engineering and Computer Science, 21*(2), 1065-1072.

Mubarak Alharbi, I., Zyngier, S., & Hodkinson, C. (2013). Privacy by design and customers' perceived privacy and security concerns in the success of e-commerce. *Journal of Enterprise Information Management, 26*(6), 702-718.

Mustafa, O. A. O. (2021). History of Banking in Sudan (Conventional and Islamic): A Critical Review (1903-2019). *International Finance and Banking, 8*(1), 29-51.

Nordhaus, W. D. (2021). Are we approaching an economic singularity? information technology and the future of economic growth. *American Economic Journal: Macroeconomics, 13*(1), 299-332.

Omer, A. H., & Adam, F. A. A. (2020). The Moderator Role of Age in the Unified Theory of Acceptance and Use of Technology: Intention to Use Internet Banking in Sudan. *Journal of Economic, Administrative and Legal Sciences, 4*(11), 158-169.

Pavithra, C. (2021). Factors affecting customers' perception towards digital banking services. *Turkish Journal of Computer and Mathematics Education (TURCOMAT), 12*(11), 1608–1614.

Prastiawan, D. I., Aisjah, S., & Rofiaty, R. (2021). The effect of perceived usefulness, perceived ease of use, and social influence on the use of mobile banking through the mediation of attitude toward use. *APMBA (Asia Pacific Management and Business Application), 9*(3), 243-260.

Rahman, M., Ismail, I., Bahri, S., & Rahman, M. K. (2022). An empirical analysis of cashless payment systems for business transactions. *Journal of Open Innovation: Technology, Market, and Complexity, 8*(4), 213.

Rajasulochana, D. S. M. (2022). E-banking and customers' satisfaction in public and private sector banks in Karnataka: an empirical analysis. *Journal of Positive School Psychology, 6*(8), 8270-8279.

Rawwash, H., Masad, F., Enaizan, O., Eneizan, B., Adaileh, M., Saleh, A., & Almestarihi, R. (2020). Factors affecting Jordanian electronic banking services. *Management Science Letters, 10*(4), 915-922.

Renzaho, A. M., Dachi, G., Ategbo, E., Chitekwe, S., & Doh, D. (2022). Pathways and approaches for scaling-up of community-based management of acute malnutrition programs through the lens of complex adaptive systems in South Sudan. *Archives of Public Health, 80*(1), 203.

Rossi, F. D., Hohemberger, R., Konzen, M. P., & Temp, D. C. (2021). E-banking security: threats, challenges, solutions, and trends. In *Research Anthology on Concepts, Applications, and Challenges of FinTech* (pp. 385-397). IGI Global.

Rymarczyk, J. (2021). The impact of industrial revolution 4.0 on international trade. *Entrepreneurial Business and Economics Review, 9*(1), 105-117.

Sahut, J.-M. (2021). Advantages of E-banking. *Journal of internet banking and commerce, 26*(5), 1-1.

Salim, B. F., Mahmoud, M. H., & Khair, H. M. (2016). Perceived factors affecting the internet banking implementation in sudan: an application of (UTAUT2). *International Journal of Applied Business and Economic Research, 14*(1), 1-16.

Sasono, I., Jubaedi, A. D., Novitasari, D., Wiyono, N., Riyanto, R., Oktabrianto, O., Jainuri, J., & Waruwu, H. (2021). The impact of e-service quality and satisfaction on customer loyalty: Empirical evidence from internet banking users in Indonesia. *The Journal of Asian Finance, Economics and Business, 8*(4), 465–473.

Sekhar, S. C. (2020). A Study on Effectiveness of Electronic banking System. *Sanshodhan,* 8-13.

Sharma, R., Singh, G., & Sharma, S. (2020). Modelling internet banking adoption in Fiji: A developing country perspective. *International journal of information management, 53,* 102116.

Sleiman, K. A. A., Jin, W., Juanli, L., Lei, H. Z., Cheng, J., Ouyang, Y., & Rong, W. (2022). The factors of continuance intention to use mobile payments in Sudan. *Sage Open, 12*(3), 21582440221114333.

Sleiman, K. A. A., Juanli, L., Cai, X., Lei, H., & Liua, R. (2021). Antecedents of the Adoption of the New Mobile Payment System in Sudan. *Revista Argentina de Clínica Psicológica, 30*(2), 212.

Subanidja, S., Sorongan, F. A., & Legowo, M. B. (2022). Leveraging financial technology entity into sustainable bank performance through a competitive advantage. *Emerging Science Journal, 6*(1), 53-63.

Sudirjo, F., Dewa, D. M. R. T., Kesuma, L. I., Suryaningsih, L., & Utami, E. Y. (2024). Application of The User Centered Design Method To Evaluate The Relationship Between User Experience, User Interface and Customer Satisfaction on Banking Mobile Application. *Jurnal Informasi Dan Teknologi,* 7-13.

Uche, D. B., Osuagwu, O. B., Nwosu, S. N., & Otika, U. S. (2021). Integrating trust into technology acceptance model (TAM), the conceptual framework for e-payment platform acceptance. *British Journal of Management and Marketing Studies, 4*(4), 34-56.

Usman, O., Monoarfa, T., & Marsofiyati, M. (2020). E-Banking and mobile banking effects on customer satisfaction. *Accounting, 6*(6), 1117-1128.

Wewege, L., Lee, J., & Thomsett, M. C. (2020). Disruptions and digital banking trends. *Journal of Applied Finance and Banking, 10*(6), 15-56.

Xue, M., Hitt, L. M., & Chen, P.-y. (2011). Determinants and outcomes of internet banking adoption. *Management science, 57*(2), 291-307.

Zhang, J., Hassandoust, F., & Williams, J. E. (2020). Online customer trust in the context of the general data protection regulation (GDPR). *Pacific Asia Journal of the Association for Information Systems, 12*(1), 4.