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ANTECEDENTS AND ADOPTION OF E-BANKING IN BANK PERFORMANCE: THE PERSPECTIVE OF PRIVATE BANK EMPLOYEES

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ABSTRACT

Aim/Purpose	This paper identifies the antecedents that affect E-Banking (EB) adoption and investigates the relationship between the level of EB adoption and the performance of private banks.
Background	Rapid technological advancement has transformed the business environment dramatically. These advancements particularly the Internet has reshaped the way businesses operate. Over the last decade, the banking industry has become highly complex and competitive and operates in a highly volatile and unpredictable global economy. With the increasing demand for electronic services, banks are harnessing EB technology to improve their products and services.
Methodology	Quantitative research using Structural Equation Modelling (SEM) was carried out with a sample size of 211 by sending questionnaires to employees of six banks in Khartoum, Sudan. The study is based on different technology theories and models.
Contribution	The study provides insights into the employees' perception of EB adoption in their banking transactions.
Findings	The results showed that four factors are significant in the adoption of EB in Sudan. However, training and user trust were insignificant in determining its adoption. Moreover, the level of adoption of EB significantly affected private bank performance.

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Recommendations for Practitioners	Private banks in Sudan that are interested in EB might find these findings helpful in guiding their technology adoption and application initiatives.
Recommendations for Researchers	To validate the research model, cross data from different countries are encouraged to apply the model to capture the differences and similarities among them. In addition, a longitudinal research could be conducted to gather data for adoption process over a longer period rather than one point of time, to investigate antecedents and bank performance outcomes by the end of the study period. Other antecedents and outcomes could possibly be included to improve the power of the study model.
Impact on Society	This study provides a reference for banks with similar developing country backgrounds in adopting EB to enhance their performance. Moreover, knowledge of antecedents and outcomes of EB adoption could be positively reflected in service quality performance.
Future Research	This research is limited to the employees' perspective, and future research could consider the perception of customers from a developing country towards EB adoption.
Keywords	technology acceptance, e-banking, adoption, performance, Sudan

INTRODUCTION

To improve business efficiency and service quality, it is critical to invest in information system technologies (Agwu & Murray, 2015; Wang & Wang, 2010). The banking industry is critical to economic development by providing efficient financial products and services (Petkovski & Kjosevski, 2014). In this regard, EB refers to banks using information technology to provide information or services to customers (Bakare, 2015; Karjuoto, Marrila, & Pento, 2002). Nowadays, Internet-based technology is crucial to businesses success (Siam, 2006; Smith, 2001). These changes affect the quality of a bank's services, its performance, reputation and ability to outperform competitors (Cracknell, 2004).

Unlike the phenomena of EB technology acceptance and usage in developed countries, EB is in its infancy stage in many developing nations (Shanmugam, Wang, Bugshan, & Hajli, 2015). During the last decade, banks have shifted to adopt EB channels resulting in increased EB services (Migdadi, 2012). Gao and Owolabi (2008) indicate that many uncontrollable external forces affect the development of the EB industry. As such, there is a considerable technology gap between the developed and developing countries in terms of investment, usage and implementation of EB. Cracknell (2004) mentioned that the early adopters of EB initiatives were extremely targeted to reduce the cost of transactions for organisations rather than deliver value to the customers. Many studies (Bakare, 2015; Kesharwani & Radhakrishna, 2013) showed that EB is still elementary in terms of application where only a small number of banks offer Web-based services to customers. As such, studies argued that the effective benefits of EB are still not realised. Even though, Yang, Li, Ma, and Chen (2018) supported that in some developing countries the main advantages are saving costs, attracting new customers, serving more clients and obtaining more opportunities.

Sudan as a developing country faces many challenges in applying EB due to weak telecommunications and networking infrastructure, lack of well-designed training packages for the staff, and a shortage of timely banking service delivery (Ammar & Ahmed, 2016). Despite the significant adoption of EB globally, limited previous studies reported this issue in developing countries such as Sudan (Alam, Magboul, & Raman, 2010; Dube & Gumbo, 2017; Isamial & Osman, 2012; Mansour, Eljelliy, & Abdallah, 2016; Sikdar, Kumar, & Makkad, 2015). This study addresses this lacuna in the literature.

The findings are expected to benefit bankers as practitioners, researchers as academics and technology strategist as policymakers. It tests a model of the antecedents of EB adoption and how its adop-

tion could affect private bank performance. The proposed model provides valuable insights to improve Sudan's banking industry. It provides guidelines for government and performance evaluators to set technology plans for the banking industry. This can be achieved by understanding the antecedents of EB adoption in order to improve banks' performance.

LITERATURE REVIEW

ELECTRONIC BANKING DEFINITION

The term EB can be conceptualised in many ways. Daniel (1999) views EB as "the process of the provision of banking services to customers through Internet technologies". Others define EB as the automatic supply of new and traditional banking products and services directly to customers, using interactive channels of electronic communication (Daniela, Simona, & Dragos, 2010; Drigă, & Isac, 2014). EB provides the customers with the ability to perform financial transactions without the intervention of human beings (Rasiah, 2010; Safeena, Date, Hundewale, & Kammani, 2013).

EB is the ability of the bank client to access their bank accounts via the Internet to conduct a banking transaction.

EB has witnessed a massive change in the performance of the banking industry (Osho, 2008). It introduces a new banking paradigm to satisfy customers' needs (Samphanwattanachai, 2007). Consequently, Pikkarainen, Pikkarainen, Karjaluoto, and Pahnila (2004, p.224) consider EB as an "Internet portal through which customers can use different kinds of banking services ranging from bill payment to making investments". The majority of the recent literature on EB applications suffers from a narrow focus by equating EB with electronic money (Aduda & Kingoo, 2012). In spite of the true advantages EB offers, some bank clients in developing countries are still using traditional ways to settle their bank's activities (Fawzy & Esawai, 2017).

ANTECEDENTS AFFECTING ELECTRONIC BANKING ADOPTION

Researchers and practitioners have been investigating the antecedents which might affect the adoption and usage of technologies based on the Technology Acceptance Model (TAM) developed by Davis (1986, 1989), Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), and Theory of Planned Behaviour (TPB) (Ajzen, 1991). The TRA is a widely studied model in social psychology concerned with the determinants of consciously intended behaviours (Fishbein & Ajzen, 1975). In a further extension of TRA, Davis (1986) introduced the TAM to describe people's acceptance of information systems technology. The goal of TAM is to provide an explanation of the determinants of technology acceptance among users. Davis (1993, p. 475) mentioned that "TAM provides an informative representation of the mechanisms by which design choices influence user acceptance, and should, therefore, be helpful in applied contexts for forecasting and evaluating user acceptance of information technology". TAM is one of the most cited models with its empirical focus on the use of multiple-item scales (Chuttur, 2009; Yiu, Grant, & Edgar, 2007). Much research effort has targeted the antecedents affecting the adoption or usage of information systems. Some of the major psychological and behavioural factors which affect the adoption of any innovation such as EB includes consumer awareness, ease of use, security, accessibility, technology resistance, reluctance to technological change, preferences and cost of innovation adoption (Gerrard & Cunningham, 2003; Srivastava, 2008).

Antecedents that affect EB adoption have been investigated in many developed countries (Lassar, Manolis, & Lassar, 2005; Lichtenstein & Williamson, 2006; Littler & Melanthiou, 2006; Maditinos, Chatzoudes, & Sarigiannidis, 2013). On the other hand, limited research captures the antecedents that influence employees' behaviour to adopt or use EB in developing countries including Sudan (Alam et al., 2010; Akhlaq & Shah, 2011; AlKailani, 2016; Auta, 2010; Eze, Yaw, Manyeki, & Har, 2011; Isamial & Osman, 2012; Khan, Hameed, & Khan, 2017; Tan, Chong, Ooi, & Chong, 2010). Despite

the advantages of EB, recent research suggests that EB applications may not achieve the expected levels of transformation (Atay & Apak, 2013). Similarly, White and Nteli (2004) argued that the adoption of EB had not achieved the intended results in developing countries. Due to the activities of banks after the adoption of the e-banking system, the operating costs of banks have increased sharply (Yang et al., 2018). Moreover, the earlier EB adoption literature concluded with controversial results regarding the relationship between EB adoption and bank performance (Kaur, 2013; Lu, Liu, Jing, & Huang, 2005; Onay, Ozsoz, & Helvacioglu, 2013). Though EB is gaining acceptance in developing countries, the research effort investigates the antecedents and performance outcomes of EB from an employee's perspective is yet to be established. This paper addresses this lacuna.

As antecedents, Teo and Tan (1998) include organisational, technological, and environmental factors as barriers to EB. Many previous works of EB that examine barriers mention disadvantages such as security, privacy, and trust of Web systems (Gerrard & Cunningham, 2003; Rotchanakitumnuai & Spence, 2003). Similarly, Larpsiri, Rotchanakitumnuai, Chaisrakeo, and Speece (2002) found that legal support has failed to foster customer trust in EB.

As a consequence of the increasing importance of modern IT for the delivery of financial services, the analysis of the antecedents of EB adoption has become an area of growing interest to researchers and managers using different theories and models in developing countries (AlKailani, 2016). For example, Jeruwachirathanakul and Fink (2005) categorised antecedents affecting strategies that banks could adopt to maximise the adoption of EB into perceptive, under bank control such as risk and privacy, and customer related factors. These groups help banks develop strategies that would directly influence the level of EB adoption. Similarly, in their Malaysian study, Suganthi, and Balachandran (2001) used an online survey to concentrate on the antecedents that potentially influence EB adoption such as accessibility, reluctance to changes, costs, trust in one's bank, security concerns, convenience, and ease of use. The results showed significant positive relationships between accessibility, reluctance to changes and awareness of EB adoption.

In their exploratory work, Malhotra and Singh (2010) investigated the most significant antecedents of EB services in India. The study revealed that these antecedents include the size of the bank, financing pattern, bank experience for providing Internet services and ownership of the banks. In Tunisia, Nasri (2011) shows that EB usage is influenced by the antecedents of factors risk, convenience, security and prior Internet knowledge. Also, demographic factors have a significant impact on the behaviour to use EB. In their study, Ismail and Osman (2012) determined EB usage and identified the antecedents that influence EB adoption in Sudan. The study showed that among all EB channels, ATM is the most popular. Also, the main antecedents that affect EB adoption are the slow Internet, delay of reporting technical problems, and unclear legislation and regulations that safeguard electronic transactions.

Electronic Banking and Bank Performance

The banking industry has been an interesting practical case for service innovation applications in which traditional transactions were moved to Web applications for commercial purposes through EB adoption (Al-Hajri, 2008). Without the need to go to the bank, EB offers the customers direct access to their financial information and to conduct financial transactions (Rotchanakitumnuai & Spence, 2003). Despite the accelerated application of EB, the relationship between the adoption and private banks performance has not received sufficient research as this relationship is not yet clear (Al-Smadi & Al-Wabel, 2011).

As for performance outcome, the study of Al-Smadi and Al-Wabel (2011) examined the impact of electronic banking on the Jordanian banks' performance. Empirical analysis has been conducted on a panel data of 15 Jordanian banks for the 2000-2010 period. The results show that electronic banking has a significant negative impact on banks' performance. Also, Dinh, Le, and Le (2015) evaluated the impact of EB on the performance (profitability ratios, noninterest operating expenses and incomes)

of banks in Vietnam. The results from the regression model showed that EB affected bank profitability through an increase in income from service activities.

In their study of the impacts of EB on the performance of banks in a developing economy, Siddik, Sun, Kabiraj, Shanmugan, and Yanjuan (2016) investigated the impact of EB on the performance of Bangladeshi banks. The results show that EB begins to contribute positively to banks' return on equity with a time lag of two years while a negative impact was found in the first year of adoption. Also, Yang et al. (2018) investigated the performance and adoption of EB system, namely, profitability and cost efficiency performance. The bank performance was measured in terms of the indicators of return on assets, return on equity, operating margin, net interest margin and efficiency ratio. The study revealed that e-banking could improve the Chinese banks' performance in terms of the indicators mentioned above. Based on a thorough survey of the literature, lack of study, together with the antecedents and performance (outcome) of EB adoption, the next section presents the proposed model.

RESEARCH MODEL AND ASSOCIATED HYPOTHESES

Based on the extant literature on EB adoption, a model was developed (Figure 1) to analyse the relationships among several selected antecedents. Accordingly, associated hypotheses were postulated. The foundation of this research is derived from behavioural studies and technology acceptance frameworks. Although EB in Sudan has witnessed observable growth in the past decade, it is still regarded in its preliminary stage when compared to the EB adoption rate in developed countries (Ammar & Ahmed, 2016). Numerous studies have identified and explored the factors of EB adoption using different theories and models (Yuen, Yeow, Lim, & Saylani, 2011). But, the structural relationships between antecedents and performance (outcome) of EB adoption is understudied. Also, another gap was detected from the fact that most of the studies regarding the adoption of EB seen from customers rather than an employee perspective (Al-Smadi, 2012; Maduku, 2014; Siddik et al., 2016) (see Appendix).

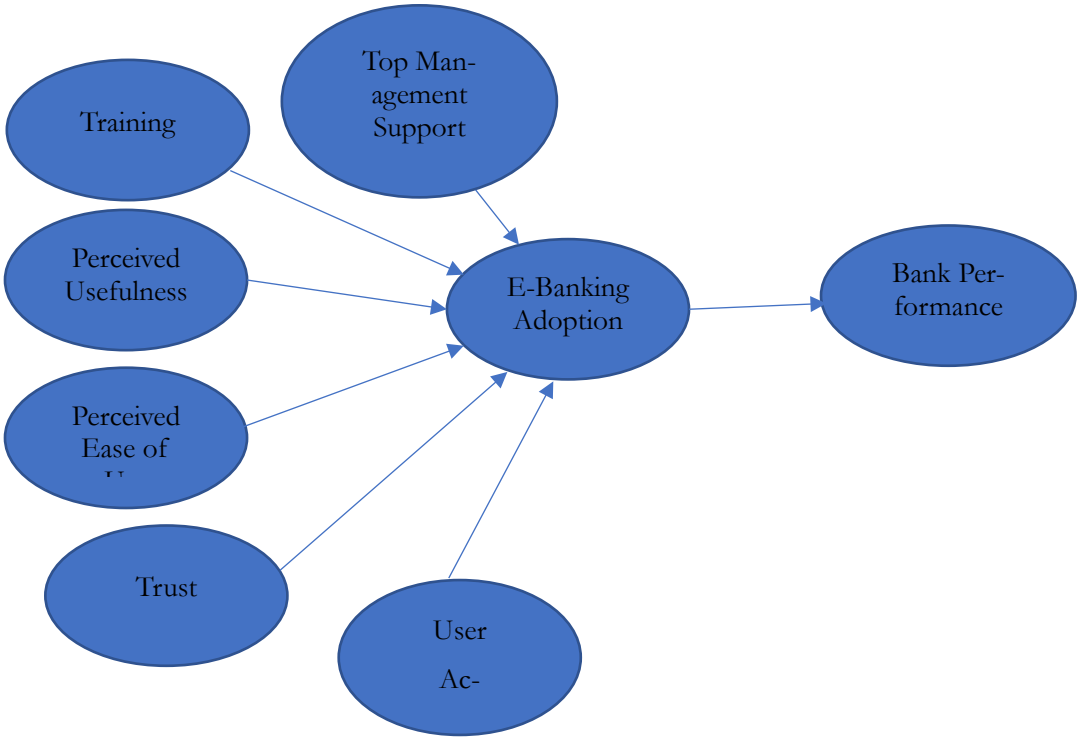

Figure 1. Hypothesised model

Surprisingly, few studies investigated the relationship between EB adoption and bank performance. This study attempts to fill this gap in the literature. Although previous literature studied the adoption of online banking, many have focused on developed nations such as the USA and Australia (Pikkarainen et al. 2004).

Top Management Support

Many studies mention the importance of senior management as a key success factor within organisations to adopt technologies (Al-Gahtani & King, 1999). The expected support from senior staff is to believe that EB technology offers strategic value, as well as encouraging employees to use this technology. Tan and Teo (2000) found that top management support significantly influences the users' intention to adopt EB. Also, Al Shaar, Khattab, Alkaied, and Manna (2015) confirmed a positive relationship between top management support and innovation. Therefore, the following hypothesis is formulated:

> H1: Top management support will have a positive effect on EB adoption among private banks in Sudan.

Training

Organisations provide their employees' training internally or externally in order to increase their capacities and for the sake of development (Hughey & Mussnug, 1997). Syed (2011) mentioned that Training and Internet skills are important for EB adoption. Moreover, Su and Gururajan (2010) found that the antecedents of technical support and training do not pose any threat to their intention to use EB. Therefore, the following hypothesis is formulated:

> H2: Training will have a positive effect on EB adoption among private banks in Sudan.

Perceived Usefulness

Davis (1989, p. 320) defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance". Users of EB will adopt the system if they believe it will benefit them such as by reducing the time spent on going to the bank and improving efficiency (Rao, Metts, & Monge, 2003). Similarly, Davis (1989) consider perceived usefulness as a direct predictor of the buyer's intention to use the technology. Yaghoubi (2010) showed a positive relationship between perceived usefulness and behavioural intention to adopt EB. Therefore, the following hypothesis is formulated:

> H3: Perceived usefulness will have a positive effect on EB adoption among private banks in Sudan.

Perceived Ease of Use

Davis (1989, p. 320) defines perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort". He mentioned that "even though the customers may believe the given application is useful, but at the same time they might think that the system is difficult to use. Hosein (2009) found a positive relationship between perceived ease of use and EB adoption. Therefore, the following hypothesis is formulated:

> H4: Perceived ease of use will have a positive effect on EB adoption among private banks in Sudan.

User Acceptance

Many researchers show that users acceptance of Internet technologies has a direct impact on its level of adoption within organisations (Doll & Torkzadej, 1989; Yang, Chandlrees, Lin, & Chao, 2009). Therefore, the following hypothesis is formulated:

H5: User acceptance of new technology will have a positive effect on EB adoption among private banks in Sudan.

TRUST

Trust is an important element affecting consumer behaviour and determining the success of technologies adoption (Alsajjan & Dennis, 2010; Yang et al., 2009). Hernandez and Mazzon (2007) indicated security and privacy are among the most significant antecedents influencing the adoption of EB. Amin (2007) confirms that trust is at the core of the EB system. One factor which influences technology trust is whether the system is secure or not (Chong, Ooi, Lin, & Tan, 2010). Therefore, the following hypothesis is formulated:

H6: Trust will have a positive effect on EB adoption among private banks in Sudan.

E-BANKING ADOPTION AND BANK PERFORMANCE

Due to the significant role that the banking sector plays in the process of economic acceleration, studying the performance of this sector in developing nations is highly important (Siddik et al., 2016). Empirical studies conducted in different countries reveal that EB services improve the performance of banks. Siddik et al. (2016) found that EB adoption has a positive impact on bank performance. Therefore, the following hypothesis is formulated:

H7: EB adoption will have a positive effect on private banks' performance in Sudan.

RESEARCH METHOD

The data for this study was collected through questionnaires. Prior literature has been used to develop the items of the questionnaire. In addition, exploratory and confirmatory factor analysis (EFA and CFA) were used to identify the final set of items. The questionnaire was pre-tested among various faculty members teaching banking subjects and bank managers to ensure all items are clear. The first part of the questionnaire collects the demographic data of the participants. The second part concerns the factors that affect the level of adoption of EB system in the bank. The third part pertains to the expected results from using the EB system (performance) in the bank.

The questionnaire has been distributed among the six biggest banks in the capital of Sudan. We requested our contacts in these banks to randomly distribute the questionnaires to senior managers, managers, supervisors, and technicians who are responsible for the EB system in their banks. Participants from other departments (e.g. IT, finance, and HR) were also included in this study. A total of 300 questionnaires were distributed to the six targeted banks.

RESULTS

DEMOGRAPHIC PROFILE

Only 250 questionnaires were returned of which 211 were included in the analysis. More than half of the participants were male (60.2%) as shown in Table 1. The majority of participants were relatively older adults, with 44.5% aged between 24 and 40 years and 36.5% between 41 and 55 years. More than half of the participants have a bachelor degree (51.2%). In addition, a little less than half (47.4%) of the participants are working in customer service, and 47.9% of the participants are supervisors. Table 1 shows that 32.7% of participants have one to five years of experience in their banks. Finally, a little less than half (47.4%) of the banks have been using EB systems between five to six years.

Table 1. Demographic data summary

Variable	No. of Respondents	Percent (%)
Gender		
Male	127	60.2
Female	84	39.8
Age		
Under 24 years	10	4.7
24 - under 40 years	94	44.5
41 - under 55 years	77	36.5
Above 55 years	30	14.2
Education		
Diploma or less	27	9.5
BA	118	51.2
MA or MBA	62	29.4
PhD	4	10
Department		
IT	48	22.7
HR	25	11.8
Finance	26	12.3
Customer Services	100	47.4
Accounts Manager	12	5.7
Management Level		
Senior Manager	22	10.4
Manager	30	14.2
Supervisor	101	47.9
Technician	58	27.5
Experience in the Bank		
Less than 1 year	19	9
1 – 5 years	69	32.7
6 – 10 years	76	36
More than 10 years	47	22.3
Usage of E-banking		
Less than 1 year	1	0.5
2 – 4 years	28	13.3
5 – 6 years	100	47.4
More than 6 years	82	38.8

FACTOR ANALYSIS

This study uses confirmatory factor analysis (CFA) and structural equation modelling (SEM) to examine the proposed model of EB adoption. CFA is used to confirm or reject the proposed model. Structure equation modelling (SEM) is performed to evaluate the hypothesised relationships. CFA is performed on the hypothesised measurement model. The CFA's results (Table 2) confirmed that the adjusted chi-square (chi-square/df) equals 1.634 (less than 3), NFA equals 0.90 (greater than or equal 0.9), CFA equals 0.955 (greater than or equal 0.9), and RMSEA equals 0.055 (less than or equal 0.08). The results suggest that the proposed model achieves a good fit with the observed data.

Table 2. CFA statistics of model fit

Model Goodness-Fit Indexes	Recommended Value	Result Model
Chi-square		1086.538 *
Degree of freedom (df)		665
Chi-square /df	≤ 3.00	1.634
Normalised fit index (NFI)	≥ 0.90	0.955
Comparative fit index (CFI)	≥ 0.90	0.955
Root mean square error of approximation (RMSEA)	≤ 0.08	0.055

*Note: N = 211, * p< 0.05*

All constructs have achieved the recommended value for composite reliability (> 0.7) as shown in Table 3. In addition, the reliability evaluation based on AVE is achieved (> 0.5), and the Cronbach's Alpha values exceed the recommended value of 0.70.

To examine the discriminant validity of the measurement model, Table 4 shows that all the constructs are unique and distinct as the factor correlation coefficient for all constructs are less than the recommended value of 0.85 (Kline, 2015). In addition, the square root of AVE in the diagonal in Table 4 was greater than the inter-construct correlations to support sufficient discriminate validity. In summary, validity and reliability support the measurement model.

Table 3. Convergent validity tests

Factor	Variables	Standardised Loadings (> 0.707)	Reliability (R^2) (> 0.5)	AVE (> 0.5)	Composite Reliability α (> 0.7)	Cronbach's Alpha (> 0.7)
Management Support	TpMgSpt5	.836	0.699	0.671	0.890	0.886
	TpMgSpt4	.903	0.815			
	TpMgSpt3	.821	0.674			
	TpMgSpt1	.704	0.496			
Training	Training3	.829	0.687	0.778	0.913	0.912
	Training2	.925	0.856			
	Training1	.889	0.790			
Usefulness	PerUseful7	.779	0.607	0.779	0.955	0.957
	PerUseful5	.884	0.781			
	PerUseful4	.947	0.897			
	PerUseful3	.944	0.891			
	PerUseful2	.889	0.790			
	PerUseful1	.841	0.707			
Ease of Use	Easeuse6	.840	0.706	0.735	0.943	0.942
	Easeuse5	.794	0.630			
	Easeuse4	.885	0.783			
	Easeuse3	.928	0.861			
	Easeuse2	.875	0.766			
	Easeuse1	.816	0.666			
User Acceptance	UserAccpt7	.951	0.904	0.848	0.916	0.921
	UserAccpt5	.781	0.610			
	UserAccpt4	.999	0.998			
	UserAccpt3	.662	0.438			

Factor	Variables	Standardised Loadings (> 0.707)	Reliability (R^2) (> 0.5)	AVE (> 0.5)	Composite Reliability α (> 0.7)	Cronbach's Alpha (> 0.7)
Trust	Usertrust1	.908	0.824	0.795	0.951	0.955
	Usertrust2	.958	0.918			
	Usertrust3	.934	0.872			
	Usertrust4	.804	0.646			
	Usertrust5	.844	0.712			
Level of Adoption	LvlAdopt1	.867	0.752	0.758	0.956	0.962
	LvlAdopt2	.910	0.828			
	LvlAdopt3	.874	0.764			
	LvlAdopt4	.847	0.717			
	LvlAdopt5	.845	0.714			
	LvlAdopt6	.877	0.769			
	LvlAdopt7	.872	0.760			
Performance	BankPerv6	.833	0.694	0.673	0.892	0.891
	BankPerv5	.812	0.659			
	BankPerv4	.823	0.677			
	BankPerv3	.814	0.663			

Table 4. Factor correlations

	Level of Adoption	Trust	User Acceptance	Ease of Use	Usefulness	Training	Management	Performance
Level of Adoption	**0.820**							
Trust	0.029	**0.892**						
User Acceptance	0.367	0.184	**0.921**					
Ease of Use	0.601	0.152	0.397	**0.957**				
Usefulness	0.576	0.132	0.446	0.811	**0.883**			
Training	0.531	0.232	0.428	0.700	0.700	**0.882**		
Management	0.221	0.191	0.478	0.309	0.306	0.422	**0.819**	
Performance	0.111	-0.001	0.052	0.135	0.172	0.139	-0.002	**0.820**

Structural Model

The structural equation modelling (SEM) was applied to test the hypotheses (Figure 2). The model fit was examined. Four common indices of fit (x^2/df of less than 3, IFI, CFI greater than 0.9, and RMSEA of less than 0.08 are considered indicators of a good fit) were used in this study. In practice, all goodness-of-fit statistics (x^2/df = 1.625, IFI = 0.955, CFI = 0.955, and RMSEA = 0.055) are in the acceptable fit to the data.

The hypothesised relationships between banks' performance, level of adoption, and six latent variables (perceived ease of use, perceived usefulness, top management support, user trust, training, and

user acceptance) are examined using the structural model as in Figure 2. As shown in Figure 2, seven causal paths represent the hypotheses of this study.

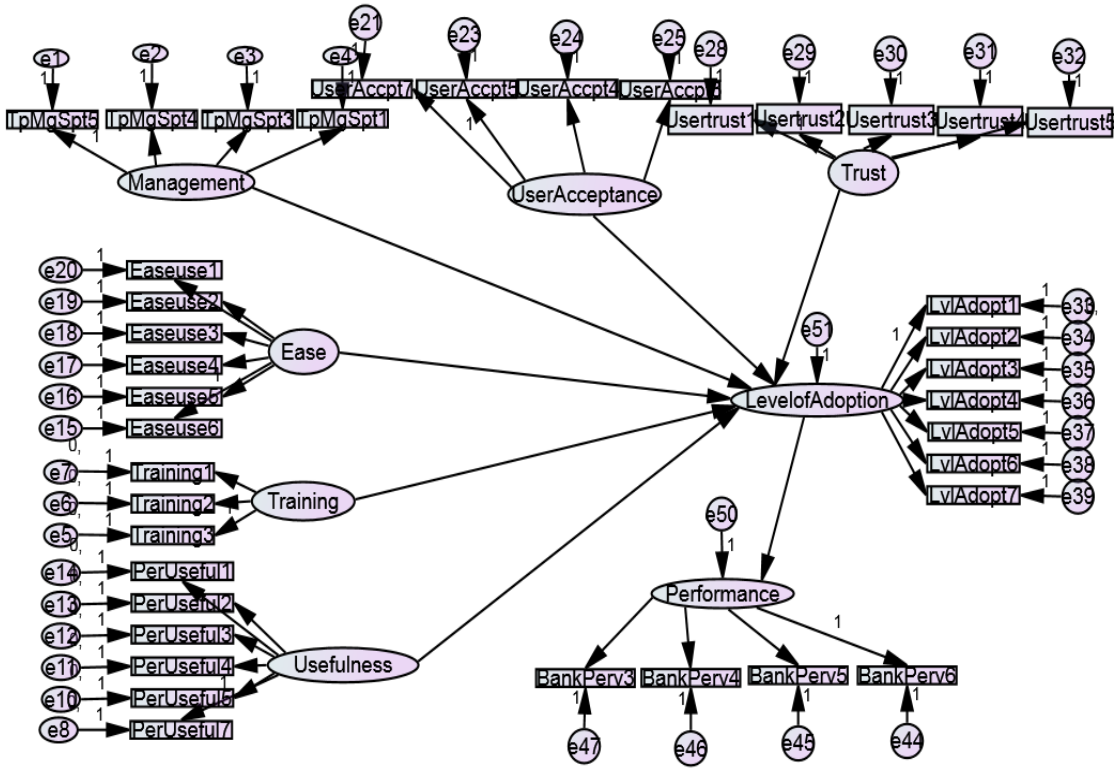

Figure 2. Measurement model

Table 5 illustrates the examination of these relationships in the structural model. Five paths are significant as the critical ratio was greater than 1.96 at the 0.05 level, and two hypothesised paths are insignificant. Table 5 also shows the summary of the hypotheses that are supported and not supported by the structural model.

Table 6 shows the standardised direct, indirect, and total effect of the variables on the level of EB adoption and banks' performance with the coefficient of determinations (R^2) values. According to the table, 79.7% of the variance in the level of adoption of e-banking system is explained by six factors: perceived ease of use, perceived usefulness, top management support, user trust, training, and user acceptance. All of these factors have a direct effect on the level of adoption with four of them considered significant (> 0.1) according to Cohen (1988).

For example, perceived usefulness and perceived ease of use are the major determinants of the level of adoption of the EB system with total effect 0.386 and 0.335 respectively. Top management support and user acceptance are the third and fourth determinants of the level of adoption with total effect 0.171 and 0.166 respectively. The variance of banks' performance totalling 31.8% is explained by the direct effect of the level of adoption of e-banking systems. The major determinant of the performance is the level of adoption with a total strong effect of 0.564. The second and third determinants are the indirect effect of perceived usefulness and perceived ease of use with the total indirect effect of 0.217 and 0.189 respectively. The effects greater than 0.1 are shown in bold in Table 6.

Table 5. Results of path tests

			Esti-mate	S.E.	C.R.	P	Comment
LvlAdopt	<---	Easeuse	.334	.068	4.920	***	Sig.
LvlAdopt	<---	PerUseful	.394	.057	6.879	***	Sig.
LvlAdopt	<---	TpMgSpt	.169	.045	3.769	***	Sig.
LvlAdopt	<---	Training	.018	.039	.463	.643	Not Sig.
LvlAdopt	<---	Usertrust	-.060	.050	-1.205	.228	Not Sig.
LvlAdopt	<---	UserAccpt	.197	.075	2.617	.009	Sig.
BankPerv	<---	LvlAdopt	.538	.054	10.021	***	Sig.

Table 6. Standardised effects for model

Factor	Determinant	Direct Effect	Indirect Effect	Total Effect
Level of Adoption ($R^2 = 0.797$)	Easeuse	**0.335**	-	**0.335**
	PerUseful	**0.386**	-	**0.386**
	TpMgSpt	**0.171**	-	**0.171**
	Training	0.020	-	0.020
	Usertrust	-0.063	-	-0.063
	UserAccpt	**0.166**	-	**0.166**
Performance ($R^2 = 0.318$)	Easeuse	-	**0.189**	**0.189**
	PerUseful	-	**0.217**	**0.217**
	TpMgSpt	-	0.096	0.096
	Training	-	0.011	0.011
	Usertrust	-	-0.035	-0.035
	UserAccpt	-	0.094	0.094
	LvlAdopt	**0.564**	-	**0.564**

Note: Effects of size greater than 0.1 in ***bold***

DISCUSSION OF THE MAIN FINDINGS

The findings of this study suggest that there is a positive relationship between top management support and EB adoption. This is consistent with previous studies (Al Shaar et al., 2015; Kurnia, Peng, & Liu, 2010; Salwani, Marthandan, Norzaidi, & Chong, 2009). When employees perceive EB, they will be motivated to engage in EB services. However, since there a possibility of management support for EB initiatives, this will effectively create more chances for EB implementation (Goi, 2005). The result of this study is incongruent with studies reporting that training plays a crucial role in employees' attitudes towards EB adoption (Maditinos et al., 2013; Zanoon & Gharaibeh, 2013). However, it is still unclear why some banks in developing countries do not pay attention to budget allocation regarding EB technical training. Consistent with previous studies (Hua, 2009; Sharma & Govindaluri, 2014), perceived usefulness is positively related to EB adoption. This is an indication that employees believe that usefulness is the subjective probability that using the technology would improve the way they could complete a given task (Jahangir & Begum, 2008). Perceived ease of use is positively related to EB adoption. This indicates that the ability to understand or apply innovation can be associated with perceived ease of using EB (Chong et al., 2010). This is reinforced by Pikkarainen et al. (2004) who found that perceived usefulness was one of the most significant factors predicting the adoption of EB. Surprisingly, trust is not significantly related to EB adoption. This result contrasts with previous studies (Abbad, 2013; Datta, 2010; Sohrabi, Yee, & Nathan, 2013). According to Alsajjan and

Dennis (2010), trust can play an important role in boosting the level of adoption of EB. One explanation for this insignificant result may be due to the lack of prior experience in online activities. Another possible reason is that users could feel that EB adoption is not as traditional banking to return their money in the case their accounts are hacked.

Consequently, improvements are required to ensure user confidence. The result of this study is congruent with studies (Oyewole, Abba, & El-Maude, 2013; Siddik et al., 2016) showing that EB has a significant impact on bank performance. This indicates that the performance of private banks is changing due to advancing EB technologies.

IMPLICATIONS OF THE STUDY

The current research adds to the existing information system literature. It enhances the understanding of EB adoption from the perspective of bank employees in a developing country context where very few e-channels are available (Ismail & Osman, 2012). This study empirically highlighted important antecedents to understand the EB adoption in Sudan. It investigated the relationship between EB adoption and bank performance. However, little work has focused on how EB adoption can influence bank performance. By doing so, empirical evidence showed that there is a significant positive relationship between EB adoption and bank performance.

The findings of the study also have useful implications for private banks involved in EB activities. The managers and practitioners need to understand the antecedents of the proposed model which were empirically tested in this research study. Understanding antecedents of EB adoption could offer a systemic approach for managers to help them set their information system plan to align with their business plans.

LIMITATIONS AND FUTURE WORK

Any research is expected to have limitations. The study was conducted in Sudan with data collected from only six private banks representing a single banking industry. It is based solely on the employees' perspective. Regarding generalisation, the findings of the research might vary if the model is validated in different industries. The data were cross-sectional. Future study may be conducted using a longitudinal design for more accurate findings at different points of time as adoption and technology could vary from one setting to another. Future research models should incorporate additional antecedents that play a significant role in EB adoption. It should consider the perception of customers from a developing country towards EB adoption.

CONCLUSION

Based on the relevant literature, this study used SEM analysis and empirically examined the antecedents of electronic banking adoption among the employees of six private banks in Sudan. It examined six antecedents influencing electronic banking adoption: top management support, training, perceived usefulness, perceived ease to use, user trust, and user technology acceptance. The study also examined the effect of electronic banking adoption on private bank performance. The results were consistent with the previous literature. Considering the antecedents, top management support, perceived usefulness, perceived ease to use, and user technology acceptance were statistically significant and had a positive influence on EB adoption, while training and user trust were not significant to the level of EB adoption. Moreover, the hypotheses associating E-banking adoption with bank performance was confirmed by the empirical analysis.

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APPENDIX

Selected Studies on E-banking Adoption in Developing Countries including Africa

Author(s) and Year	Objective(s)	Method	Findings
Aliyu, Younus and Tasmin (2012)	To investigates the factors that influence the consumer adoption of Electronic banking in Nigeria	The empirical data were collected from a questionnaire survey of 125 from Bayero University Kano (BUK), in northern Nigeria	The results show's that the relevant factors determined the adoption of Electronic banking in Nigeria include the level of its six factors, namely awareness, ease of use, security, cost, reluctance to change and accessibility
Khater, Almansour and Mahmoud (2013)	To determine the factors that influence acceptance of internet banking in Sudan	Sample of 207 bank customers, structural equation modelling was applied	The results reveal that internet connection quality has direct effect on the behavioural intention to use internet banking in Sudan
Daniel and Jonathan (2013)	To examine the factors that influence the adoption of online banking in Ghana	Data was analysed by using multiple Regression Analysis in SPSS to generate ANOVA results	The results showed that the original constructs of TAM i.e. Perceived Usefulness (PU), Perceived Ease of Use (PEOU) as well as the extensions of government support, trust and security were all significant to customers' intensions to adopt online banking
San Ong, Hong, Teh, Soh, and Tan (2014)	To identify factors that induce consumers to adopt internet banking services in Malaysia	It analyses data from 200 respondents in Malaysia	The findings show that cost saving, risk and privacy, features availability and convenience are the key factors that influence consumers' internet banking usage

Author(s) and Year	Objective(s)	Method	Findings
Gikonyo (2014)	To improve the rare empirical knowledge on the adoption of internet banking in Kenya	Content analysis and descriptive statistics was used to analyse the data	The result showed that more men have adopted banking than women; education level is not a barrier to the banking services, the middle-aged people have embraced the banking services than any other age category; awareness, website features and security all affect the adoption of IB
Sankari, Ghazzawi, Danawi, El Nemar and Arnaout (2015)	To examine the factors affecting the adoption of internet banking in Lebanon	Using several variables which are taken from three different models: TAM, TPB, and TRA	The results showed that that attitude has positive and significant impact on intention
Ramavhona and Mokwena (2016)	To investigate factors which influence the adoption and use of Internet banking in the context of South African rural areas	A quantitative research approach was used	The perceived compatibility, trialability and external variables such as awareness and security were found to have significant influence in the adoption of Internet banking in South African rural areas
Hossain (2016)	To identify customers' view regarding cost effectiveness, time savings and security of different types of e-banking products like online banking, ATM banking, internet banking, mobile banking and telephone banking in Bangladesh	Descriptive statistics and Chi-square test were used for analysing the data	Analysis indicated no relationship between online banking and different demographic variables
Moodley and Govender (2016)	To explore factors influencing the adoption of Internet banking based on the literature and the unified theory of acceptance and use of technology (UTAUT)	Data was collected from 272 academics through a survey questionnaire, and correlations and regression were used to analyse the relationships	Performance expectancy, effort expectancy and facilitating conditions had a positive association with academics' Internet banking usage and trust had a positive association with academics' behavioural intention to use Internet banking

Author(s) and Year	Objective(s)	Method	Findings
Masoud and AbuTaqa (2017)	To identify and analyse factors affecting customers' adoption of E-Banking services in Jordan	The study sample was 450 E-banking services users, who have been chosen from nine main banks selected by the researchers	There was a significant effect of E-Service Quality, E-Perceived Usefulness, E-Security, E-Reliability on the adoption of E-Banking services
Rapidah, Shafini, Suhaily, Dalila, and Mardiana (2018)	To examine the elements that effect the acceptance of online banking services among staff in a Municipal Council in Malaysia	265 staff in a Municipal Council in Malaysia were tested for responding. Pearson correlation and multiple regression technique were employed	The findings revealed that perceive ease of use, perceive usefulness and trust have substantial relationship with the intention to use internet banking

BIOGRAPHIES

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Muneer Abbad is a Lecturer of business administration with an emphasis on strategic management, leadership styles, and management information systems. Muneer Abbad received his PhD in business administration from Coventry University UK in 2009. Alongside his PhD, Muneer has an MBA from Jordan University, MSc in Finance and Banking from Yarmouk University, a BSc in Computer Engineering, BA in Business Administration, and a PGCTHE (Postgraduate Certificate of Teaching in Higher Education). His research interest includes organizational behavior and HRM. He is currently an Associate Professor at Community College of Qatar.