



Customer Insight to Digitalisation and Open-Banking in Nigeria

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ABSTRACT

The business world is experiencing rapid technological integrations. Several innovations have contributed to the success of businesses as the customer continues to play a strategic role in innovation's acceptance or rejection. Open banking is a disruptive innovation that represents a departure from the traditions in emerging markets where financial inclusion has been focused on the consumer. It is rapidly being adopted in developed economies with developing economies such as Nigeria and India making incursions in adopting the innovation. Its ability to impact the business environment and improve access to financial services depends on customers' consented data thereby making customers significant to its success. The challenge is on rising data privacy violation and data leakage. The purpose of the study is to examine the determinants of the success of open banking in Nigeria from customers' perspective. The study is a novel study in Nigeria following the focus of extant studies on application and challenges of the innovation. Cross-sectional survey, case study analysis and close-ended questionnaire were adopted in the study while structural equation modeling was employed in



analysing the data. The findings revealed that customers consent to open banking is positively influenced by the direct effects of compatibility and customers' perception of security and trust. Also, the success of the innovation is impacted by the negative link between perceived access, perceived risk and customers consent to open banking. The significant result of the indirect relationships also justifies the importance of these variables in ensuring the success of open banking in Nigeria. With this, emphasis is on strategic management and policy drives that ensure effectiveness and protection of customers.

Keywords: *Bank Customers, Digitalization, Finance, Online Banking, Open Banking*

1. INTRODUCTION

The banking sector in Nigeria has been undergoing transformations in recent years. The era of traditional methods in customer offerings have been overtaken by technological facilities leading to better operations, improved service delivery and customer relationship. With the advancements in technology, it heralded the digitalisation process in the banking industry that impacted service delivery to customers. According to Goga (2020), the digitalisation process has facilitated improvements in communication with customers, enhanced banks' innovativeness and increased the options for e-payment channels. One of the major transformations in Nigeria is the implementation of automated teller machines (ATM) which became massively adopted in Nigeria. Other ones such as point of sale terminal is becoming a common use by individuals, particularly in withdrawals and deposits though it has taken time to diffuse. With the competitive nature of the industry, the impact of digitalisation of the banking industry is still emerging given the impact of advancements in technology.

Recently, open banking is being integrated in developed nations such as the United Kingdom. It is gradually becoming a feature of the financial ecosystem in the developing countries like Nigeria. For instance, developing economies such as India, Singapore and Malaysia have made good progress towards open banking while there are evidences of about 87% countries adopting open banking in one form or the other



(Laplante & Kshetri, 2021). The attraction is because of its perceived benefits and deeper implications that border on customer privacy and consent for its success.

The concept of open banking deals with sharing of customer data. In the past, this was done internally in the banks using the Application programming interface (Open Banking, 2020). With this process it is a closed system because the customer data is solely under the custody of banks. The sharing of data implies that customer data is not solely in custody of the banks rather the customers now possess control on data sharing while third parties also have access to it depending on customers' consent. Thus, it is best described as an open system. Thus, the concept of open banking is described as a financial ecosystem that grants consumers more access to information and choices as well as promoting movement of money in the financial ecosystem between financial institutions (Laplante & Kshetri, 2021). It is the process of sharing bank customers' information to a third party following the consent of the bank customer such that the information enables the designing of tailor-made customer financial products (Plaitakis & Staschen, 2020). The implication is that prior to the emergence of open banking, the information about bank customers are not accessible to outside banks. Thus, the emergence of open banking facilitated data sharing for vital purposes such as the creation of innovative financial products and management of personal finance. According to Laplante and Kshetri (2021) its governance involves a combination of application interface, operational guidelines for improving customer experiences, and security structure. Generally, its operation calls for critical involvement of four major parties. This includes the apex bank; the application programming interface providers such as the commercial banks, telecommunication firms, and insurance companies that have the data of customers; the application programming interface customers such as the fintechs and other third parties that requires and uses the customer information for tailor-made financial products; and the individual bank customer whose consent is needed in the process.

Open banking is projected to provide several benefits such as facilitating the development of innovative products (Hoganlovells, 2018), improving accessibility to financial products, ensuring competitiveness in the banking industry (Onyango,



2023), and positively impacting financial inclusion (Giya, Kagee & Thibane, 2021; Plaitakis & Staschen, 2020). These benefits imply that bank customers and third parties like fintech have important roles in the process. The fintechs are one of the major beneficiaries of the open banking. Their role is underscored from their ability to leverage the advantages of technologies to provide efficient financial products to customers in ways that will positively impact competitiveness of the financial industry (Navaretti, Calzolari & Pozollo, 2018). However, from the customers' dimension, it is argued that bank customers might be disadvantaged because of the reduced security, loss of control over personal data and money, negative impact on financial inclusion, and concern on the increasing impact of digitalisation on family life (Reynolds, 2017). Its progression on implementation in the future could be exacerbated by data breaches (Jaiyeola, 2023; Akintaro, 2023), banks and fintechs violation and abuse of bank customers' data privacy (Tunji, 2023; Ubah, 2021), and failure to comply with stipulated guidelines and regulations (Tosin & Ayodele, 2023). In this regard, open banking is argued to be a mere catchphrase that raves for a temporary moment before fizzling out while in other cases it is projected to have huge potential (Open Banking, 2020).

In Nigeria, the operational guidelines and regulations to open banking were published in 2023 by the central bank of Nigeria (Aletor 2023). This made the country to be the first African country to launch the innovation (Onyango 2023). It is a massive adjustment for the Nigerian customers, regulators, financial and non-financial businesses, and the entire financial ecosystem following the sharing of customer data between involved groups. The context of data breaches is huge concern in Nigeria. It can affect the adoption and diffusion of open banking in the country. Recently, despite the guidelines on strict compliance with open banking and the customer 'permissioned' data in Nigeria, data breaches have risen astronomically by 64% thereby ranking the country 32nd globally on data breaches (Obarayese, 2023). Thus, they have suddenly become topical discourse in open banking in Nigeria. This is because of the previous experiences of bank customers on fraudulent activities on their bank accounts with ATM, and the emergence of data breaches within few



months of implementation. One of the problems the study seeks to address is to identify the determinants of open banking given that the focus of extant studies is majorly on operational guidelines, policy drive, and challenges of open banking. This direction of the research is aligned more to customer satisfaction, value creation, adoption, and end customers' perspective. Remarkably, the dearth of literature in this aspect is not only peculiar to Nigeria but also other nations because of its novelty. For instance, Briones de Araluze (2022) argued that the direction of research towards consumer perspective is necessary to provide comprehensive view of open banking from customers' dimension given that open banking is an emerging phenomenon. In this guise, the study seeks to fill the gap by examining the direct and indirect influences that facilitates the success of open banking. Thus, the main objective of the study is to examine the customer insights to digitalisation and open banking in Nigeria. This involves considering the factors that impact the consent of customers in open banking in Nigeria.

2. LITERATURE REVIEW

In literature, open banking is approached from a market-driven dimension such as the contexts in Nigeria, and a regulatory dimension such as the approach in United Kingdom. Its emergence is a combination of several factors that encompass consumer behaviour. According to Chan et al. (2022) open banking has a high chance of positively impacting present banking practices. The innovation is expected follow the adoption and diffusion processes of novel financial technologies (Dynes, 2018). A significant aspect of open banking for the consumers is that aspect of consent given the technological and practical course of open banking (Chan et al., 2022). Although, consent is expected not to be coerced, Borgogno and Colangelo (2020) argued that UK consumers are confident with data sharing to banks but reluctant to do so with providers. Ultimately, what determines the rate of acceptance and adoption is diffusion and not the innovation (Dearing & Cox, 2018). The implication is that significant numbers of users are required to adopt innovation for it to have meaningful contribution to the society (Rutto, 2022). According to Chan et al. (2022) the method



adopted in presenting open banking to consumers is essential because it is deemed to impact value perception, trial and adoption. This is considered to have significant effect. For instance, studies such as Rutto (2022) argued that perception of benefits and costs are critical in determining adoption of innovation. Extant studies reveal that the factors differ but Claudy, Garcia & O'Driscoll (2015) argued that risk perception is a major consideration for consumers in their decision to adopt innovation. With the initiative beginning to gain global foothold, market-driven approaches are rising across developing nations such as Singapore and Mexico (Polasik & Kotkowski, 2022).

Studies such as Goga (2020) investigated digitalisation, data and open banking in South Africa and confirmed that customer consent is a pre-requisite for beneficial open banking. Zandamela (2021) evaluated the benefits of open banking to consumers, banks and fintech companies to reveal the rising consumers' demand for digital services, trustworthiness to banks through long term exchange relationship, and importance of collaboration among the parties involved in open banking. In the study of Laplante and Kshetri (2021) the basic requirements for open banking, conceptualisation, enablers and inhibitors to open banking were critically revealed to cover various contexts such as the legislation, security profiles, regulatory initiatives and technology. The report of PwC (2019) revealed the peculiarity of Nigeria's challenges with open banking to be associated with failures or delays in other integrations projects. The report indicated that the critical schools of thought for implementing open banking the threat school of thought, the wait-and-see school of thought, and the catalyst school of thought. Although the threat school of thought and the wait-and-see school of thought are somewhat averse, the catalyst school provides the understanding of open banking to be more disruptive. This is associated with the global financial ecosystem while the wait-and-see approach is the prevailing school of thought among the Nigerian financial players (PwC, 2020). Following its novelty, Briones de Araluze and Plaza (2022) adopted a bibliometric analytical approach to open banking conceptualisation to reveal a lack of consensus on open banking definition but showed change in business model, customer data sharing, involvement



of fintechs and other technology companies, and regulation as the key drivers of open banking. In the study of Chan et al., (2022) on consumers' fintech adoption of open banking in Australia, the use of UTAUT model revealed the significant role of perceived risk, social influence, effort expectancy and performance expectancy on usage intention of open banking. Recently, a study in African country by Rutto (2022) assessed the factors that determine the adoption of open banking in Kenya. The study considered perceived value, cost of infrastructure, perceived relative advantage, and government support as variables that impacts open banking adoption. Further studies such as Polasik and Kotkowski (2022) examined how privacy, trust and digital financial inclusion can impact the adoption of open banking by consumers in Europe.

2.1. Perceived Access

The concept of accessibility has been approached as a multi-dimensional construct that encompasses access to information, language learning ease, computer equipment and system reliability (Rice & Shook, 1988). In other instances, accessibility dimension encompasses access terminal and system usability (Karahanna & Straub, 1999). In others, it was approached from access to information and e-banking transactions (Liebana-Cabanillas et al., 2013). Generally, it is a combination of opportunities and resistance (Miller, 2018). It is perceived as a strong indicator of user decision about activity behaviour (Pot et al., 2021). Initially, it is described as the potential to participate in an opportunity distributed across space (Preston & Raje, 2007) such as in care environment and satisfaction (Akinici & Sinay, 2003). Recently, it is approached from the ability to access information and e-banking transactions (Liebana-Cabanillas et al., 2013) such as in customer accessibility of e-banking (Suleiman & Usman, 2016) and web accessibility (Bengtsson & Pamp, 2021). Accessibility is a critical factor that impacts adoption rate of innovations and significantly contributes to e-banking (Martey & Gligah, 2016). According to Suleiman and Usman (2016) perceived access is the customers' perception of their ability to access financial information and services while Andrade et al. (2018) argues

that it is a user's right to information and the removal of the barriers to the information. Zandamela (2021) indicates its potential to improve the unbanked accessibility to financial products while enabling the bank customers to access superior financial products. The importance is underscored from enabling the financial system to become an open system rather than closed system where banks, insurance firms, and telecommunications firms have sole custody of customer information. Extant literature reveals its connection to trust in influencing consumer perception (Leao de Carvalho et al., 2015) and to security in consumers' perceptual analysis (Reis et al., 2013). In this survey, accessibility is approached from customer access to financial products and ancillary factors that impact its effect. Extant literature indicates that accessibility influences adoption of innovations (Poon, 2008), and trust (Liebana-Cabanillas et al. 2013) while the study extends the nexus to compatibility, and security because of the uniqueness of the innovation and individual characteristics, and prevailing data breaches in the country. Thus, the following hypotheses were proposed:

H1. Perceived access is positively and significantly related to perceived trust in open banking

H2. Perceived access is positively and significantly related to perceived security in open banking

H3. Perceived access is positively and significantly related to compatibility in open banking

H4. Perceived access is positively and significantly related to customer consent to open banking

2.2. Perceived Trust

The important role of trust in marketing has been established as a huge concern in the business world and as a factor that supports maintenance of relationship (Bigne´ & Blesa, 2003). According to Ranaweera, Mcdougall and Bansal (2005) it deals with the ability to adhere to promises in fulfilling commitments. It can positively impact



privacy concerns by causing a reduced tension to customer privacy issues (Blut et al. 2015). Thus, adoption of innovation tends to increase with greater customer trust to innovation (Liebana-Cabanillas et al. 2013). According to Kalinic et al. (2021) trust is a combination of cognitive and behavioural factors. The behavioural aspect relates to the willingness of the customer to be vulnerable with the expectation of the other to the transaction fulfilling their obligation (Liébana-Cabanillas et al., 2014). The cognitive aspect considers the reliability involved in the fulfillment of tasks in exchange relationship (Dwyer et al., 1987; Oloveze et al., 2022). Extant literature reveals that trust is essential in online transactions (Molinillo et al., 2020) such as in cardless cash transactions (Oloveze et al., 2022) and online payments involving the use of mobile devices (Liébana-Cabanillas et al., 2014). Thus, the role of trust demands a closer attention to it because of the uncertainties around innovations (Bart et al. 2005). Where customers have trust in organisations, Yang et al. (2015) argued that the tendency to adopt the innovation is higher because it mitigates the effect of risk to the innovation. In technological innovations, the levels of trust are impacted by the risk involved in the adoption of innovation especially at the early stage of the innovation although it mitigates with time (Liebana-Cabanillas et al., 2018). However, initial trust is essential for the success of technological innovation (Oloveze et al., 2023) because it can impact customers' continuous adoption (Yang et al. 2015). It has been utilised in understanding the customer's privacy concerns on intention to adopt open banking (Oloveze et al., 2023) while other studies reveal its importance in consumer behaviour (Leong et al., 2013) and online behaviour of customers (Molinillo et al., 2020). Studies suggest its positive effect on customer behaviour (Oloveze et al. 2022; Liebana-Cabanillas et al. 2013). Therefore, the following hypothesis was formulated:

H5. Perceived trust is positively and significantly related to customer consent in open banking

2.3. Perceived Security

In literature, Ooi and Tan (2016) loss of money and confidential data are concerns for customers. With innovations that are unfamiliar to customers, security concerns are more highlighted (Kim et al. 2010). It is a vital factor in technological innovations that plays significant role in user behaviour to innovations. With innovations like m-wallet, it is a strong predictor to customer adoption (Shin 2009; Ramos-de-Luna et al. 2017) though it has been proven not to significantly influence adoption in others (Morosan & DeFranco, 2016). Security and trust are rarely associated in literature despite the probabilities of trust rising from a secure innovation. The prevailing data breaches calls for understanding the relationship between trust and security. Therefore, the following hypotheses were proposed:

H6. Perceived security is positively and significantly related to perceived trust in open banking

H7. Perceived security is significantly related to customer consent in open banking

2.4. Compatibility

The concept of compatibility is based on how users perceive innovation to be consistent in terms of values, needs and experiences (Schierz, Schilke & Wirtz, 2010). The understanding is that innovations like open banking needs to match with experiences of the adopter in addition to their values and behavioural lifestyle. Compatibility projects the importance of coherence between the user and the attributes of the innovation. With higher alignment of the users' characteristics and the innovation characteristics, adoption of innovation is improved (Hidayat-ur-Rehman et al., 2022). In this context, the focus is on the consistency of bank customers' preference for digital services, their values and expectations, and the attributes of open banking innovation. Extant literature confirms its impact on consumer behaviour (Schierz et al., 2010). Therefore, the following hypothesis was proposed:

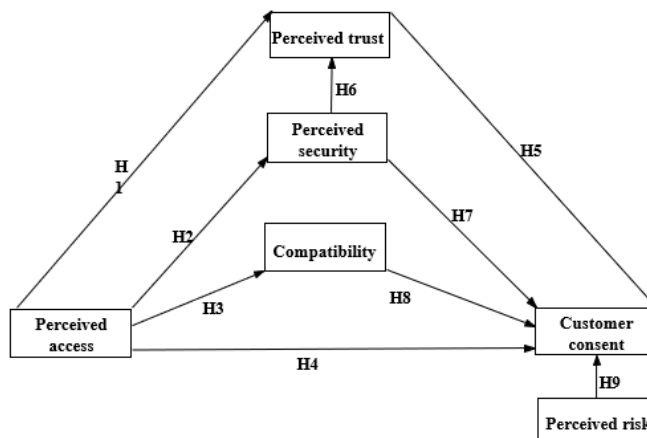
H8. Compatibility is positively and significantly related to customer consent to open banking

2.5. Perceived Risk

Risk is a context that customers considerably assess in exchange relationships. It is capable of discouraging customers from adopting innovation particularly when there is poor information about the innovation. Risks are associated with uncertainties and losses. It could be in form of financial risk, economic risk, and data risk. According to Ali et al. (2022) it encompasses privacy issues and security concerns. With online settings, Ozturk et al (2017) argued that customers' concern is on exposure to fraud and irregularities. With open banking, the element of risk can encompass customers' fear of loss of money, unwanted exposure of private information and risk of fraud considering the rising data breaches in Nigeria. Studies such as Kalinic et al. (2019) confirm a negative relationship and suggest that it is important to be used to assess customer behaviour towards adopting innovation. Other studies such as Oloveze et al. (2022) suggest no significant relationship. Therefore, the following hypothesis was proposed:

H9. Perceived risk is negatively and significantly related to customer consent in open banking

Figure 1: Conceptual Model



3. METHODOLOGY

A quantitative approach was adopted to examine the hypotheses and provide statistical empirical support to the findings. Structured questionnaire was used and scaled on a 5-point Likert to generate data from bank customers in South East, Nigeria. Firstly, a face examination of the questionnaire by experts was focused on the coverage and reliability of the questions. The questions were adapted from related studies on e-banking and open banking. The wordings were adjusted to the context of the study. Secondly, the respondents were clarified on the meaning of open banking prior to participating in the survey. This was done through a brief explanation and screenshots of open banking screenshots on the online questionnaire to ensure that the participants have understanding of the basics of open banking. Thirdly, a pre-requisite for participation in the survey was determined. In this, a participant must have a functional bank account. This served as a filter question for screening out irrelevant data. Further, the sample size was justified using power analysis as revealed on figure 2. This follows the recommendation from extant literature (Hair et al., 2019; Uttley, 2019) in determining sample size of a study. The approach helps to determine the minimum sample requirement for a structural model (Hair et al., 2014).

*Figure 2: Sample size justification using G*power analysis*

F tests – Linear multiple regression: Fixed model, R² deviation from zero

Analysis: A priori: Compute required sample size

Input:	Effect size f ²	= 0.02
	α err prob	= 0.05
	Power (1-β err prob)	= 0.80
	Number of predictors	= 5
Output:	Noncentrality parameter λ	= 12.9400000
	Critical F	= 2.2280828
	Numerator df	= 5
	Denominator df	= 641
	Total sample size	= 647
	Actual power	= 0.8000445

Fourthly, the study was conducted in Nigeria to indicate the context of open banking in the country. However, given the inaccessibility of the sampling frame, a

combination of judgmental sampling, snowball sampling and quota approach were used in selecting the samples. The quota helped to provide spread and representativeness from bank customers in the South East Nigeria. Further, judgmental approach focused on bank customers with functional bank accounts while the snowball approach helped to utilise the first contacts with functional accounts in different states to reach the others. The structured questionnaire was designed using Google form and hosted online with an invitation to participate in the survey. The link to the online questionnaire was shared through social media and email mailing list. Demographic characteristics included in the questionnaire were gender and age.

3.1. Structural Model Evaluation

SPSS v23, AMOS 23 and Hayes Process v2.16 were used in analysing the data. 750 samples were collected. 80 samples that represent 10.7% of the total samples were screened out for illegibility and inappropriateness. 620 forms were used. This is justified following the recommendations of Kline (2016) in using larger samples above 200 for complex models that has more parameters. Further, the sampling adequacy for factor analysis was justified using Kaiser-Meyer-Olkin measures while the null hypothesis of no variation was checked through Bartlett's test of sphericity. At 0.874 and 8426.399($p < 0.000$), sample is justified adequate and null hypothesis of no variation rejected respectively. Further, common method bias (CMB) was confirmed using Herman's single factor technique. CMB is not a problem in this study given the value of 44.038 that is within the threshold in literature. Four factors were extracted that accounted for 76% cumulative variance.

The demographic result shows male 59.6%, female 41.4%. 61.3% were above 30 years, 39.7% were below 30 years. Reliability was carried out through Cronbach alpha and composite reliability. In literature, 0.6 and 0.7 were recommended thresholds for Cronbach alpha and composite reliability respectively (Hair et al. 2006). Table 1 show that these thresholds were met for each of the constructs thereby confirming the reliability of the instrument. Validity was checked using convergent and discriminant approaches. With convergent validity the factor loadings on table 1

and figure 3 justified the validity given that the factorial loads were above the threshold of 0.6 as recommended in literature (Bagozzi & Yi, 1988). This is further justified with the values of AVE on table 1 for each of the constructs as they were within the recommended thresholds in literature. Fornell and Larcker (1981) recommend 0.5 thresholds. With respect to the discriminant validity on table 2, the correlations were below 0.9 (Hair et al. 2006) while all the correlations between the dimensions were below 0.5 as suggested in literature (Fornell & Larcker, 1981). All the values on the diagonal are below the root of AVE thereby indicating further existence of discriminant validity. Thus, validity is justified.

Table 1: Measurement Model

Item	Factorial loads
Perceived access (CA=0.89; CR= 0.82; AVE=0.60; Mean=3.51)	
I think open banking system offers me ease of using financial products	.64
It gives me the convenience of making easy choice on financial options	.90
In general, open banking system gives me access to financial services	.88
Perceived trust (CA=0.91; CR=0.91; AVE=0.78; Mean=3.32)	
I think open banking system will stay committed to its promises	.84
I think open banking system will act responsibly	.92
I think there will be honesty with open banking system	.90
Perceived risk (CA=0.83; CR=0.88; AVE=0.71; Mean=3.44)	
Due to involvement of non-bank institutions, consenting to open banking puts my finances at risk I am afraid that the benefits may not outweigh the risks associated with consenting to open banking	.82 .81
I think that consenting to open banking system is risky	.75
Perceived security (CA=0.80; CR=0.81; AVE=0.68; Mean=3.19)	
I think open banking system has adequate safety measures for me to consent to it	.88
I would like open banking system to be safe for my financial needs	.76
Compatibility (CA=0.89; CR=0.92; AVE=0.78; Mean=3.27)	
Open banking system fits well in my financial lifestyle	.94
It is compatible with my preferred financial lifestyle	.79
It is consistent with the way I like my financial information to be handled	.92
Customer consent (CA=0.93; CR=0.93; AVE=0.81; Mean=2.66)	
I am willing to consent to sharing of my personal and financial privacy data	.92
I consent for my personal and financial privacy information to be shared among financial institutions	.94

I prefer banks to share personal and financial privacy data among other financial institutions

.84

Cronbach Alpha = CA; Composite reliability = CR; Average variance extracted = AVE

Figure 3: Measurement Model Output

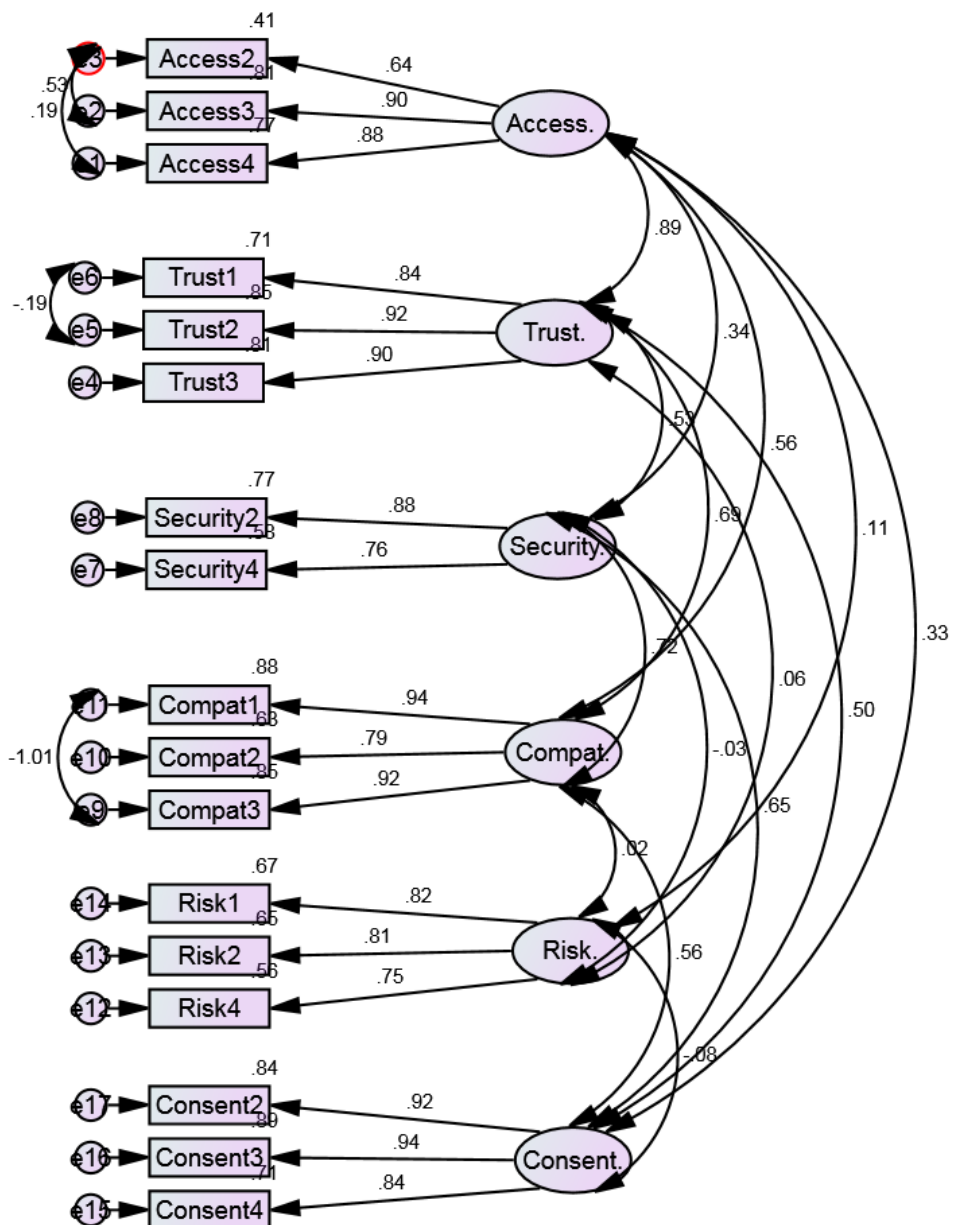




Table 2: Inter-correlation matrix and Discriminant validity

	P.Access	P.Trust	P.Risk	P.Security	Compatibility	C.Consent
P.Access	.906					
P.Trust	.771	.883				
P.Risk	.127	.024	.843			
P.Security	.352	.482	.001	.825		
Compatibility	.540	.646	.027	.613	.883	
C.Consent	.306	.475	-.064	.580	.553	.900

Note: Main diagonal – (in bold) square root of AVE

The measurement model was assessed using incremental, absolute fit and parsimonious model fit as revealed on table 2. As suggested by Hair et al. (1996) absolute fit index of minimum discrepancy chi-square could be ignored when the sample size that is used in the study is more than 200. The other values of the model from the incremental fit index are within the recommended thresholds except RFI which is marginally acceptable. In this guise, the thresholds were met thereby justifying the fit of the structural model.

Table 3: Result of fit indices

Fitness index	Fit indices	Threshold	Model's value	Literature
Parsimonious fit	CMIN/DF	<3	6.88	Marsh and Hocevar (1985)
Absolute fit	GFI	≥0.90	0.89	Joreskog and Sorbom (1984)
	RMSEA	<0.08	0.09	Browne and Cudeck (1993)
Incremental fit	Chi-Square	>0.05	0.00	Wheaton et al. (1977)
	NFI	≥0.90	0.92	Bollen (1989)
	RFI	≥0.90	0.89	Bryne (1998)
	IFI	≥0.90	0.93	Bryne (1998)
	CFI	≥0.90	0.93	Bentler (1990)
	TLI	<0.90	0.91	Bentler and Bonett (1980)
	RMR	<0.08	0.06	Bryne (1998)

Notes: Normed fit index (NFI). Relative fix index (RFI). Incremental fit index (IFI). Comparative fit index (CFI). Tucker-Lewis index (TLI). Root mean squared residual (RMR). Root mean square error of approximation (RMSEA).

3.2. Structural Model Results

Structural equation modeling through the maximum likelihood was used. The structural paths were tested for significance through the standardised coefficient estimates, the p value and the critical ratio. The results are presented on table 4, figure 4 and figure 5. The result confirms perceived security as the strongest direct predictor of customer consent to open banking. H1 to H4 were from perceived access. H1 ($\beta = 0.899$, $p = 0.000$), H2 ($\beta = 0.451$, $p = 0.000$), H3 ($\beta = 0.678$, $p = 0.000$) were confirmed thereby indicating that perceived access positively influence perceived trust, perceived security and compatibility respectively in open banking. H4 ($\beta = -0.378$, $p = 0.000$) was also confirmed but revealed a significant negative influence on customer consent in open banking. H5 ($\beta = 0.405$, $p = 0.007$) was confirmed thereby proving the positive effect of perceived trust on customer consent in open banking. H6 and H7 were from perceived security. At H6 ($\beta = 0.197$, $p = 0.000$) and H7 ($\beta = 0.428$, $p = 0.000$) perceived security was confirmed to have a significant positive effect on perceived trust and customer consent respectively in open banking. H8 ($\beta = 0.337$, $p = 0.000$) was confirmed thereby indicating a significant positive effect on customer consent in open banking. H9 ($\beta = -0.102$, $p = 0.017$) was confirmed thereby justifying the significant negative effect of perceived risk on customer consent in open banking.

Table 4: Testing of hypotheses

Hypotheses	Estimate	S.E	C.R	Std. Estimate	p	Decision
H1: Perceived access→Perceived trust	.899	.039	22.806	.837	.000	Yes
H2: Perceived access→Perceived security	.451	.047	9.585	.456	.000	Yes
H3: Perceived access→Compatibility	.678	.042	16.241	.675	.000	Yes
H4: Perceived access→Customer consent	-.378	.164	-2.305	-.356	.000	Yes
H5: Perceived trust→Customer consent	.405	.151	2.681	.406	.007	Yes
H6: Perceived security→Perceived trust	.197	.033	6.055	.182	.000	Yes



H7: Perceived security→Customer consent	.428	.059	7.204	.397	.000	Yes
H8: Compatibility→Customer consent	.337	.058	5.843	.318	.000	Yes
H9: Perceived risk→Customer consent	-.102	.042	-2.390	-.089	.017	Yes

However, further tests conducted to examine the indirect relationship in the model. This was done through Hayes Process as revealed on table 5. The result of the tests of the indirect relationships from perceived access revealed significant positive effects for the paths involving compatibility ($\beta = 0.3399$, $p = 0.000$), perceived security ($\beta = 0.1345$, $p = 0.000$), and significant negative effect for the path involving perceived trust ($\beta = -0.1699$, $p = 0.000$). The indirect relationship between perceived security and customer consent through perceived trust is also significant ($\beta = 0.5252$, $p = 0.000$).

Table 5: Estimates of Indirect Relationships

Test of indirect relationships through Hayes Macro Process v2.16	Direct Effect	Indirect Effect	S.E	z	P
Perceived access/Compatibility→Customer consent	.0125	.3399	.033	10.392	.000
Perceived access/Perceived security→Customer consent	.1345	.2179	.027	7.986	.000
Perceived access/Perceived trust→Customer consent	-.1699	.5223	.052	10.036	.000
Perceived security/Perceived trust→Customer consent	.5252	.1413	.023	6.278	.000

Figure 4: Fig 4. Result of conceptual model

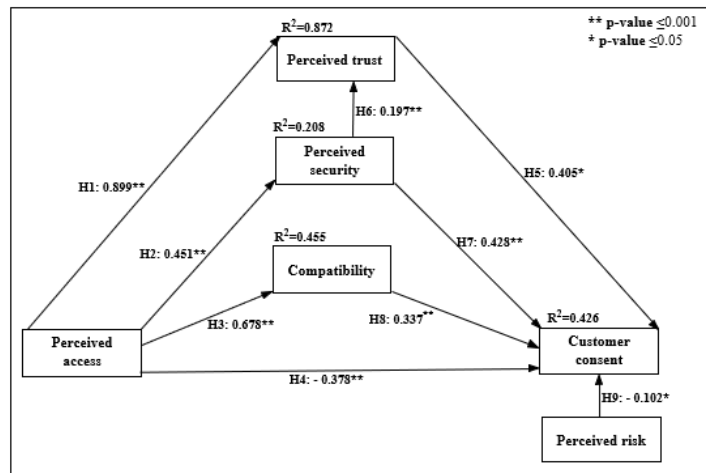
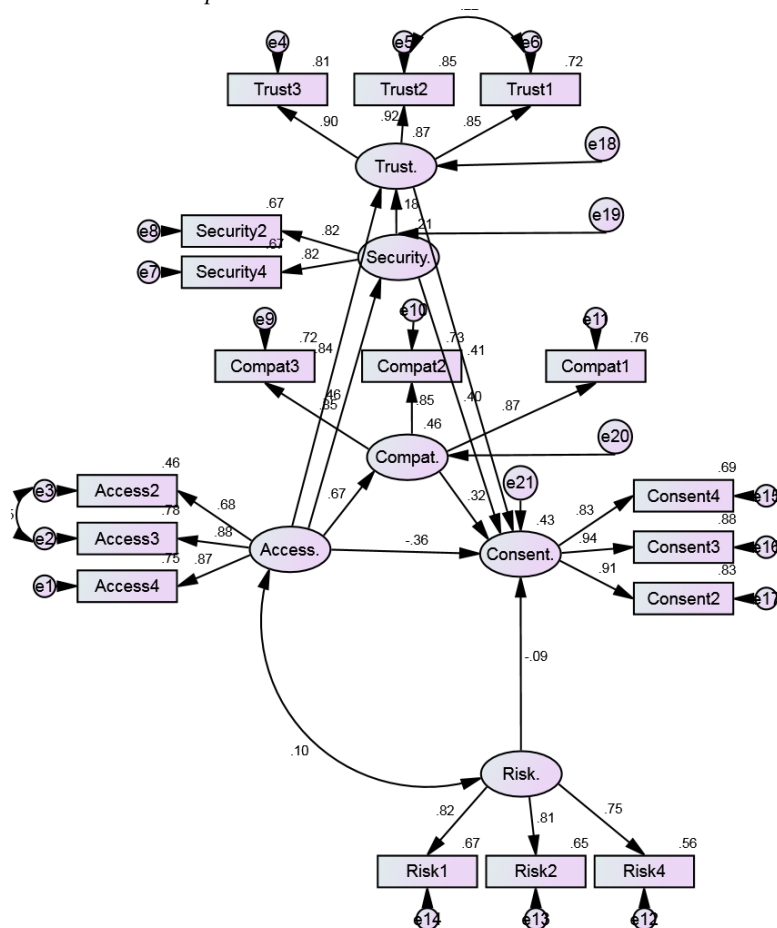


Figure 5: Structural Model Output





4. DISCUSSION AND CONCLUSION

4.1. Theoretical Contributions

The study sought to investigate the customer perspectives to digitalisation and open banking system in Nigeria. This is a pioneering empirical study in Nigeria on open banking. Thus, it is likely to serve as a springboard model for future empirical studies seeking to reduce potential customer barriers to adoption of open banking. The conceptual model was designed using perceived access, perceived trust, perceived security, compatibility and perceived risk as factors that affect customer consent to open banking. The proposed hypotheses were significant for all the hypotheses. Thus, the theoretical contributions from the results are important for further policymaking, modification of operational guidelines and regulations, and understanding of market-driven open banking in Nigeria. Firstly, the study approached the issues of open banking from the perspectives of bank customers' privacy, accessibility to financial services and the compatibility of open banking with customer values, beliefs and experiences, and digital services' lifestyle.

Secondly, perceived security is the major factor that influences customer consent to open banking system. The effect size is considerably higher than results from previous studies on related innovations (Ramos-de-Luna et al. 2017). This could be attributed to the rising data breaches that were at all time high thereby increasing bank customers' concern on the protection of their financial data. Secondly, the rising fintechs' poor compliance to operational guidelines and regulations on open banking raises customer concern on exposures to vulnerability and losses. This reveals the need to exercise high level of control over fintech's management of customer data. Further, security is associated with trust in online banking. This theoretical support is often not supported in literature. However, the study confirms that trust in open banking is dependent on the level of security associated with the innovation. A stronger perception of security leads to improved trust in open banking thereby removing barriers that hinder adoption of open banking system.



Thirdly, the result on trust reveals that it plays a major role in customer consent to open banking. The promise of commitment and being faithful to promises is a necessary condition in customer-fintech business relationships in open banking. Thus, trust is important for any innovation that possesses financial value. Customers place value on product or service offering since value is a major determinant for purchase and engagement. This was confirmed in related studies dealing with technological services (Oloveze et al. 2022; Liebana-Cabanillas et al. 2013).

Fourthly, the element of risk in open banking is perceived by bank customers to be important in their decision to consent to open banking. The negative relationship supports existing literature on related innovations in banking (Kalinic et al. 2019) and extant literature on open banking (Rutto, 2022; Chan et al., 2022). This implies that increases in loss of money and chances of fraudulent activities on personal bank account influence bank customers' averseness to open banking. Thus, increases in bank customers' perception of existence of risk and threats to their private information deter their ability to support the innovation.

Fifthly, perceived access is the strongest factor with indirect effect on customers' consent to open banking. The perception of bank customers to accessibility of open banking is highlighted with its influence on trust, security and compatibility. Thus, perception of access to the benefits of open banking is dependent on factors such as trust, security and compatibility of the innovation with bank customers' lifestyle, values, expectations and previous experiences. The results confirm earlier studies of the effect on trust (Liebana-Cabanillas et al. 2013) and consumer behaviour (Poon, 2008) while establishing a new relationship effect on security and compatibility. However, perceived access further revealed a negative connection to customer consent. The context of accessibility having an inverse relationship reveals the prevailing concern with the sharing of personal data and private financial information. At the present level of adoption in Nigeria, the indication is that increases in perception of accessibility are negatively linked to customer consent to open banking. This expresses the unwillingness to consent to sharing of personal and financial privacy data among financial institutions. Factors that could contribute to negative

connection could be the prevailing increase in data breaches and compromise by few banks during the data collection stage. Essentially, privacy breaches and affects consumers' preference, choice and decisions.

Sixthly, the indirect relationships were tested through Hayes macro process v2.16. The major indirect links are from perceived access and perceived security. As revealed on table 5 all the tested indirect relationships were significant. However, the result of the direct and indirect relationships from perceived access revealed that all the direct relationships have less effects compared with the indirect effects. The strongest indirect relationship to customer consent is from perceived trust. This reveals the key role of trust in open banking. Trust is an essential element in transactions. The result indicates that although the direct effect might be negative with customer consent, the promise and fulfillment of trust in open banking is essential to significantly and positively influence its adoption. This is similar with the results indirect relationships from compatibility and perceived security. The implication is that the direct effect of perceived access is low but it is significantly more with the indirect routes to open banking. It proves that improving the access to open banking is better approached from indirect links. This can be promoted using celebrity endorsements and strategic communications and management. On the other hand, perceived security was revealed to have a higher direct effect than indirect effect. The context of security is a strong indicator for directly choosing to consent to open banking. The supportive role of trust is revealed not to have a better effect compared with the direct relationship although it is still significant. This is a significant insight for organisations in strategy formulation and management of customer relationships and businesses.

4.2. Practical Implications

The context of open banking requires a successful follow-up to any operational guidelines and regulations that are implemented in financial ecosystem. The perspective of customers' concern on security implies that the success of open banking is solely dependent on the customers' consent especially when they are



comfortable with the security. In this context, the regulators need more stringent measures before licensing any third party that handles customer data. Secondly, the importance of meting out strong punitive measures for defaulters and third parties who are non-compliant with the regulations can facilitate improved perception of open banking. The perspective of perceived accessibility to the benefits of open banking implies that open banking will promote production of innovative financial products and services. Also it can enable fintechs to reach the under-banked and deepen the competitive level in the financial industry. This should not come at a significant cost for the bank customers. To improve customers' access to superior products, trust building in open banking is essential. This would require designing of strategic marketing communication and targeting it to the decision makers, opinion leaders, and social media influencers. For instance, celebrity endorsement is already proven in literature to significantly impact patronage (Oteh et al., 2022). The adoption of measures such as the celebrity endorsement can impact the rate of adoption and diffusion. Security and trust have a nexus as indicated in the findings. The implication is that open banking can diffuse in the financial market when the security improves significantly or when trust is built on any existing security profiles in the ecosystem. This shows the significant role of trust in the innovation given the positive relationship between the constructs. Further, it practically demands strong assurances to customers on how their data will be used. Additionally, it reveals the need to devise a mechanism for urgent redress to private data breaches. This can involve using commensurate compensation measures that should deter businesses from indulging in sharp practices. If open banking should not be seen as a catch-phrase but an innovation with practical benefits, the regulator (Central Bank of Nigeria) needs to create a temporary department that is tasked with the responsibility of overseeing open banking operations. This can be in terms of policy initiatives that meet the dynamics of the financial market, regulations that are periodically modified to the dynamics of the financial market, compliance with guidelines and automated means of monitoring compliance in real time or back-end check, and mechanism to detect and punish offenders.



4.3. Managerial Implications

The findings suggest that the regulatory body and the application programming interface party like commercial banks and insurance firms that solely holds customer data should adopt a systemic measure that determines the third party's non-compliance and inappropriate usage of customer data. There is need for collaboration between the central bank of Nigeria, Nigeria data protection bureau, and National information technology development agency in managing the excesses of third parties. The proposed hypotheses that provide customer insight to open banking indicate deeper call for customers' consent for each transaction. To improve security and trust, and mitigate risk, automated mechanism should be devised to ensure that bank customers authorise the use of their data for any particular purpose and not beyond the consented purpose. With security as the strongest predictor, regulators could foster customer belief in the open system by approaching security issues through publication of third parties that are approved for businesses, periodically rating and publishing their quarterly compliance with guidelines and operations, and publishing defaulters with the punitive measures meted out to them. The results imply that security of customer data needs to be managed and secured while being shared between parties involved. However, this must be with the customers' consent at each usage of the data usage to enable the customer have control on the usage of their private information. This might be labourious but with customers' sensitivity to security of their data, the trust issues and risky perception of the innovation, it is important to adopt approaches that will promote customers' consent to the use their data at this early implementation stage. Further, the process of sharing the data calls for all the stakeholders to understand their roles in the process and the implications of non-compliance in the financial market.

5. LIMITATION AND FUTURE LINES OF STUDY

There are limitations in this study that should serve as caution in considering the results for widespread adoption. Firstly, the inaccessible sampling frame led to the use of non-probability sampling technique in this survey thereby calling for a



probability sampling method that offers better representation. Secondly, the data collection technique and the use of cross-sectional design (quantitative method) was within the period that information escalated about data breaches in Nigeria. This could have impact on participants' response to the scale items given the previous experiences in Nigeria when fraudulent activities were executed by criminals on automated teller machine. Therefore, a longitudinal survey could provide a sort of robust support or variance to the relationships.

Following the results, future studies are recommended to include more variables such as the social construct. This will help to understand the level of influence it has in modifying behaviour and the role it plays in facilitating bank customer adoption of open banking. Future studies can as well be approached from the moderation effect or mediation analysis such as from the contexts of age, gender, education and previous experience with related innovations. With the study serving as a pioneer study in Nigeria; and Nigeria serving as the first sub-Saharan country to implement open banking system, a comparative study that follows a cross-country format could help to provide in-depth information.

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