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Original article

Factors influencing adoption of electronic point of sales (E-POS) by shoppers in Nigeria

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Abstract

Banking services nowadays are shifted from manual to electronic, but not every country of the world has managed to transform its payment system to electronic level due to some cultural antecedents. In developing countries like Nigeria, the introduction of electronic banking has undergone some stages starting from the improvement of the method of payments and to the provision of several electronic payment platforms as alternative means for cash payments to customers. The success of these electronic payment platforms depends on the level of adoption by consumers. The growing reliance on digital financial transactions globally has left a gap in understanding adoption patterns in developing countries. This study aims to identify and analyze the factors influencing Nigerian retail shoppers' use of electronic point-of-sale (POS) systems. A structured survey was conducted among 237 respondents across six geopolitical zones in Nigeria, using SEM (Structural Equation Modelling) to test hypotheses derived from the Unified Theory of Acceptance and Use of Technology (UTAUT). The results indicate that performance expectancy, ease of use, and social influence significantly affect users' intention to adopt POS systems. This research underscores the importance of technological relevance, ease, and peer influence in enhancing adoption rates, providing actionable insights for policymakers and financial institutions in similar socioeconomic contexts.

Keywords: electronic point of sale, Nigeria, retail shoppers, performance expectancy, effort expectancy, social influence, technology adoption, POS systems, structural equation modelling, unified theory of acceptance and use of technology (UTAUT)

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Оригинальная научная статья

Факторы, влияющие на принятие покупателями Нигерии электронных точек продаж (E-POS)

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Аннотация

В настоящее время банковские услуги переходят с ручного на электронный уровень, но не все страны мира сумели перенести свою платежную систему в электронную среду из-за некоторых культурных традиций. В развивающихся странах, таких как Нигерия, внедрение электронного банкинга прошло в несколько этапов, начиная с улучшения способа оплаты и заканчивая предоставлением нескольких электронных платежных платформ клиентам в качестве альтернативы оплаты наличными.

Успех этих электронных платежных платформ зависит от уровня принятия потребителями. Растущая зависимость от цифровых финансовых транзакций во всем мире оставила пробел в понимании моделей принятия в развивающихся странах. Целью данного исследования является выявление и анализ факторов, влияющих на использование нигерийскими розничными покупателями электронных систем точек продаж (POS). Был проведен структурированный опрос среди 237 респондентов в шести геополитических зонах Нигерии с использованием SEM (моделирования структурных уравнений) для проверки гипотез, полученных из Единой теории принятия и использования технологий (UTAUT). Результаты показывают, что ожидаемая производительность, простота использования и социальное влияние существенно влияют на намерение пользователей принять POS-системы. Данное исследование подчеркивает важность технологического соответствия, простоты и мнения окружающих для повышения темпов принятия, предоставляя действенные идеи для политиков и финансовых учреждений в схожих социально-экономических контекстах.

Ключевые слова: электронная точка продажи, Нигерия, покупатели розничной торговли, ожидаемая эффективность, ожидаемые усилия, социальное влияние, внедрение технологий, POS-системы, моделирование структурными уравнениями, Единая теория принятия и использования технологий (UTAUT).

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Introduction

Banking services in developed countries of the world has transformed from manual to electronic, but this cannot be said of many developing countries due to some cultural antecedents [1]. A significant number of financial transactions processed via electronic platforms include electronic point-of-sale terminals (POS), Electronic Fund Transfers (EFT), Automated Teller Machines (ATMs), Mobile Banking, Internet Banking, and several other electronic tools [2,3]. These electronic platforms also play critical roles in the development of efficient and robust Inter-Bank Settlement systems [3,5]. For instance, the Nigerian Inter-Bank Settlement System [5], has been conducting annual research on POS adoption in the country. Researchers, policymakers, marketers, and other stakeholders have continuously shown a strong interest in the level of consumers' adoption of these electronic payment platforms, which is seen as a pointer to the level of advancement of a country's payment system [4, 3, 6, 7, 8].

The growth of e-banking in the world is driven by its merits, which include: improvement in service delivery, faster, more accurate, and cheaper funds transfer, promotion of the availability of financial services, and the capacity to process a large volume of transactions, and much more [9, 10]. Undoubtedly, electronic banking has transformed the traditional method of banking in many countries and changed the way that banks render services to customers [1, 11, 12, 13]. Indeed, it has offered many advantages to banks and customers [9,14]. Electronic banking has helped banks improve their business efficiency and, service quality and attract new customers [1]. It has also enabled banks to lower operating costs, improve customer service delivery, retain customers, reduce branch traffics, and downsize the number of branch staff [15]. In developing countries like Nigeria, electronic banking has improved the method of payments and provided several electronic payment platforms as alternative means for cash payments to customers, regardless of the product or the product attributes and, to a very large extent, the success of these electronic payment platforms depends on the level of adoption by consumers [16, 17, 18, 19, 20].

Since the introduction of the cashless policy in Nigeria, the Central Bank of Nigeria (CBN) and commercial banks in the country have been making frantic efforts to encourage the adoption and use of POS. According to a CBN report, Nigerian banks have invested over $480 million in

the acquisition of POS with 1,200,000 POS terminals deployed across the country. Despite these huge investments and the efforts of the CBN to position POS as a preferred mode of payment in Nigeria, market analysis indicates a low rate of POS adoption in the country [5,21]. Hence, the interest in evaluating factors that encourage the adoption of this new technology in the country. This will help policymakers, financial managers, and commercial organizations in making informed decisions that will promote consumers' use of e-payment options, and consequently lead to enhanced corporate performance.

Review of related literature and methodology

Over the years, various scholars have studied technology adoption processes in different countries and have developed useful theories to explain the human behavioral attributes at work in those processes and contexts [30,27, 28]. In recent times, scholars have adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh, Morris, Davis, and Davis in 2003 [49]. Hence, the UTAUT model has been adopted as the theoretical model for this research.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model was developed to address the weaknesses and limitations of previous theories and models used in the study of technology adoption by consumers when scholars like Venkatesh et al. (2003) [49] noticed that researchers were confronted with a choice among a multitude of models in the study of technology adoption [17,18]. Researchers were bound to choose constructs across models or choose favored models, thus ignoring the contribution from alternative ones. They felt the need for a unified view of users' acceptance of new technology [18]. The relationships that exist in the UTAUT are illustrated in Figure 1 with four moderators – gender, age, experience, and voluntariness.

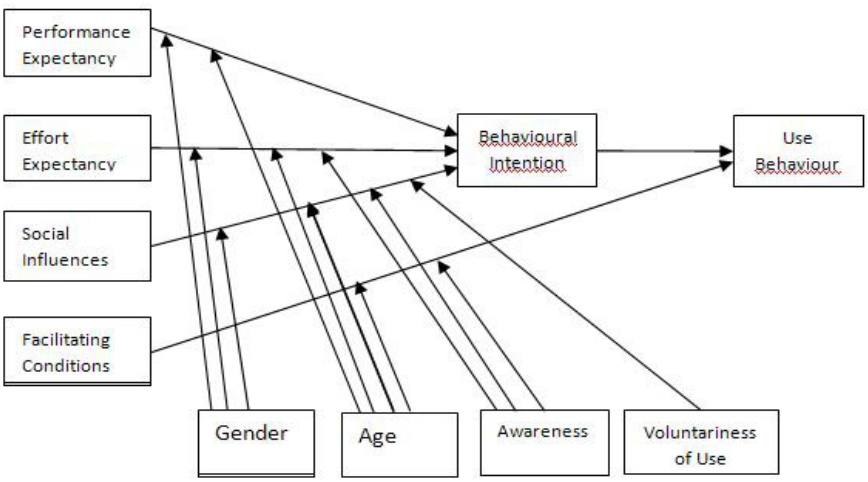

Fig. 1. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model. Source [49]: Venkatesh V., Michael G., Davis G.B., Davis F.D. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly,* 2003, 27 (3), 447.

Рис. 1. Модель унифицированной теории принятия и использования технологий (UTAUT). Источник [49]: Венкатеш В., Майкл Г., Дэвис Г.Б., Дэвис Ф.Д. Принятие информационных технологий пользователями: к унифицированному взгляду. MIS Quarterly, 2003, 27 (3), 447.

The model has four exogenous variables – performance expectancy, effort expectancy, social influences, and facilitating conditions; two endogenous variables – intention to use technology and user behavior and four moderators – gender, age, experience, and voluntariness.

Performance Expectancy (PE)

Performance Expectancy deals with the degree to which an individual believes that using the system will help him/her attain gains in job performance. It relates to how individuals believe new technology will help them perform their job better [19]. The constructs in the other models that relate to performance expectancy are perceived usefulness (Technology Acceptance Model, and combined TAM-TPB), extrinsic motivation (Motivational Model), job fit (Model of PC Utilization), relative advantage (Diffusion of Innovation), and outcome expectancy (Social Cognitive Theory). Within each of these models, performance expectancy was the strongest predictor of intention. It remained significant at all points of measurement both in voluntary and mandatory settings [20].

Several technology acceptance studies have acknowledged the strength of this factor in predicting behavioral intention. For instance, Oliveira, Faria, Thomas, and Popovic [11], validated the positive influence of performance expectancy on behavioral intention in their study of mobile banking adoption in Portugal, where performance expectancy was seen as the most important factor in the acceptance of mBanking. The influence of performance expectancy on behavioral intention is also validated by other researchers such as Escobar-Rodriguez and Carvajal-Truzillo [25], Bhatiasevi [2] and Karsen, Chandra & Juwitasary [12].

Within the context of POS adoption, performance expectancy reflects users' perception of POS on convenient payment, fast response, and the effectiveness of the service [62]. Perceived POS performance reflects how users see the POS technology as useful such that it would help them in making payments faster and more productively in a convenient manner [6]. For instance, in a study of the challenges facing Internet banking acceptance Narodna and Srbije (2021) characterized the attributes of usefulness in terms of service delivery speed, time-saving and accuracy. Considering the prevalent use of the UTAUT model in the study of adoption, there seems to have been a consensus among researchers in this area that customer perception of the utility and relevance of any technology is a major motivator for the adoption of such technology [2, 49]. Considering the foregoing, the number one research question is raised for the study:

Research Question 1. To what extent does perceived POS performance (performance expectancy) influence intention to use POS in Nigeria?

Effort Expectancy (EE)

Effort Expectancy deals with the degree of ease associated with using a system. It relates to the degree of ease or difficulty associated with the use of the system [9]. In the other models, effort expectancy relates to perceived ease of use (Technology Acceptance Model), complexity (Diffusion of Innovation and Model of PC Utilisation), and ease of use (Innovation Diffusion Theory). The construct in each of these individual models was significant in both voluntary and mandatory settings. As expected, from the literature it was significant only during the post-training measurement. Effort expectancy is believed to affect technology adoption during early stages significantly but becomes non-significant over periods of extended and sustained usage [1].

Evidence from past literature indicate that the influence of effort expectancy on behavioral intention is stronger in older workers and young women [2]. The influence of effort expectancy on behavioral intention is hypothesized to be moderated by gender, age, and experience. These effects were stronger in young women and older workers at early stages of experience. Several studies have confirmed a positive relationship between effort expectancy and behavioral intention (Bhatiasevi, 2015 [2]; Escobar-Rodriguez & Carvajal-Truzillo, 2014 [25]; Tosuntas et al, 2015 [53]; Gunawan, Sinaga & Purnomo, 2019 [26]).

In the context of POS users' adoption, it will be based on how they perceive POS as being easy or difficult to use in terms of their interaction with the machine and how they believe they can learn and become skillful at using it. It is characterized by the amount of effort an individual perceives that they will need to put forth to use the POS [54, 3]. In developing countries like Nigeria, the alternative to making a payment with POS include paying with cash, cheques, or by other forms of electronic transfers [7]. However, cash is the predominant way of making payments in Nigeria; especially retail payments [21]. This is due to the cash-and-carry nature of the Nigerian economy.

As such, the effort that people consider they would need to put forth to use POS could be an important factor in people choosing to use POS; especially where they find it handy to use cash. It is obvious from the literature that the easier the process of using technology is, the more users are likely to try it out and use it [2]. Evidence from the literature tends to ascribe an underpinning universality that performance expectancy and effort expectancy are the two main determinants of technology adoption [31,22]. The two are similar to perceived usefulness and perceived ease of use in TAM. Hence, this study assumes that they are as good a universal motivator of technology adoption and will apply to POS adoption. Considering the foregoing, the number two research question is raised for the study:

Research Question 2. To what extent does perceived POS ease of use (effort expectancy) influence intention to use POS in Nigeria?

Social Influence (SI)

Social Influence deals with the degree to which an individual perceives that important others believe he or she should use a new system, or people that influence them believe they should use the new system. It relates to how an individual is affected by his or her peers [19] . Previous studies by Thomas et al. [51] on mobile learning adoption, and Escobar-Rodriguez and Carvajal-Truzillo [25] on examining online ticket purchasing for low-cost carriers, concluded that there was a positive relationship between social influence and behavioral intention. Social factors influence is premised on people's relationship with others. It deals with how an individual is affected by other people that are important to them. People have an influence on each other which shapes their subjective norms [28, 24] . Social influence relates to how users may be influenced by others who are important to them or who they value their opinion. This will include, for example, the staff of a retail shop that handles the POS machine. A consumer may not want to use a POS if the staff of a merchant store does not display a positive attitude toward the machine. Therefore, one can assume that Social factor influence is potentially a good motivator of POS adoption in Nigeria. Considering the foregoing, the number three research question is raised for the study:

Research Question 3. To what extent do social factors (Social influence) influence the intention to use POS in Nigeria?

Research Design and Area of the Study

The descriptive research design was adopted in this study, involving the survey research method. The study was carried out in the six geopolitical zones of Nigeria. This was necessary so that a truly representative national coverage can be achieved. To access the data, the researcher followed the method adopted by previous researchers in the subject area [55]. A multi-mode survey method that combined online and offline questionnaire administration techniques was employed in the distribution of the questionnaires. This is in line with the suggestions of methodology scholars [56, 57]. The data sourcing was done over three months. At the end of the three months, a total of 237 questionnaire cpies were received and found usable for the study.

Population of the Study

The population of this study comprised users of POS in shopping malls in Nigeria. It was an infinite population. It was not necessary to survey the staff of the retail shops since their opinions

might not represent the true interpretation of their customers' perceptions of the POS services. Moreover, serviced customers are always in the best position to explain their perceptions of the services and channel quality as well as the reasons for the choices, attitudes, and intentions towards the services they receive.

Sample Size and Sampling Technique

Since the population size of POS users in Nigeria is unknown (infinite), the researchers decided to follow the Cochran's (1977: 428) sample size determination formula for an infinite population, to arrive at a representative and manageable number of samples for the survey. The computation gave a sample size of 384. This figure was distributed on an equal proportional ratio of 64 samples to each of the six selected States in the country. The purposive sampling technique was used. The respondents were judgmentally selected using the convenience-intercept sampling method (White and Nteli, 2004: 51) [58] and snowball sampling method (Klopper et al., 2006: 162) [59], which justify the use of convenience-intercept and snowball sampling in recruiting respondents in researches involving financial transactions due to the private and confidential nature of such transactions (White and Nteli, 2004: 51) [58]. Bryman (2004) [60] also indicates that snowballing is acceptable when convenience sampling is necessary (Klopper et al. (2006: 162) [59]. The advantages of using snowballing were that it also helped to widen the scope of recruitment as well as the profile of respondents [56].

The inclusion criteria were that respondents must be aged between 18 years of age, be current customers of a banking institution, and must be one who owns an ATM card. Student research assistants were used to keep some of them engaged (Odigbo, Etuk & Akpam, 2020) [61].

Research Instrument

The questionnaire was found to be the most suitable and applicable instrument for collecting relevant data for this study. According to Ghauri and Gronhaug (2005) [62], questionnaire-based surveys are among the most widely used data collection methods in business studies. Saunders et al. (2003) also note that since each respondent is required to answer the same set of questions given to others, the questionnaire is an excellent instrument for "collecting responses from a large sample for quantitative analyses." In the composition of the research questionnaire, measurement scales contained in various previously validated research instruments in the area of technology adoption, were borrowed and modified in this study as suggested by various scholars, including Suh and Han (2002: 252) [63]; Wang, Wang, Lin, and Tang, (2003: 509) [64]. Suh and Han (2002) [63] used it in their study of trust as a major factor that affects customer acceptance of Internet banking in South Korea. Oliveira et al. (2014) [51] used it in their study of mobile banking adoption in South Korea; Bhatiasevi (2015) [2] did in his study of the adoption of mobile banking in Thailand; and Wang et al. (2003) [64] in their study of factors affecting customer acceptance and usage of Internet banking in Taiwan.

Method of Data Presentation and Analysis

Likert 5-point scale was employed for data presentation, while the hypotheses were tested with Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structure (AMOS) – part of Confirmatory Factor Analysis (CFA). The Structural Equation Modelling (SEM) technique was used to test the relationship between the variables in this research. The technique is considered adequate for this type of investigation since it allows for answering questions that involve multiple regression analysis of factors among the measured dependent variable and a group of measured independent variables (Ullman 2007). Confirmatory factor analysis (CFA) which is part of the SEM was used in measurement model validation. The aim was to determine whether the measured variables accurately reflect the desired constructs or factors. The input matrix was SPSS/AMOS and the results were estimated on Chi-square goodness of fit (X2), the

Root Mean Square Error of Approximation (RMSEA), the Tucker-Lewis Index (TLI), and the comparative fit index (CFI). The RMSEA and CFI are measures of overall model fit.

Weights were assigned to the range of mean responses obtained from the survey. Very Low Extent (VLE) is represented by a mean/grand mean of 1.00 – 1.99, Low Extent (LE) is represented by a mean/grand mean of 2.00 – 2.99, Some Extend (SE) is represented by a mean/grand mean of 3.00 – 3.99, Great Extent (GE) is represented by mean/grand mean of 4.00 – 4.99 and Very Great Extent (VGE) is represented by a mean/grand mean of 5.00.

Results and discussions

Composite Sample

384 users of POS were sampled across the six geopolitical zones in Nigeria. Out of this number, 237 (61.72%) questionnaires were correctly completed and returned. These 237 questionnaire copies were found valid for the analysis. Out of the 237 respondents surveyed, 120 representing 50.6 percent are male; and 117 representing 49.4 percent are females. 204 representing 86.1 percent are aged between 18 to 25 years; 20 representing 8.4 percent are aged between 26 to 35 years; 11 representing 4.6 percent are aged between 36 to 45 years; 2 representing 0.8 percent are aged between 46 to 55 years; and none of the respondents was from 56 years. 41 respondents representing 17.3 percent are civil or public servants; 188 representing 79.3 percent are students; 2 representing 0.8 percent are into business or self-employed; and 2 representing 0.8 percent are unemployed.

145 representing 61.2 percent are WASC/GCE/SSCE/Equivalent qualification holders; 34 representing 14.3 percent are Diploma/ND/NCE qualification holders; 34 representing 14.3 percent are MBBS/BSC/BA/HND holders; and 17 representing 7.2 percent have postgraduate qualifications. All the 237 respondents surveyed representing 100 percent are aware of and users of POS.

Table 1

Mean Responses for perceived POS performance

Таблица 1

Усредненные ответы для воспринимаемой производительности POS

Sample number	Questionnaire item	VGE 5	GE 4	SE 3	LE 2	VLE 1	∑FX	$\bar{x}$	Decision
1	To what extent do you find POS useful for making payments?	129 645	86 344	10 30	9 18	0 0	1037	4.43	GE
2	To what extent does using POS enable you to make payments better?	61 305	108 432	44 132	12 24	9 9	902	3.85	SE
3	To what extent does POS enable you to make payments more quickly?	118 590	82 328	24 72	13 26	0 0	1016	4.29	GE
4	To what extent do you consider POS efficient for making payment?	58 290	108 432	42 126	20 40	3 3	891	3.86	SE
							Grand mean	4.11	GE

Table 2

Mean Responses on perceived POS ease of use (Effort Expectancy)

Таблица 2

Усредненные ответы на воспринимаемую простоту использования POS (ожидание усилий)

Sample number	Questionnaire item	VGE 5	GE 4	SE 3	LE 2	VLE 1	∑FX	$\bar{x}$	Decision
1	To what extent do you find POS easy to use?	114 570	75 300	16 48	17 34	7 7	952	4.16	GE
2	To what extent do you understand how to use POS?	60 300	98 392	37 111	37 74	2 2	879	3.76	SE
3	To what extent can you use the POS?	65 325	96 384	42 126	25 50	0 0	885	3.88	SE
4	To what extent was it easy for you to learn how to use POS?	96 480	96 384	26 78	13 26	0 0	968	4.19	GE
							Grand mean	3.99	SE

Table 3

Mean Responses on Social Factors Influence

Таблица 3

Усредненные ответы на влияние социальных факторов

Sample number	Questionnaire item	VGE 5	GE 4	SE 3	LE 2	VLE 1	∑FX	$\bar{x}$	Decision
1	To what extent do your family members encourage you to use POS?	46 230	58 232	63 189	42 84	25 25	760	3.25	SE
2	To what extent do your friends and people around you encourage you to use POS?	43 215	83 332	40 120	43 86	25 25	778	3.32	SE
3	To what extent do you get encouragement to use POS from people that you value their opinion?	48 240	74 296	51 153	48 96	13 13	798	3.41	SE
4	To what extent do the retail shop staff encourage you to use POS?	66 330	94 376	31 93	37 74	9 9	882	3.72	SE
							Grand mean	3.43	SE

Tables 1, 2 and 3 display voters' mean responses to the issue-based questions of the study. To measure the extent to which retail shoppers' intention to use POS relates to the actual usage of POS in Nigeria, respondents were asked to indicate the extent to which they always use POS. They were asked to indicate the extent that they think they will always use POS, the extent

that they have always made payment with POS successfully and the extent to which they have always been able to use POS. From the literature review, it is believed that intention leads to user behavior. Therefore, an individual that intends to use POS plans to use it. However, they may or may not follow through on the intent or plan. Retail shoppers can be said to have adopted the usage of POS when they accept the product and continue to use it in a sustained manner. Tables 1, 2 and 3 above indicate that retail shoppers' in Nigeria who use POS have adopted it to a low extent with a grand mean of 2.95. The respondents indicated that they always use POS to a very low extent with a mean of 1.97. Respondents indicated that they think they will always use POS to a low extent with a mean of 2.23. Respondents indicated that they have always made payments with POS successfully to some extent with a mean of 3.82. They also indicated that they have always been able to use POS to some extent with a mean of 3.60.

Measurement Model Assessment and Confirmatory Factor Analysis (CFA)

The SEM/CFA was done to assess data integrity and evaluate the distributional assumptions of the estimation method to be used via maximum likelihood (ML), which carries with it the assumption of multivariate normality (MVN). Missing data or factor subtraction was done through list-wise deletion on available case analysis. The input matrix was SPSS/AMOS and the results were estimated on Chi-square goodness of fit (X2), the Root Mean Square Error of Approximation (RMSEA), the Tucker-Lewis Index (TLI), and the comparative fit index (CFI). The RMSEA and CFI are measures of overall model fit. They summarize the goodness-of-fit of a complete model in a single number. The default choices were the variance–covariance matrix with ML estimation methods. The total sample size for the analysis was 237 (n = 237). Number of models tested is two.

All these were done to achieve the most reliable parameter estimates and fit indices in the study.

Model Fit Criteria

Model fit is based on the following relative fit index (RFI) criteria:

The model fits the data when the chi-square value is low. The lower the chi-square value, the lower the discrepancy between our model and the observed data.

The model is considered "Good" when the Root Mean Square Error of Approximation (RMSEA) is below 0.06.

The model is considered "Good" when the Tucker-Lewis Index (TLI) is above 0.95.

When the comparative fit index (CFI) is below 0.90 (CFI< 0.90), reject the model.

Model Modification Criteria

Model Presentation and Result Interpretation

Model 1.

SEM model 1 was tested with a total of 67 variables, where the Observed Endogenous variables were represented as follows: perceived POS performance (performance expectancy [PE]), perceived POS ease of use (effort expectancy [EE]), Social Factors influence (SI), Facilitating conditions (FC), trust in technology (TIT) and intention to use (INT). The PE, EE, and SI accounted for 4 variables each. The SI had 3 variables, while TIT and INT had 5 respectively. The total number of variables in the model is 67, with 29 observed variables and 38 unobserved variables. However, adding the error variances translated to 36 numbers of exogenous variables and 31 numbers of endogenous variables.

Parameter Summary and Assessment of Normality (Group number 1)

The Parameter measures of variances and covariance show that there wasn't a high degree of divergence between the constructs measured. The model achieved a fair distribution or normality since the differences in values between the minimum and the maximum in each of the variables

tested are below 5. The model has 464 distinct sample moments, with 107 distinct parameters to be estimated, making the degree of freedom to be 357 with a probability of 0.000.

Final Output Result Interpretation of Model 1

The results are interpreted with four (4) SEM statistical tools – the chi-square goodness of fit, baseline comparisons with Tucker–Lewis index (TLI), Comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA) as stated earlier by the researcher.

Model Fit Summary

Table 4

The Chi-Square Goodness of Fit (CMIN)

Таблица 4

Критерий согласия хи-квадрат (CMIN)

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	107	1435.357	357	.000	4.021
Saturated model	464	.000	0		
Independence model	58	3831.958	406	.000	9.438

Table 4 shows that the chi-square goodness of fit (X2) result was 1,435 at 357 degrees of freedom and p = 0.000. However, the chi-square to a degree of freedom ratio (X2/df ratio) was 4.021, showing a high degree of convergence. Meanwhile, due to the high value of the chi-square, the researcher made a resort to baseline comparisons with other statistical tools like the Tucker–Lewis index (TLI), Comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA) as stated earlier.

Table 5

The Baseline Comparisons

Таблица 5

Базовые сравнения

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.625	.574	.690	.642	.685
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

The Tucker–Lewis index (TLI)

Table 5 shows that the Tucker–Lewis index (TLI) is 0.642 < 0.95, hence, Model One is considered «Not Fit» for the Data.

Comparative Fit Index (CFI).

Table 5 also shows that the comparative fit index (CFI) is 0.685 < 0.90, hence, Model One is considered «Not Fit» for the Data.

The Root-Mean-Square Error of Approximation (RMSEA)

Table 6

The Root Mean Square Error of Approximation (RMSEA)

Таблица 6

Среднеквадратическая ошибка аппроксимации (RMSEA)

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.113	.107	.119	.000
Independence model	.189	.184	.195	.000

Table 6 shows that the Root Mean Square Error of Approximation (RMSEA) is 0.113 > 0.06, hence, Model One is considered «Not Fit» for the Data. All these results posted above, then, necessitated a modification of the model for a better fit and better result for the constructs and data.

Model 2.

The structural equation modification model 2 (appendix VI) shows that one more factor each were added to the Observed Endogenous variables of perceived POS performance (performance expectancy [PE]), perceived POS ease of use (effort expectancy [EE]), while social factors (Social influence [SI]) remained 4 factors. Facilitating conditions (FC) was also retained with 3 factors, while trust in technology (TIT) and intention to use (INT) also had their 5 initial factors retained respectively. Total number of variables in the model is 67, with 29 observed variables and 38 unobserved variables. However, adding the error variance it translated to 36 numbers of exogenous variables and 31 numbers of endogenous variables.

Parameter Summary & Assessment of normality (Group number 1)

The parameter measures of variances and covariances show there wasn't a high degree of divergence between the constructs measured. It could be seen that the models achieved a fair distribution between and amongst the variables measured.

Final Output Result Interpretation of Model 2

Again, the results will be interpreted with four (4) SEM statistical tools – the chi-square goodness of fit, and baseline comparisons of Tucker–Lewis Index (TLI), Comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA) as stated earlier.

Model Fit Summary

Table 7

The Chi-Square Goodness of Fit (CMIN)

Таблица 7

Критерий согласия хи-квадрат (CMIN)

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	78	916.755	357	.000	2.568
Saturated model	435	.000	0		
Independence model	29	1279.805	406	.000	3.152
Zero model	0	3422.000	435	.000	7.867

Table 7 shows that the chi-square goodness of fit (X2) result was 916 at 357 degree of freedom and p = 0.000. However, the chi-square to degree of freedom ratio (X2/df ratio) was 2.568, showing a high degree of convergence. Meanwhile, due to the high value of the chi-square, a resort was made to baseline comparisons with other statistical tools like the Tucker–Lewis index (TLI), Comparative fit index (CFI), and the root-mean-square error of approximation (RMSEA) as stated earlier by the researcher.

Baseline Comparisons

Table 8

Baseline Comparisons

Таблица 8

Базовые сравнения

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.284	.185	.393	.971	.91
Saturated model	1.000		1.000		1.000

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Independence model	.000	.000	.000	.000	.000

The Tucker–Lewis index (TLI)

Table 8 shows that the Tucker–Lewis index (TLI) is 0.971 > 0.95, hence Model two is considered "Fit" for the Data.

Comparative Fit Index (CFI)

Table 8 also shows that the comparative fit index (CFI) 0.91 > 0.90, hence, Model two is considered "Fit" for the Data.

Table 9

The Root-Mean-Square Error of Approximation (RMSEA)

Таблица 9

Среднеквадратическая ошибка аппроксимации (RMSEA)

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.052	.075	.088	.000
Independence model	.095	.090	.101	.000

Table 9 shows that the Root Mean Square Error of Approximation (RMSEA) is 0.052 < 0.06, hence, Model two is considered "Fit" for the Data. The baseline comparison indicated that the second model adopted is fit, we therefore proceed with the hypothesis testing.

Research Hypotheses Tested

The factor loadings (regression weights) output indicate that the hypothesized paths between the major constructs and the dependent variable are significant except path between intention and usage behaviour.

Table 10

Selected AMOS text output for the model estimates

Таблица 10

Выбранный текстовый вывод AMOS для оценок модели

			Estimate	S.E.	C.R.	P	Label
INT	<---	PE	.808	.184	4.399	***	par_20
INT	<---	EE	.545	.206	2.653	.002	par_21
INT	<---	SI	.493	.115	4.303	***	par_22

Note: *** p<.001; ** p<.01; * p<.05.

From Table 10 above, five of the research hypotheses are supported. The p. values are all less than 0.05 except for intention to use POS. This implies that:

– improved perceived POS performance (performance expectancy) had a significant positive influence on intention to use POS in Nigeria.

– improved perceived POS ease of use (effort expectancy) had a significant positive influence on intention to use POS in Nigeria.

– improved social factors influence (social influence) had significant positive influence on intention to use POS in Nigerian.

– improved facilitating conditions had a significant positive influence on usage of POS in Nigeria.

– improved trust in technology had a significant positive influence on usage of POS in Nigeria.

– the relationship between intention to use POS and POS usage behaviour was not significant

in Nigeria.

The standardized regression weights are interpreted as the correlation between the observed variable and the corresponding common factor. Five of the six observed variables indicate that the respective factor explains a respectable portion of the variance. The standardized regression weights (factor loading) are show in the table 11. below:

Table 11

Selected AMOS text output for standardized regression weights

Таблица 11

Выбранный текстовый вывод AMOS для стандартизированных весов регрессии

	Estimate
INT<---PE	.733
INT<---EE	.405
INT<---SI	.588
UB<---FC	.409
UB<---TIT	.588
UB<---INT	.072

Discussion of Findings

From Table 10, it is obvious that perceived POS performance (Performance Expectancy) explains about 73.3% of the variation in intention to use POS in Nigeria (Perceived POS Performance, $\beta = .733$, $p < .001$). This result is in line with the earlier result that perceived POS performance to a great extent influences intention to use POS in Nigeria. Perceived POS ease of use (effort expectancy) explains 40.5% of the variation in intention to use POS in Nigeria. This is in line with various findings [22,23] (Chao, 2019 [22]; Celik, 2016 [23]). It also validates the study by Oliveria et al. (2014: 697) [11] which found a positive influence of performance expectancy on the behavioral intention of mobile banking customers in Portugal.

The findings are also consistent with that of Bhatiasevi (2015) [2], Escobar-Rodriguez and Carvajal-Truzillo, (2014) [25], Oliveria et al. (2014) [11], Gunawan, Sinaga & Purnomo (2019) [26]; Tahrini, El-Masri, Ali & Serrano (2016) [27]; and Tusyanah, Wahyudin & Khafid (2021) [28]. The finding is however contradicted by Omotayo and Dahunsi (2015) [29] which found that there is no significant relationship between perceived usefulness which is similar to perceived POS performance or performance expectancy and the adoption of POS by business organizations in Nigeria. The findings also disagree with NIBSS (2015) [5] which indicated that businesses in Nigeria had 93.6% preference for the use of POS against the use of cash. The finding is also supported by various studies which identified that perceived usefulness which is similar to performance expectancy is an important antecedent to individuals' adoption of online teaching (Alqahtani, Kavakli & Sheikh, 2018 [30]; Audet, 2021 [31]; Gonzales & Gonzales, 2021 [32]; Halili & Sulaiman, 2018 [33]; Kalavani, Kazerani & Shekofteh, 2018 [34]; Szopiński & Bachnik, 2022 [35]; Šumak & Šorgo, 2016 [36]; Suki & Suki, 2017 [37]).

Perceived POS Ease of Use was also found to have a positive relationship with behavioral intention to use POS in Nigeria (Perceived POS Ease of Use: $\beta = .405$, $p = .002$). The result indicated that Perceived POS Ease of Use explained 40.5 percent of the variation in intention to use POS in Nigeria. This indicates that when consumers perceive that they do not have to put forth too much effort to use any technology, like online learning resouces, they are more likely to use it, and improved effort expectancy will lead to its improvement adoption (Kim, Kim & Han, 2021 [38]; Li & Lalani, 2020 [39]; Pham & Dau, 2022) [40]. Similar findings on new technology usage intentions were also documented (Sangeeta & Tandon, 2021 [41]; Qiao, Zhu, Guo, Sun &

Qin, 2021 [42]; Raza, Qazi, Khan & Salam, 2021 [43]; Sudono, Adiwijaya & Siagian, 2020 [44]).

The findings from this research also show that social factors influence has a positive relationship with consumers' intention to adopt and use POS in Nigeria (Social Factors Influence: $\beta = .558$, $p < .001$). Social Factor Influence explained about 58.8 percent of the variation in intention to use POS in Nigeria. This shows that the people were influenced by peers. Hence, improvement in social factors like family members, friends, and people around an individual encouraged people's intentions to use POS in the country. This result is not surprising given the cultural affinities of the people. In the context of this study, people that are close to the users of POS were found to have some influence on the users' intention to use POS. They chose to use POS when they are encouraged to use it by people they interact with. This finding is collaborated by various studies (Vlachopoulos, 2020 [45]; Septiani, Handayani & Azzahro, 2017 [46]; Yates, Starkey, Egerton & Flueggen, 2021 [47]; Lazarevic & Vasić, 2019; Marikyan & Papagiannidis, 2023 [48]).

Conclusion

Based on the outcome of this study, the following recommendations are made to improve the adoption of POS:

There is a need for increased awareness about the benefits of using POS. Such awareness should focus on addressing the various factors that affect the adoption of POS as revealed in the study.

POS adoption will improve when merchants advertise the availability of POS in their shops in a persuasive manner. This will help build confidence.

Given the positive relationship discovered between Social Factor Influence and intention to use POS and Nigeria being a collectivist nation, POS adoption can be improved through awareness and marketing campaigns that will target consumers through their social circles – family, friends, relatives, and shop attendants.

Stakeholders should present a common front in the provision of a call to action for POS payments by making POS payments more intuitive and exciting through loyalty programs. Rewarding shoppers for making payments with Cards will serve to increase adoption of POS; especially when it is tied with promotional campaigns that make effective use of the positive relationship observed between social influence and adoption as revealed in this study.

Regulatory bodies need to improve on risk management guidelines and communicate these to all stakeholders to improve security, build stakeholder confidence and encourage further adoption and use of POS.

POS should be provided with help menus that will enable easy fixing of common errors that occur in the process of payments.

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Authors' contribution

Okoli Maurice – conceptualization supervision writing – review & editing: ideas; formulation or evolution of overarching research goals and aims; management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse; preparation, creation and/or presentation of the published work – including pre-or postpublication stages; oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.

Odigbo Benedict – methodology formal analysis data curation writing – original draft visualization: development or design of methodology; creation of models; application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data; preparation, creation and/or presentation of the published work, specifically writing the initial draft preparation, creation and/or

presentation of the data presentation.

Nzekwu David – validation investigation resources project administration: verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs conducting a research and investigation process, specifically performing the experiments, or data/evidence collection; provision of study materials, computing resources, or other analysis tools; management and coordination responsibility for the research activity planning and execution.

Конфликт интересов

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