



# Tvet-Based E-Payment Technology Education and Financial Inclusion Among Nigerian Microenterprises

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**Abstract:** *This study utilizes Structural Equation Modelling technique to examine likely effects of TVET-based e-payment education on financial inclusion frontier among microenterprises in Abeokuta metropolis, Nigeria. The study employs quantitative survey research design to obtain cross-sectional data among randomly sampled 384 micro-entrepreneurs and managers in the study area using structured questionnaire. The selected respondents operate in 8 business districts in both Abeokuta South Local Government and Abeokuta North Local Government. From financial access model estimation results, an increase in the level of TVET-based education on internet banking, mobile payment and ATM will significantly increase microenterprises financial access in Nigeria by 10.1%; 12.3%; and 10.1% respectively. Specifically, the results reveal that education on internet banking and mobile payment will produce positive and significant effect on potential usage of formal financial products and services by microenterprises in the study area. The study, therefore, affirms that the adoption and implementation of e-payment technologies education within TVET have potential and significant positive implications for increased financial inclusion in Nigeria particularly among the microenterprises in Abeokuta metropolis. The study recommends that policymakers in Nigeria education sector and governments should facilitate the teaching and learning of e-payment technologies in all TVET centres across the country.*

**Keywords:** TVET, Education, Microenterprise, Financial Access, Financial Usage, E-Payment

## Introduction

The introduction of Technical and Vocational Education Training (TVET) is hinged on its potentiality to promote a culture of sustainable economic development particularly for the benefits of developing countries. Specifically, TVET is expected to play two key roles in a country where the initiative is launched and implemented. First, TVET is hoped to provide training opportunities and career development for the benefits of large number of school leavers and second to aid provision of required skilled manpower in all areas of the economy and enhance industrialisation process (Wahba, 2011). The role of TVET in providing skilled manpower through practical skills and knowledge acquisition for enhancement of industrialization process is often linked to inclusive growth. This is premised on the fact that when skilled labour who cannot secure active paid or salaried jobs from formal sector decide to engage in informal sector the industrialization process in the economy is positively affected. It can be argued further that the participation of TVET trained graduates in the informal sector could have multiplier effects on the informal system where there is presence of large number of uneducated business owners. However, the most important function of TVET in enhancing the informal sector through provision of technical and vocational

training has not been keenly appreciated in most of the developing countries including Nigeria (Wahba, 2011).

Meanwhile, the informal sector accounts for the largest parts of the total employment in these countries particularly Nigeria where 80% of her employment comes from informal sector (Adewumi, 2022). Thus, given the fact that microenterprises are dominant in informal setting of the developing economies positioning e-payment education within TVET could contribute immensely to increased financial inclusion of this category of business and drive inclusive growth (Bansal, 2014). In developing countries with Nigeria inclusive, a large number of studies have been conducted on relationship between technology adoption and financial inclusion with specific focus on e-payment technologies. Some of these studies found positive relationship (Alabi & Olaoye, 2022; Asia, 2020; Kelikume, 2020; Omar & Inaba, 2020; Ene *et al*, 2019; Sindani *et al*, 2019; Abor *et al*, 2018; Evans, 2018; Lenka & Barik, 2018; Nwafor, 2018; Okoroafor *et al*, 2018; Murendo *et al*, 2017; Soumare *et al*, 2016) while few obtained negative correlation (Raza *et al*, 2019; Senou *et al*, 2019; Williams *et al*, 2017). Relatively, evidence from extant literature suggests that only Saka and Oyelekan (2022) empirically



analyzed e-payment technologies education within TVET framework in Nigeria.

The earlier study by Saka and Oyelekan (2022) focused on possible implications of TVET-based e-payment technology education for financial inclusion of business firms in the country informal sector with specific coverage of microenterprises. However, Saka and Oyelekan (2022) failed to provide empirical evidence of how such TVET education could affect access and usage of formal financial products and services by the informal sector in the study area. This current study, therefore, aims to fill the identified gap in literature while relying on methodological frameworks developed in Saka and Oyelekan (2022). Nigeria, where adult formal financial exclusion rate still at 33% (Enhancing Financial Innovation & Access [EFInA], 2020) could benefit hugely from education on e-payment technologies through TVET programmes in schools, technical vocational institutes, and entrepreneurship development centres. This could also be a facilitating factor for an accelerated financial inclusion in Nigeria as Central Bank of Nigeria hope to achieve 95% adult financial inclusion target rate by 2024 (Emefiele, 2019). This study is organised as follows. The first section discusses the introduction to the study followed by review of relevant literature on the areas of interest. The third section contains methodology adopted in the study. This is followed by section four that contains presentation of result, interpretation and discussion of results. The paper ends in section five with conclusion reached and recommendations of the study.

## Literature Review

TVET simply refers to as practical training offered through non-academic technical education which develops the skills and knowledge of trainees or apprentices assumed to be available for working in different sectors of the economy. These trainees or apprentices are potential learners of trades or crafts trained as students in different technical vocational institutes, centres and schools. According to Wahba (2011), TVET is generally viewed as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of knowledge, practical skills, and attitudes relating to occupations in various sectors of economic and social life. Within the context of this study, TVET education is considered theoretically as a veritable means through which financial inclusion can be improved for inclusive economic growth in Nigeria. The concept of financial inclusion refers to the process of enlisting previously neglected segment of population into financial system.

This study argues that the issue of financial inclusion is more important to micro and small enterprises and

entrepreneurship than large firms. The reason is culminated in the fact that vast majority of poor people or less privileged adult often engage in these kinds of businesses. Thus, improved access to array of savings and risk mitigation products can help these theoretically financially excluded segments to be more active economically and contribute significantly to economic growth of a country (Triki & Faye, 2013). The electronic payment (e-payment) channels through which improved financial inclusion can be achieved include mobile payment, Automated Teller Machine (ATM), web or internet payment and Point of Sales (PoS) machines and terminals. These mechanisms provide greater contribution to financial inclusion by exposing businesses of previously excluded people from formal financial system to lower costs and accelerated improvement in obtaining required investment funds.

Meanwhile, the surge in the population of mobile phone (popularly known as handset) has motivated the interest of financial service providers to leverage on the opportunities offered by the technology. Mobile phone serves as one of the reliable instruments to provide digital financial services to users. In recent years, the rise in population of phone users has enhanced mobile money penetration in many countries particularly developing nations and promotes more financial inclusion in these economies (Allen *et al*, 2014; Beck & Cull, 2013).

Therefore, developing countries can leverage on the opportunity of TVET to improve education on financial inclusion via e-payment mechanisms. Theoretically, this current study is underpinned by diffusion of innovation theory. The diffusion of innovation theory was developed by Rodgers in 1962 (Lockett, 2018). The theory explains how an innovator or a technology developer could communicate his new innovation or technology through certain channels to social system members over time. In particular, the theory provides explanation on how information about a new innovation or technology could be diffused through specific channels for members of a social system to embrace it. Rogers (2003) identified four components of diffusion process which are innovation or new technology, social system, communication channels and time. Relatively, in this study, the new innovation is deemed as financial inclusion frontier in Nigeria. The social system is considered to be microenterprises, that is, owners / operators of microenterprises in Nigeria particularly those in the metropolitan city of Abeokuta. E-payment mechanisms such as mobile payments, ATM, PoS, web or internet payment and others are classified as communication channels while the period between introduction of TVET learners to e-payment education and adoption is viewed as time in diffusion of financial inclusion process. Thus, increased financial inclusion as new innovation among owners and operators of microenterprises is the result of diffusion process in this study. Some of the importance of diffusion of innovation theory to explain digitization-based financial inclusion by



small business owners includes ability to operate at lower costs, improvement in operational efficiencies and labour productivity (World Bank, 2016).

Empirically, a thorough review of prior available internet-based studies indicates that relatively little experiment has been conducted on potential financial inclusion benefits of e-payment technology education that can be offered via TVET programmes. A noticeable work in this aspect is SEM-based survey experiment carried out by Saka and Oyelekan (2022) among microenterprises in Abeokuta metropolitan city. The findings from these co-authors work show that an increase in the level of TVET-based e-payment technologies education has significant potential impact to increase financial inclusion among educated microenterprises owners or operators in Nigeria. Thus, potential TVET-based e-payment technologies education has significant positive implication for enhanced financial inclusion in Nigeria. The experimental outcome in Saka and Oyelekan (2022) correlates with large number of prior empirical studies on relationship between e-payment technology and financial inclusion (see, Soumare *et al*, 2016; Murendo *et al*, 2017; Abor *et al*, 2018; Evans, 2018; Lenka & Barik, 2018; Nwafor, 2018; Okoroafor *et al*, 2018; Ene *et al*, 2019; Sindani *et al*, 2019; Kelikume, 2020; Omar & Inaba, 2020; Alabi & Olaoye, 2022). These authors had found positive relationship between adoption of technology and advancement of financial inclusion across countries and different geographical locations. In retrospect, this current study expands the scope of financial inclusion in Saka and Oyelekan (2022) in order to provide specific empirical evidence of how TVET education could affect access and usage of formal financial products and services by the informal sector in Nigeria particularly Abeokuta metropolis. In Saka and Oyelekan (2022), there was no specific econometric analysis of access to financial products and usage of such products and services by microenterprises. Meanwhile, such lack of specificity may not appropriately guide government and policymakers on financial inclusion on the specific segment of financial inclusion that needs more policy actions and improvements in Nigeria.

## Methodology

This study utilizes quantitative survey research design with questionnaire as instrument to obtain the required data for an informed inferential analysis. Survey design allows a researcher to test a research question or a hypothesis about a relationship between two or more variables (Creswell, 2012; Saka & Adeyanju, 2022).

Thus, the study employs cross-sectional survey design to test the extent to which potential e-payment technology education in TVET can improve financial inclusion among microenterprises in the study area relying on

diffusion of innovation theory. As stated in the introductory section, this study follows methodological postulations developed by Saka and Oyelekan (2022). In that paper, the population of the study which is also adopted in the current study comprises of microenterprises that currently operate in Abeokuta metropolitan city. According to Saka and Adeyanju (2022), these businesses are many and indeterminable in figure coupled with the fact that there is lack of information on total number of this category of business at both local and national level in Nigeria. In other words, this study follows the same approach in Saka and Adeyanju (2022) by focusing on microenterprises owners with at least completed secondary school education in the study area. The implicit assumption is that educated microenterprises owners are more likely to use these e-payment technologies in their operations than uneducated microenterprises owners. Hence, educated microenterprises owners form the target population in this study. Again, this study follows sampling determination procedural steps in Saka and Adeyanju (2022) which had earlier used Krejcie and Morgan (1970) sample size determination formula for unknown population. The formula is provided as thus:

$$S = \frac{\left(\frac{\text{Range}}{2}\right)^2}{\left(\frac{\text{AccuracyLevel}}{\text{ConfidenceLevel}}\right)^2} \dots (\text{Equation 1})$$

Where;

S = Sample size;

Range = Range of micro firms owners with secondary education (assumed to be between 10,000 firms and 100,000 firms) = 100,000 – 10,000 = 90,000 firms

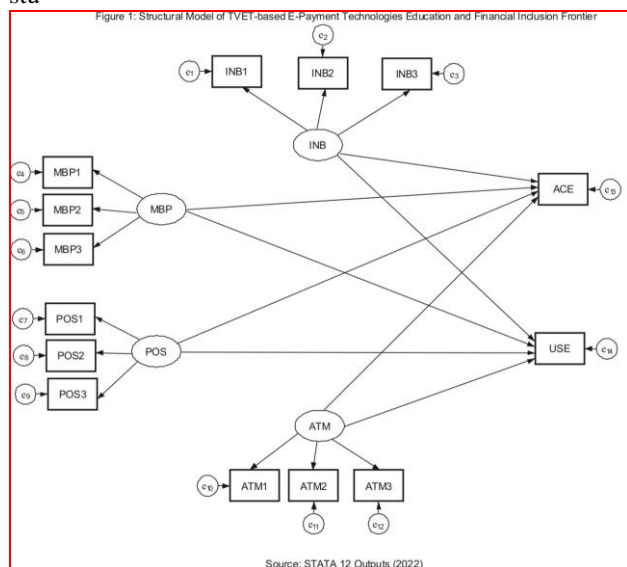
Confidence level = 1.96 (2-tailed) at 5% level of significance

Accuracy level = range score × desired level of accuracy (expressed as proportion, 0.05) (Krejcie & Morgan, 1970). The result yields a sample size of 384 educated microenterprises owners.

The study area, Abeokuta, is the capital of Ogun State and the largest metropolitan city in the State. The city has two Local Government Areas (LGAs) - Abeokuta South Local Government and Abeokuta North Local Government. In these two LGAs, many business districts (BDs) abound (Saka & Adeyanju, 2022; Saka & Oyelekan, 2022). However, for an effective coverage, this study randomly sampled four business districts from each of the LGAs thereby resulting to 8 BDs selected. This practice is similar to approach in Saka and Adeyanju (2022). From Abeokuta South LGA, the four (4) sampled BDs are Adatan-Asero Business Unit, Oke Ilewo-Ibara Business Unit, Ijaye-Sapon Business Unit and Amolasho-Kuto Business Unit (see Saka and Adeyanju, 2022). In Abeokuta North LGA, the other 4 sampled BDs are Saje-Elega Business Unit, Lafenwa-Sabo Business Unit, Olomore-Ita Oshin Business Unit and Ibrekodo-Bode Business Unit. Further, the obtained 384 sample size

earlier determined was divided by 8 BDs to arrive at 48 respondents (educated ME owners or operators) per business district which are systematically selected for questionnaire administration between January 15 and May 19, 2023. The use of systematic sampling technique is based on a designed sampling frame. The framework was designed based on information obtained from pre-survey study and these include names and specific address of each of the microenterprises in each of the sampled business districts.

Further, the study adopts Structural Equation Model (SEM) developed in Saka and Oyelekan (2022). The authors developed the model to explain relationship between potential effect of positioning e-payment technology education within TVET and financial inclusion frontier among Nigerian microenterprises. According to Saka and Oyelekan (2022), SEM model was required due to large number of multiple variables involving latent and observed variables used to seek information on prospective e-payment technologies education (like internet banking, mobile payment, PoS, ATM, web payment), accessibility and usage of formal financial products and services. The stu



dy SEM model is diagrammatically presented as thus:

From Figure 1, the following structural equations are formulated:

$$ACE_i = \alpha + INB_i + MBP_i + POS_i + ATM_i + \varepsilon_{13} \dots (1) \text{ (Structural Model 1)}$$

$$USE_i = \alpha + INB_i + MBP_i + POS_i + ATM_i + \varepsilon_{14} \dots (2) \text{ (Structural Model 2)}$$

Where:

Accessibility of formal financial products and services (measured by potential owning a bank account)

Usage of formal financial product and service (measured by potential use of bank loan or credit) and both *ACE* and *USE* are proxies for financial inclusion.

Internet Banking; Mobile Phone Payments; Point of Sales; Automated Teller Machine

*INB; MBP; POS and ATM* are measures of e-payment technologies.

= model constants; = random error in equation 1;

= random error in equation 2; *i* = individual sampled microenterprise with educated owner / operator.

Specifically, the two structural models were analyzed through the use of maximum likelihood method as determined by the outcome of multivariate normality and informed by Mardia's multivariate Kurtosis (normal distribution) with all analyses performed at 5% level of significance.

## Presentation and Discussion of Results

### Presentation of Results

The estimated results are presented in this sub-section.

**Table 1: Financial Inclusion Impact of TVET-based E-Payment Technologies Education Structural Estimation Results**

**Source: STATA 12 Outputs (2023)**





## Discussion of Results

Descriptively, Table 1 shows that data analyzed represent responses to 351 questionnaires out of total 384 administered. Some 14 questionnaires were unreturned while other 19 contain missing data on key variables of interest or poorly filled. The figure revealed in Table 1 indicates that the study analyzed approximately 91% of the total information required. According to Schreiber *et al* (2006) and other scholars in *SEM* analysis, the conduct of *SEM* analysis is very sensitive to sample size adequacy. So the authors take this into consideration.

estimated. In *SEM* analysis, a standard case of 10 observations per 1 parameter has been recommended (Schreiber *et al.*, 2006). Thus, the total number of 351 observations as analyzed responses indicates that the study sample size is adequate. Similarly, the missing responses pose no problem to the study *SEM* analysis because it proved to be missing response at random. The *SEM* analysis conducted in this study was performed with *STATA 12* using maximum likelihood estimation method at 5% significance level and Mardia's multivariate Kurtosis analysis indicates multivariate normality.

From the specified *SEM* diagram in Figure 1, 20 regressions and 14 variances are specified totaling 34 parameters to be estimated. But the obtained 351 sample

Structural equation model		Number of obs.	=	351
Estimation method		= ml		
Log likelihood		= -913.10038		
-----				
		OIM		
	Coef.	Std. Err.	z	P> z  [95% Conf. Interval]
-----				
Structural				
ACE <-				
INB	.1014963	.045408	2.24	0.025 .0124984 .1904943
MBP	.1235883	.0652011	2.90	0.005 .0042034 .25138
POS	.0650138	.087238	-0.75	0.456 -.235997 .1059695
ATM	.1014198	.039803	2.55	0.011 .0234073 .1794323
_cons	1.862319	.0208203	89.45	0.000 1.821512 1.903126
-----				
USE <-				
INB	.146128	.0989162	-3.48	0.040 .3400003 .0477443
MBP	.2265927	.1420333	2.60	0.011 .0517875 .5049729
POS	.0839185	.1900383	-0.44	0.659 -.4563867 .2885497
ATM	.0095223	.0867065	-0.11	0.913 -.179464 .1604194
_cons	2.112319	.0453547	46.57	0.000 2.023425 2.201212
-----				
Variance				
e.ACE	.1196417	.0101846		.1012566 .1413649
e.USE	.5677455	.0483297		.4805013 .6708304
-----				
LR test of model vs. saturated: chi2(1)		=	0.31,	Prob > chi2 = 0.5760
Fit Indices				
-----				
Fit statistic		Value	Description	
-----				
Likelihood ratio				
chi2_ms(1)		0.313	model vs. saturated	
p > chi2		0.576		
chi2_bs(9)		19.465	baseline vs. saturated	
p > chi2		0.022		
RMSEA		0.000		
CFI		1.000	Comparative fit index	
TLI		1.591	Tucker-Lewis index	

responses as shown in Table 1 indicate that there is an acceptable level of 10.3 participants per 1 parameter

The results in Table 1 consist of estimation results of structural model 1 and model 2 equations. From Table 1, the results on coefficients of the predictors indicate that potential education on e-payment technologies via TVET



has potential positive impact of increasing financial inclusion in Nigeria. In the main, the first model result illustrates analysis outcomes of equation 1 in the methodology section. It is indicated in the first model result that potential education on e-payment technologies like internet banking, mobile payment services and *ATM* will produce significant positive impact on owning of bank account among microenterprises in Nigeria. From the model 1 result, an increase in the level of TVET-based education on internet banking, mobile payment and *ATM* will significantly increase microenterprises financial access in Nigeria by 10.1%; 12.3%; and 10.1% respectively.

However, the coefficient of *POS* in model 1 result indicates that potential TVET-based education on *POS* (coefficient: .065; p-value: 0.456) will produce non-significant positive effect on possibility of owning bank accounts by microenterprises in Nigeria. From model 2 results in Table 1, the coefficients of all the study predictors still produce positive effects on financial inclusion in Nigeria. Meanwhile, from model 2, financial inclusion is measured by potential usage of formal financial products and services. In Table 1, an increase in the level of TVET-based technology education on internet banking, mobile payment, *POS* and *ATM* will increase the likelihood of usage of formal financial products and services among microenterprises in Nigeria approximately by 15%; 23%; 8% and 10% respectively. However, only education on two of the technologies (*INB* with p-value of .040 and *MBP* with p-value of .011) will produce positive and significant effect on potential usage of formal financial products and services by microenterprises in Nigeria.

Furthermore, the vast majority of good-of-fit indexes of the analyzed *SEM* estimations such as Chi-square for model versus saturated ( $p > .05$ : 0.576); *RMSEA* (0.000); *CFI* (1.000) and *TLI* (1.591) as displayed in Table 1 indicate that the study model fit the observed data. This is quite impressive and satisfactory; thus, provides easy possibility to make an informed inferential assertion. In addition, the model standardized residual as captured by Standard Root Mean Square Residual (*SRMR*) with value of 0.006 indicate that the study model is well specified. Interestingly, the empirical evidence obtained from this study is consistent with findings by Saka and Oyelekan (2022) that offering e-payment technology education through TVET programmes has potential positive implications to increase financial inclusion in Nigeria. Also, the evidence of positive relationship between e-payment technologies and financial inclusion in this study is in agreement with previous results from extant literatures such as Saka and Oyelekan (2022); Alabi and Olaoye (2022); Kelikume (2020); Omar and Inaba (2020); Ene *et al* (2019); Sindani *et al* (2019); Abor *et al* (2018); Evans (2018); Lenka and Barik (2018); Nwafor (2018); Okoroafor *et al* (2018); Murendo *et al* (2017); and Soumare *et al* (2016).

## Conclusion and Recommendations

This paper utilizes *SEM* technique to examine likely effects of TVET-based e-payment education on financial inclusion frontier in Nigeria within the context of microenterprises in Abeokuta metropolis. The estimation outcomes of cross-sectional microenterprise survey data reveals that high probability of improved financial access among Nigerian microenterprises can be associated with learning on e-payment technologies such as internet banking, mobile payment and *ATM* via TVET. But with TVET-centred education on internet banking and mobile payment there is likelihood of higher level of financial products and services usage among Nigerian microenterprises. Therefore, the study affirms that the adoption and implementation of e-payment technologies education within TVET have potential and significant positive implications for increased financial inclusion in Nigeria particularly among the microenterprises in Abeokuta metropolis. Consequent upon this affirmation, the study recommends that policymakers in Nigeria education sector and governments should facilitate the teaching and learning of e-payment technologies in all TVET centres across the country. While delivering such education more emphasis should be devoted to internet banking, mobile payment and *ATM* technologies.

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