

Technology Readiness Index Model and Online Transaction: Artificial Intelligence Perspective

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ABSTRACT

This research addresses the question of optimism, innovativeness, discomfort, insecurity, Anthropomorphism, and intelligence as independent variables of customer influencing on accepting Artificial Intelligence in online/mobile banking. Structured questionnaires were distributed to prospective customers through the customer service departments by applying the TARO YAMANI formula, 390 was arrived at as the sample size. STATA 13.0 statistical software was used in data analysis. The hypothesis was tested with a data set of 390 potential customers of Nigerian deposit money banks. The results favored the positive technological readiness index dimension of optimism and innovation why insecurity and discomfort which abate customer influence prove positive. This interesting insight places customers in passive role and increases the human-technology interface. Anthropomorphism and intelligence also indicated a positive relationship. This study becomes a switchboard on customers' acceptance of Artificial Intelligence in online/mobile banking findings signified sustainability in technology adoption literature and provide specific avenues for further inquiry.

Key words: Artificial Intelligence, Technological readiness index, Anthropomorphism, intention of continuance use. Online/mobile banking.

JEL classification: M21, M31.

1.0 INTRODUCTION

Electronic banking has become a platform that bridges payment and receipt electronically (Purearea, et al, 2020) through data where customers can access and make transactions in their respective accounts without visiting the banking hall. However, other services and payments can be made via mobile platforms, anytime, and anywhere, this made digital innovation in the modern banking landscape visible helping to reduce customer operation time and geographical barriers.

More recently, technological advancements have opened the doors for artificial intelligence to facilitate enterprise cognitive computing, which involves reconfiguring intelligent workflows, and personalized learning systems (Tarafdar et al, 2019). In the banking context, its use is seen in voice assistance, biometrics, and more seamless sales and has guided the anti-fraud risk monitoring, and credit underwriting. The application of Artificial Intelligence Technology intervened and accelerated automation, Blockchain, and Fintech (Uduimoh et al, 2019).

The inclusion of Artificial Intelligence into mobile banking has met customer's fundamental needs, messages alert by service providers that communicate with users (Lee and Chen, 2022), besides, there is a noticeable trend in the use of Artificial Intelligence to enhance the banking experience and services for customers, the use of chatbots in banking has led to optimize appointment scheduling time, reduce service time, and market segmentation.

However, despite extensive research on the impact of Artificial Intelligence on Mobile Banking, the effects on customers relationship remain challenging and ambiguous (Noreen et al, 2023), Prior findings indicate various factors e.g. attitude, awareness, and perceived risk. Extant literature demonstrated uncertainty among employees, if not properly designed and adapted (Pelau, Ene, and Pop, 2021). However, Anica-Popa et al, (2021), highlighted relative learning generalization and contextualization as a continuous impass to automation. Arguably built new frontiers for competitiveness.

Although empirical and narrative literature reviews exist, their restriction is on a specific level of analysis such as individual levels on consumer acceptance (e.g. Nagy and Hajdu, 2021). This raises some objections, first, previous review limited their scope to only the leadership role in Artificial Intelligence adoption (Fountain et al, 2019, Mohapatra 2020), the leadership role could not able to detect fraudulent activities, tracking of transactions, and also identify suspicious activities as well as assessing data for various compliance issues even with the help of Artificial Intelligence Technology. So there is a need to enact anti-money laundering legislation to guide against irregular payment as well as improve the standard process for combating money laundering, second, whereas previous reviews focused on mobile banking usage, comfort, and anthropomorphic intelligence (Manser Payne et al, 2018; Zhu, 2018; Jiang, 2018, Wang, 2017). Therefore, it behooves to understand the anthropomorphic role which signifies a system that behaves similarly to humans when processing a service or task (Lin et al, 2021). Third, whereas previous review focus on consumer's adaptation to new technologies which can be explained by several models, such as the Technology Acceptance Model (TAM), Davis 1986, Theory of Reasoned Action (TRA), Fishbein and Ajzen, 1975, we reasoned an extension of these model. Additionally, Schepman and Rodway (2020) expressed some reservations about the applicability of the technology acceptance model (TAM) to measure attitudes toward artificial intelligence, furthermore, it's the management of any organization that can decide to integrate Artificial Intelligence

into the mode of rendering service whether online, invariably customer is indifferent to such services. Hence, these models are inappropriate to measure customer preferences toward artificial intelligence. However, we reasoned along the lines of Nagy and Hajdu (2021) to test the model of the technology readiness index proposed by Parasuraman (2000) toward customer's acceptance of online service and compare the findings with Nagy and Hajdu (2021), and ambiguity about technology ability to meet targets (Patel, Kautish and Patel, 2023; Chang and Chen, 2021; Kautish, Sharma and Khare, 2021).

Arguably, a more holistic understanding of Artificial Intelligence's impact on online banking is inevitable, through a comprehensive quantitative survey on multi-dimensional phenomena, advancing the literature three-fold, first, advancing the attribute of the legal framework, this allows for an understanding of previous studies on the dynamic of legislation concerning Artificial Intelligence legal or legislation in online services, which eventually add value to safeguard customers and management stands. Second, by reviewing the Artificial Intelligence literature, we reasoned anthropomorphism attribute signifies a system that behaves similarly to humans when processing a service or task (Hassan & Wood, 2020). Third, Artificial Intelligence is been reviewed and aligned with the Technological Readiness Index (TRI), Cho, et al, 2019. We reasoned on the premise of its characteristics and customer's adoption of mobile banking. In this regard, we attempt the Technology Readiness Index (TRI) as an overarching theoretical basis due to customer's predisposition toward the use of these technologies.

With knowledge of the Artificial Intelligence concept being novel to Nigerian online banking which also is still at an embryonic stage, the authors of this paper extend the study of Nagy and Hajdu (2021) by including anthropomorphism, intelligence variables, and testing the usefulness of the Technology Readiness Index as proposed by Parasuraman (2000) to compare the result presented by Nagy and Hajdu (2021).

This study discusses intelligence, and anthropomorphism, and presents the technology readiness Index (TRI) model. The next section focuses on research methods. In the result and discussion section, validity and reliability tests are presented inclusive hypothesis tests, an analysis of the relationship among variables is presented, and comparison results with previous studies are discussed before the conclusion section.

1.0 Literature Review

The evolution started from 1.0 banking to 4.0 banking, which comprises advanced technology and the use of Artificial Intelligence. This inclusive concept helps lower operational costs, decongest the banking promises, and remove geographical barriers, and the application suppleness, portability, flexibility, and movability have also been the main reasons for the increase. Additionally, Artificial Intelligence has become prominent in the rearrangement of banking operations in the New Normal.

Theoretical Foundation

Internet experience plays an inconsistent role in information disclosure among parties in mobile banking. The behavioral intent of the customers is measured by the glance at private information disclosure. Online customer decision entails personal disclosure to third and fourth parties in online transaction. In other words, there are risks and benefits associated with mobile banking, scholars suggest that to understand how customers make a rational choice when they are persuaded to disclose personal information to banking and retail shops, one appropriate theory to justify this rational decision is the privacy calculus theory (Xu et al, 2011, Keith et al, 2013, Sun et al, 2015). This theory emanates from the equity theory when privacy risk is lessened, thus resulting in higher benefits. On the contrary, when customers perceive that information disclosure has higher risks than benefits, thus it becomes unwarranted (Sun et al, 2015). Here the crucial influence on the disclosure of personal information is how customers perceive privacy (Lowry et al, 2012). Extant literature defines online privacy as how much the customers are privy about their personal data exposure and the ability to retrieve it if need be (Ham and Nelson, 2016). In the case of online banking, customers might trade off personal information. When customers have made financial transactions and an alert notification is received, and then they comprehend how their personal information has been utilized by a third party. Since online/mobile banking entails transactions that target customer's personal information, there is a paradoxical situation where customers need an in-depth analysis of the risk-benefit involved in the intention or perceived acceptance of online/mobile banking transactions. In this study, Artificial Intelligence Technology readiness indexed, intelligence, and anthropomorphism are explained by examining the intention of customers to accept perceived online/mobile banking transactions, despite its predicament and relevance to modern technology. Past studies have applied the PCT in mobile advertising, location-based advertising as well as in the e-commerce context (Li et al, 2011, Dinev et al, 2013, Pentina et al, 2016; Cruz-Cardenas et al, 2021). This research evaluates the Artificial Intelligence feelings of customers in the dispositions of personal information data in online/mobile banking applications.

Key Areas of Artificial Intelligence in Online/Mobile Banking

- **Cost Saving:** Artificial Intelligence has reduced the utilization cost of stationary ensuring operating cost becomes access to managerial and customer information without stationary cost.
- **Chatbots:** Chatbot technology is one of the most unique and interesting Artificial Intelligence technology software, which interacts with customers with preprogrammed queries of the customers for courteous, effective communication and instant resolution (Mogaji et al, 2021). Chatbot technology not only resolves

queries without human interaction but also collects data on customer's queries, which can be used to resolve future problems (Huang and Lee, 2022).

- **Customer Experience:** Customer preferences have changed drastically due to quick responses with Artificial Intelligence Technology machine learning Artificial Intelligence digitizes operation to meet customer's expectations (Lin and Lee, 2023, Tang, Jiang, and Lee, 2022).
- **Fraud Detection:** Banks are more exposed to multi-dimensional transactions, and artificial intelligence uses mathematical computation and complex algorithms that help monitor both customer and personnel's behavior by implementing unsupervised learning programs, thus fraud prevention (Rahman et al, 2022).
- **Automation:** Increase currency counts, and reduce mathematical errors.

Also, this has led to an uptick in the adoption of Artificial Intelligence services such as chatbots, E-KYC (know your client), and robo-advisers (Agarwal, Swami, and Malhotra, 2022). Wu and Olson (2020) highlight the need for banking institutions to continue investing in Artificial Intelligence technology to reduce future risks and enhance the integration between online and offline channels.

1.1 Artificial Intelligence in Online Banking

The Banking sector has witnessed more innovative advanced applications. Various forms of development have been challenges contemporary society faces. The application of Artificial Intelligence has been found in multiple fields including online business involving financial transactions (Rodrigues et al, 2022). There has been a noticeable trend in investigating how Artificial Intelligence shapes customer's experience of online banking and its impacts. Trivedi, (2019) fails to address how customers experience failure of the inability of Artificial Intelligence robots to perform human-like and how customer acceptance of artificial intelligence, applications online has led to innovative disruption of banking channels, (e.g. Automated Teller Machines, online banking, mobile banking (e.g. imaging of checks, voice recognition, chatbots), and solutions (e.g. Artificial Intelligence in investment advisor and selectors) remains unclear. The expectation Confirmation Model (ECM), the model helps to explain the factors that affect customers' continued willingness to use this technology, their perception of information system use benefits of intelligence and anthropomorphism (Bhattacharjee, 2001, Susanto, Chang and Ha, 2016, Foroughi, Iranmanesh, and Hyun, 2019, Tang, Jiang and Lee, 2022, Quan, Binh and Lyi, 2022, Lee and Chen, 2022; Lin, Zheng and Lee, 2023).

How the Artificial Intelligence-driven model is used to predict the outsourcing process depends on the effectiveness of Artificial Intelligence tools in driving efficient organizational strategies, however, there remain several challenges in implementing Artificial Intelligence Technologies including human resources aspect and corporate

culture to allow for such efficiency (Medhi and Mondal, 2016; Fountain, McCarthy and Saleh, 2019). More recently, there has been a noticeable focus on discussing some of the challenges associated with Artificial Intelligence implementation in banking institutions, its integration, and relation, its integration to human-machine interaction for sustainable implementation, Mohapatra (2020). While most of this current research has focused on technology (Lim, Zheng, and Lee, 2023) internet buying behavior (Onete, Constaninescau, and Filip, 2008) in the past. However, other resistance includes workers' fear and company budget constraints. Overall, banks use of Artificial Intelligence to focus on technology to drive operations and implementation.

With the recent development in mobile technology, Artificial Intelligence enhancement of mobile and online banking has been more secure, trusted, useful, and valuable due to its innovativeness, customer experience, and efficiency in service delivery, creating a harmonious relationship (Huang and Rust, 2020, Lim et al, 2023). Nonetheless, issues in usage are timely resolved through natural language and precisely formulated queries (Zhu, 2018). The goals are to generate standardized, consistent, and reliable services (Manswer Payne et al, 2018), improve efficiency (Lin et al, 2023), and reduce subjective errors of customers and employees with Robots, thus increasing the efficiency and profitability of banks (Pelau, Ene, and Pop, 2021). The aesthetics, dynamism to store, and retrieve information, a greater degree of personalization of customer profile fascination of rationalization and technical visualization increase customers' continuance intention, this fully reflects intelligence and anthropomorphism (Li, Bonn and Ye, 2019, Lin et al, 2023).

Technology Readiness Index (TRI)

Technological advances in robotics and Artificial Intelligence have led financial institutions to embrace this technology, however, there are several models used in adaptation to Artificial Intelligence. These include; Theory of reasoned action (Fishbein and Ajzen, 1975), Theory of Planned Behaviour (Ajzen, 1985), Technology Acceptance Model (Davis, 1986), Innovation Diffusion Theory (Rajagopal, 2002), Technology Readiness Indexed (Parasuraman, 2000), Unified Theory of Acceptance and Use of Technology (Venkatesh, et al, 2003), Stimulus Organism-Response Theory (Mehrabian and Russell, 1974).

Artificial Intelligence refers to machines exhibiting human intelligence that require mechanical, analytical, intuitive, and empathetic intelligence. The technology readiness index model involves customer acceptance, approval, and usage of innovative technology that utilizes mental processes. Parasuraman (2000) described technology readiness as associated with a customer's mental state and not related to technical proficiency or capabilities, it is concerned with customers' propensity to embrace and use new technologies for accomplishing goals in the workplace, (Kaur and Thakur, 2021). Technology readiness toward mobile banking educates financial institutions about

customers' predisposition to artificial intelligence mechanisms of service provision, utilization, and adaptation. This model is used to gain insight into customers' technology readiness to embrace and interact with internet technology (Holmstorm, 2022).

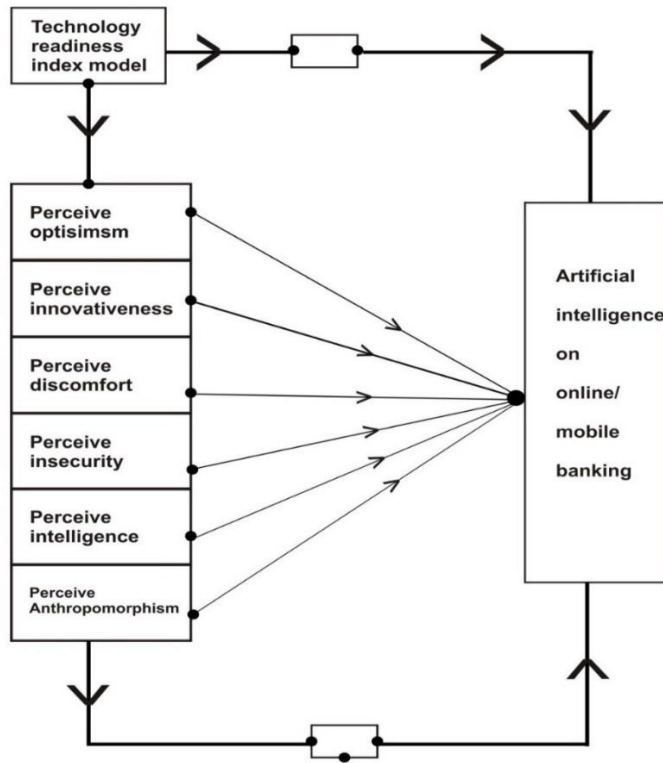
Parasuraman's (2000) technology readiness index has been studied across various contexts, with the growth of commercial activities through website, mobile, and social media, Parasuraman and Colby (2015) refined and developed a 16-item TRI scale with 4 dimensions called TRI 2.0. TRI 2.0 proposed that customer's attitudes and beliefs about technology have optimistic and damaging consequences (Patel et al, 2023; Ashraf, Thongpapani, and Razzaque, 2015; Roy and Moorthi, 2017). TRI 2.0 offers four dimensions; optimism and innovativeness leading to TR1, while discomfort and insecurity interrupt TR2 (Parasuraman and Colby 2015). Optimism conveys control advantage, flexibility, and efficacy, while innovativeness predicts an individual belief and adoption of technology (Chang and Chen, 2021). Discomfort entails consumers' lack of control over technology and ease toward it. While insecurity represents distress and ambiguity about technology's ability to meet goals (Chang and Chen, 2021; Kautish et al, 2021).

Aslam, Ahmed, and Sajjad (2019) examined the impact of the technology readiness index on user satisfaction in mobile banking and found that optimism and innovativeness positively impact consumer acceptance, while discomfort and insecurity impact negatively consumer acceptance of Artificial Intelligence in online banking. Nevertheless, Flavin et al, (2021) presented a contrary report in their study on analytical artificial intelligence on technology readiness index effect, their finding showed surprisingly that feeling of technological discomfort positively influences consumer acceptance of online shopping in Artificial Intelligence. This interesting finding challenges previous insight and reduces barriers to technology acceptance.

Based on the TRI model, we explore the extent of customer's willingness to technology that performs human tasks. This is the first distinctive study of the TRI model in developing nations. In addition, our research identified consumer intelligence and anthropomorphism as an antecedent to the technology readiness index but frequently ignored.

It must be noted that the technology readiness dimension are divided into two motivators, optimism and innovativeness, and two inhibitors, discomfort and insecurity. According to Parasuraman and Colby (2015) contributors are positive, while inhibitors are negative. Invariably previous research has followed this trend and their findings complement Parasuraman and Colby, (2015). Therefore we are convinced that deeper insight is needed to appraise the findings of Parasuraman and Coby (2015) in relation to mobile banking services to customers.

Research Framework



Source: Author's desk 2024

The intention to use mobile banking is constructed in the model as a dependent variable (Wang, Lin, and Luarn, 2006), whereas the other four technology readiness drivers were independent variables (optimism, innovativeness, discomfort, and insecurity), intelligence and anthropomorphism are independent variables (Lee and Chen, 2022, Lin, Zheng and Lee, 2023, Parasuraman and Colby, 2015).

2.0 Methodology and Research Questions

2.1 Methodology

STATA 13.0 Statistical tool was used in analyzing the data in a sequential order. A reliability and validity test was carried out, as well as descriptive and correlation analysis, additionally, the Ramsey test and post-diagnostic test were carried out.

The constructs and the measurement instruments presented in Table () were developed based on the literature review, and accordingly, the Technology readiness indexed model was adapted from Parasuraman and Colby (2015), perceived intelligence

was adapted from (Lim et al, 2021; Moussawi and Koufaris, 2019) and perceived anthropomorphism was also adapted from (Lim et al, 2021, Moussawi and Konfaris, 2019). The dependent variable intention to use online/mobile banking was adapted from Priya, Gandhi, and Shaikh, (2018).

In collecting data, a questionnaire of 21 questions (variable) was administered. Table (1), eight demographic variables – sex, educational level, age, profession, place of residence, annual personal income, frequency of mobile banking, previous investment experience, measurement constructs enlisted in the table (), demographic variables measured in percentage, while the technology readiness indexed model variables, intelligence, and anthropomorphism were administered on Likert 5-point scale, ranging from strongly disagree (1), to strongly agree (5).

Respondent provided explanations on how technology contributes to ease of daily life, meaning you can make a transaction without visiting the banking premises, moreover, different app service developed by banks that supports artificial intelligence and how they can be used online were revealed to customers, notification of transaction were equally updated with their mobile phone, various deposit money banks that have developed app via artificial intelligence were showcase to customers, the service of connectivity using artificial intelligence tools were also revealed. Other services include a POS (Point of Sale) app used as a medium of cash collection and an automated Teller Machine for withdrawing and depositing cash into an account. The dead man door, voice recognition, and automatic search in case of armed-weapon are all services powered by artificial intelligence available in banks service provided.

Constructs and Instruments Measured

2.0	Constructs	3.0	Definition	4.0	Measurement Instruments
5.0	Perceived optimism	6.0	Extent of technology contribution in making daily life easy.	7.0 8.0 9.0	PO1. Recent technologies contribute to standard life in banking. PO2. Technology gives people control over their daily lives using online purchase banking. PO3. Technology makes customers more productive in their personal life by purchasing materials using online banking mediums.
10.0	Perceived innovativeness	11.0	The degree to which technology has led to creativity in enhancing interest	12.0 13.0 14.0	Pi1. I advise customers especially when faced with problems using online banking services. Pi2. I am abreast with the latest developments in Artificial Intelligence apps related to online/mobile banking. Pi3. Use new high-tech products in online/mobile banking help but with directives from voice assistance.

15.0	Perceived discomfort	16.0	Uncontrolled technology can overpower customers.	17.0	PD1. Technical support lines are inconsequential in online banking.
				18.0	PD2. Online transactions are pleasant.
				19.0	PD3. I technically approve online banking at any time.
20.0	Perceived insecurity	21.0	The extent of distrust, from skepticism about it potential harmful consequences.	22.0	Pi1: I don't feel confident doing huge financial transactions in online banking.
				23.0	Pi2: Technology reforms have created panic in online banking.
				24.0	Pi3: Most previous information received through online banking is difficult to comprehend.
25.0	Perceived intelligence	26.0	The extent to which users perceive Artificial Intelligence technology and its capabilities when interacting with Artificial Intelligence	27.0	Pi1: Mobile banking application facilitates transactions.
				28.0	Pi2: I understand mobile banking instructions.
				29.0	Pi3: I can adapt my behavior quickly using mobile banking applications.
30.0	Perceived anthropomorphism	31.0	Ascribing human characteristics to non-human things.	32.0	PA1: The online banking application makes me feel considerate.
				33.0	PA2: Mobile banking application respect.
				34.0	PA3: The application feels friendly.
35.0	Intention of continuance use	36.0	Extent to ease of transaction in daily activities	37.0	PimB1: I planned to use mobile banking applications regularly.
				38.0	PimB2: I intended to recommend this application to others.
				39.0	PimB3: I used a mobile banking application multiple times during this week.

An online survey in Google form was not possible, so the researcher decided to deposit the questionnaire with the operations managers and customer services of the bank customers who come to laid complaints about inappropriate transactions and those applying for new Auto Teller Machine Card (ATMC), expired or, renewing their card with database Automated and transferring the huge sum of money was contacted and given the form to complete, this was in June to October 2023 in Nigeria.

2.2 Research Questions and Hypothesis

This research determines the link between Artificial Intelligence on the Technology readiness indexed model and the perceived intention of customers toward online/mobile banking. The influence of motivators (optimism and innovativeness) on the perceived intention of customers on online/mobile banking, the capacity of inhibitors (discomfort and insecurity) in customer intention on online/mobile banking. Additionally, variables were included in the research (intelligence and anthropomorphism) on the perceived intention of customers in online/mobile banking.

Research Question

These research questions guide the study;

RQ1: To what extent does customer optimism influence acceptance of Artificial Intelligence on online/mobile banking?

RQ2: To what extent does customer innovativeness influence acceptance of Artificial Intelligence on online/mobile banking?

RQ3: To what extent does customers' discomfort influence acceptance of Artificial Intelligence in online/mobile banking?

RQ4: To what extent does customer insecurity influence acceptance of Artificial Intelligence in online/mobile banking?

RQ5: To what extent does customer intelligence influence acceptance of Artificial Intelligence on online/mobile banking?

RQ6: To what extent does customer anthropomorphism influence acceptance of Artificial Intelligence in online/mobile banking?

Sample Data

Assessment lien in deposit money banks is important in Nigeria as the fastest growing economy in sub-Saharan Africa that has embraced Artificial Intelligence mechanisms in its reform strategies. The sample size was determined through the application of the Taro Yamane formula. The total population comprises 15,500 customers of 10 targeted banks that embrace the technology readiness index at the workplace.

Optimism and Perceived Acceptance of Artificial Intelligences in Online Transaction

Optimism entails control, advantages, flexibility, and efficacy. Optimism is an empowering agent of thinking and a critical motivator of social expectation toward perceived acceptance of artificial intelligence in online transactions, optimist accept situations on technological advancement, and benefits and are aware of how to use it instead of complaining, which is an intrusiveness factor. Therefore, customers with little discomfort are bound to utilize innovations, with the assistance of fast internet, in online networking, showing the significance of the technology readiness model for development and advancement. Tus, optimistic customers are more positively predisposed toward new technologies (Godoe and Johansen, 2012; Kaplan and Haenlein, 2020). Besides, looking into extant literature has revealed a positive connection between optimism and perceived acceptance of Artificial Intelligence technology in online/mobile banking (Aslam, Ahmed, and Sajjad, 2019, Flavian et al, 2021, Mohan, Zakkariya and 2023). Thus, we propose that;

H₁: Optimism is proportionate to perceived acceptance of Artificial Intelligence in online transaction

Innovativeness and Artificial Intelligence in Online Transaction

Innovativeness predicts a customer belief and adoption of technology. It's the willingness, resourcefulness, and rethinking of advancement in the field of technology. The debutants perceive benefits attained from Artificial Intelligence online transactions, and conversely, tend to overlook risks associated with internet networking. Highly innovative customers tend to be open-minded toward innovative financial services e.g. mobile payment (Oliveira et al, 2016). Furthermore, innovativeness embraces adoption intentions. Innovative customers, generally have a positive impression of technology functionality support, thereby, showing its positive influence on online transactions (Prodanova et al, 2021; Elliott et al, 2012, Hong et al, 2017; Qasem, 2021; Patel et al, 2023).

Thus, we propose that;

h₂: Innovativeness is proportionate to perceived acceptance of Artificial Intelligence in online transaction

Discomfort and Artificial Intelligence in Online Transaction

Discomfort is to some degree of fear and being overwhelmed by technology. Customers who experience discomfort with technologies perceive them as complicated and unable to satisfy their needs (Lu et al, 2012). Customers experiencing high levels of discomfort in an unknown technology environment can feel averse to using new technology-based products and services (Tsang et al, 2004). Nonetheless, youthful shopper finds no discomfort in using new technology because they are the co-creators of these devices. These Artificial Intelligence devices are uniquely and phenomenologically determined by the beneficiary. Additionally, the removal of frontline employees and replaced by automated agents who interact socially with customers leads to value co-creation (Vargo and Lusch, 2016; Caic et al, 2018; Flavin et al, 2021). Thus, we propose that;

h₃: Discomfort is proportionate to perceived acceptance of Artificial Intelligence in Online Transaction

Insecurity and Artificial Intelligence in Online Transaction

Security has been one of the vital issues in online business and versatile monetary services which influence clients to see that mobile payment process could be a high risk (Merritt, 2011). Online Transactions through Artificial Intelligence are faceless interactions, which may lead to lesser customer interest in them. According to Bawack et al, (2021), if the customer feels less confident and distracted and believes in becoming more dependent, it reduces customer engagement. Suppose, customers do not trust artificial intelligence online transactions, (Huang et al, 2022) in that case, they will have a sense of insecurity that obstructs their transactions online (Bawack et al, 2021). Prior studies have concluded that in the finance industry insurance customers tend to refuse to

adopt new technology-based services (Oliveira et al, 2016). Contrarily, the laws guiding the establishment of such transactions, the modalities of transaction i.e. receipt and the world turning into a global village might encourage customers to jettison the fear of insecurity in monetary transactions.

Moreover, Napitupulu et al, (2018) indicated in their study that SMEs in South Tangerang utilized online transaction activities in payment partially through the use of ATMs, only that they need awareness and technical assistance. Syamfithriani et al, 2020 indicate the acceptance of online transactions in commercial activities in the Kuningan regency. Thus, we propose that;

h₄: Insecurity is proportionate to perceived acceptance of Artificial Intelligence in online transactions.

Intelligence and Artificial Intelligence in Online Transaction

Smart card innovative payment systems have digitalized the economy (Chen, 2014). This technological advancement has become an intelligent defense mechanism for financial solutions. This intelligence feature is regarded by customers as a humanization of technology with intelligence attributes demonstration of interaction in semantic understanding ability in tasks of online transaction (Lee and Chen, 2022). Scholars have shown that intelligence attributes increase customers' performance in online transactions (Moussawi et al, 2020, 2022; Lin et al, 2023). Thus, we hypothesize that;

h₅: Intelligence is proportionate to the perceived acceptance of Artificial Intelligence in online transactions.

Anthropomorphism and Artificial Intelligence in Online Transactions

Anthropomorphic implementation indicate the customer's perception of the human-like characteristics of robots (Balakrishnan and Dwivedi, 2021; Marikyan et al, 2022). This can instill positive emotion in customers, attitudes, experiences, and cognitions. The online transaction entails the trust of customers with Artificial Intelligence human interfaces. This human interface understands customers' pecuniary needs and perceived emotions through information provided via pleasant text. Customers can experience warmth reception and interaction. Anthropomorphic elements perceived in online transactions can enable them to obtain friendly service, consistent with customers' usage expectations in online transactions. Artificial Intelligence applications can respond effectively to problems during online transactions and accept customers' requests (Lin et al, 2023). This flexibility from a human perspective, increases customer usage to online transactions. Extant studies have shown that anthropomorphism enables customers to complete online transactions when using Artificial Intelligence in mobile banking applications (Lee and Chen, 2022; Lin et al, 2023). Thus, we hypothesize that;

h₆: Anthropomorphism is proportionate to the perceived acceptance of Artificial Intelligence in online transactions.

Table 1: Demographic profile

Demographic Age	Categories	Frequency	Percentage
Age	18yrs – 25yrs	90	27.3
	26yrs – 35yrs	110	33.3
	36yrs – 45yrs	90	27.3
	46 and above	40	12.1
Sex	M	190	57.6
	F	140	42.4
M/Status	Single	205	62.1
	Married	120	37.9
Employment structure	F/time salaried	90	27.3
	P/time salaried	30	9.0
	Self-employed	90	27.4
	Retired	40	12.1
	Housewife	20	6.0
	Student	60	18.2
Educational level	Primary	05	1.5
	SSCE	10	3.0
	ND	110	33.3
	HND/B.Sc	120	36.4
	M.A/M.Sc	80	24.2
	Ph.D	05	1.5
Profession	Civil servant	90	27.3
	Public servant	110	33.3
	Businessman	130	39.4
Place of resident region	N-west	40	12.1
	N-east	30	9.0
	Mid-belt	90	27.3
	S/south	40	12.2
	S-west	70	21.2
	S-east	60	18.2
Annual income per month	\$200	30	9.0
	\$300	20	15.2
	\$500 and above	60	75.8
Use of online/mobile bank transaction	Daily	250	75.8
	Weekly	20	6.0
	Monthly	60	18.2
Previous investment experience	Insurance	60	18.2
	Haulage	20	6.0
	Banking	250	75.8

Source: Author desk, 2023

Out of the 390 customers randomly chosen, 330 were valid, presenting a response rate of 85% which is satisfactory. The authors tested for non-response by comparing the first three of the respondents to the last three and by comparing the respondents to non-

respondents in terms of key variable study (Werner et al, 2007). We observed that the responses are indifferent, suggesting non-response bias of data. We minimized evaluation apprehension by assuring respondent confidentiality (Podsakoff et al, 2003).

Validity & Reliability Analysis

The reliability is measured by Cronbach Alpha (1951). It is the most used method in measuring latent variables. Table (7) shows that the C.A. values for all constructs stood above 0.70. According to Calisir, Basak and Calisir (2016) construct uniformity level is considered to be good. When C.A. values are greater than or equal to 0.70 indicating a table (3) the K.M.O and Bartlett test for sampling adequacy was significant (KMO = 0.7364, $p = 0.000 < 0.05$) indicating that the variables are reliable and internally consistent.

Table 2: Reliability Assessment

Item	OBS	Sign	Item-test correlation	Item-test correlation	Average Inter Item covariance	Alpha
trimop	330	+	0.7239	0.5554	.2158165	0.7658
trimin	30	+	0.6626	0.4722	.2318854	0.7845
trimdc	330	+	0.7385	0.6187	.2266575	0.7516
trimis	330	+	0.6545	0.4945	.2401142	0.7750
intell	330	+	0.5049	0.3788	.2823045	0.7926
antpsm	330	+	0.6420	0.5295	.258086	0.7716
paaimb	330	+	0.7977	0.7074	.2198711	0.7374
Test scale					.2392479	0.7953

Source: Researcher calculation using STATA ver. 13.0

Table 3: KAISER-MEYER-OLKIN (Measure of Sampling Adequacy)

Variable	KMO
trimop	0.8634
trimin	0.8599
trimdc	0.8216
trimis	0.8089
intell	0.5904
antpsm	0.6205
paaimb	0.6936
Overall	0.7364

Model Specification

This study adapted and modified the model specification of Noreen et al, (2023). They examined Artificial Intelligence (AI) in bank consumers perspective. In five Asian countries (Pakistan, China, Iran, Thailand, and Saudi Arabia). Questionnaires were developed and administered to customers in banks in these five Asian countries.

Awareness, attitude, subjective norms, perceived risk, perceived usefulness, and knowledge of Artificial Intelligence technology were taken as independent variables, and intention to adopt artificial intelligence as independent variables. Our study's originality is in capturing the technology readiness index dimension, intelligence and anthropomorphism as independent variables, and perceived acceptance of Artificial Intelligence in online/mobile banking transactions as dependent variables. The model is specified in econometric form in equation (1)

$$AIMBT = f(TRIOTmPT + TRINVE + TRIDCMF + TRINSCTY + INTEG + ANTPRSM + UT) \dots \dots \dots (1)$$

$$AIMBT = \alpha_1 + \beta_1 TRIOTMPT + \beta_2 TRINVE + \beta_3 TRIDCMF + \beta_4 TRINSCTY + \beta_5 INTEG + \beta_6 ANTPRSM + UT \dots \dots \dots (2)$$

Where;

AIMBT = Perceived Acceptance of Artificial Intelligence in Online/Mobile Banking Transactions

TRIOTMPT = Technology Readiness Index Model of Optimism

TRINVE = Technology readiness index mode of Innovativeness

TRIDCMF = Technology readiness index model of Discomfort

TRINSCTY = Technology readiness index model of Insecurity

INTEG = Intelligence

ANTPRSM = Anthropomorphism

u = Error term

α_0 = constant

$\hat{\alpha}_1 - \hat{\alpha}_4$ = regression coefficient

Sample Size

$$n = \frac{N}{1 + N(e)^2}$$

Where;

n = S. size

N = Pp size

e = err mg 5%

$$n = \frac{15500}{1 + 15500(0.0025)}$$

$$n = \frac{15500}{1 + 38.7}$$

$$n = \frac{15500}{39.7}$$

n = 390

Method of Data Analysis

OLS regression and canonical correlation analysis were used for data analysis for certifying regression model post regression diagnostic Test (PRDT) were carried out before generalization including using VIF test for multicollinearity to test for heteroskedasticity effect and the Ramsey regression specification – error test is employed for an omitted variable (Ramsey RESET) and STATA version 13.0 software are applied as the statistical analysis of collected data.

Descriptive Analysis

Table () shows the mean results, the constructs indicate 5 as the maximum value which explains the story agreement of respondents at some point regarding all the asked, whilst, the minimum value level at (1) whereby the data shows that the respondent has an undecided answer for any asked questions. Moreover, the sample size of 390 respondents is indicated by descriptive data. Following the mean results author depicts that participants agree on concerning optimism (3.969) innovation (3.869) discomfort (4.13) insecurity (4.133) intelligence (4.354) and anthropomorphism (4.236).

Table 4: Descriptive Statistics

Variables	Mean	p.50	Max	Min	N
trimop	3.969697	4	5	1	330
trimin	3.869697	4	5	1	330
trimdc	4.136364	4	5	1	330
trimis	4.133333	4	5	1	330
intell	4.354545	4	5	3	330
antpsm	4.236364	4	5	2	330
paaimb	4.160606	4	5	1	330

Source: Researcher's calculation using STATA ver. 13.0

Table 5: Skewness/Kurtosis for Normality

Variable	OBS	Pr(skewness)	Pr(Kurtosis)	Adj chi2(2)	Prob>chi2
trimop	330	0.0000	0.0036	46.56	0.0000
trimin	330	0.0000	0.0174	41.25	0.0000

trimdc	330	0.0000	0.0000	65.16	0.0000
trimis	330	0.0000	0.0000	64.41	0.0000
intell	330	0.0601	0.0001	15.86	0.0004
antpsm	330	0.0062	0.6545	7.33	0.0256
paaimb	330	0.0000	0.0000	61.60	0.0000

Source: Researcher's calculation using STATA ver. 13.0

Table 6: Correlation Test

The correlation matrix in table () indicates a positive correlation among the studied variables

	trimop	trimin	trimdc	trimis	intell	antpsm	paaimb
trimop	.0000						
trimin	.3529	.0000					
trimdc	.4848	.3986	.0000				
trimis	0.4308	0.2346	0.4384	1.0000			
intell	0.1889	0.1469	0.3214	0.3115	1.0000		
antpsm	0.2942	0.3145	0.3122	0.2395	0.4937	1.0000	
paaimb	0.4873	0.5120	0.5213	0.4024	0.2468	0.6469	1.0000

Source: Researcher's calculation using STATA ver. 13.0

Table 7: Principal Components/correlation

Number of obs = 330

Number of comp. = 7

Trace = 7

Rotation: (unrotated = principal) Rho = 1.000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.26586	2.24396	0.4666	0.4666
Comp2	1.0219	.13692	0.1460	0.6125
Comp3	.884978	.286069	0.1264	0.7390
Comp4	.598909	.0681335	0.0856	0.8245
Comp5	.530775	.0514011	0.0758	0.9003
Comp6	.479374	.261166	0.0685	0.9688
Comp7	.218209		0.0312	1.0000

Table 8: Principal Components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	unexplained
trimop	0.3811	-0.3657	0.1920	-0.3771	-0.4769	0.5599	0.0328	0
trimin	0.3440	-0.3024	-0.4959	0.5915	0.2510	0.3438	0.1152	0
trimdc	0.4102	-0.2016	0.1998	0.3420	-0.4387	-0.6344	0.1984	0
trimis	0.3501	-0.1327	0.6078	-0.0731	0.6829	-0.0089	0.1369	0
intell	0.2944	0.6833	0.2886	0.3870	-0.1651	0.2859	-0.3230	0

antpsm	0.3858	0.4976	-0.3432	-0.3594	0.0463	-0.0573	0.5926	0
paaimb	0.4584	-0.0449	-0.3270	-0.3266	0.1463	-0.2844	-0.6870	0

Following the indicated result from table () optimism, innovativeness, discomfort, insecurity, intelligence and anthropomorphism ($R^2 = 0.6347$) jointly account for 63.47% variation perceived acceptance of artificial intelligence in online/mobile banking transactions for non-included variables, explaining 36.53% variation in online/mobile banking transaction. The standard coefficient (beta) was employed to assess the strength of optimism, innovativeness, discomfort, insecurity, intelligence, and anthropomorphism the regression result in the table () ($t = 3.22$, $\hat{\alpha} = 0.0976$, $P < 0.001$) indicates the existence and qualities of the relationship between optimism, on perceived acceptance on artificial intelligence in an online transaction, is affirmed to be significant. H_2 ($t = 5.50$, $\hat{\alpha} = 0.1559$, $P < 0.000$) which suggests that innovativeness positively influences the adoption of artificial intelligence in online/mobile banking transactions in terms of creativity is supported. ($t = 4.84$, $\hat{\alpha} = 0.1922$, $P < 0.000$) implies that H_3 is supported, thus, discomfort with perceived acceptance of artificial intelligence in online/mobile banking transactions is confirmed to have a positive relationship. H_4 is on the relationship between insecurity and perceived acceptance of adoption of artificial intelligence in online/mobile banking transactions ($t = 3.38$, $\hat{\alpha} = 0.1159$, $P < 0.001$) the result indicates a positive relationship. H_5 indicates the relationship between intelligence on perceived acceptance to adopt artificial intelligence in online/mobile banking transactions ($t = 4.49$, $\hat{\alpha} = 0.231$, $P < 0.00$) indicating a positive relationship. Final, H_6 ($t = 13.10$, $\hat{\alpha} = 0.634$, $P < 0.000$). The positive relationship between anthropomorphism on perceived acceptance to adopt artificial intelligence in online/mobile banking transactions is confirmed.

Table 9: Multiple Regression

Source	SS	DF	MS	Numbers of obs = 330			
Model	115.820653	6	19.3034422	F (3, 246)	=	93.52	
Residual	66.6672254	323	.206400079	Prob>F	=	0.0000	
Total	182.487879	329	.554674404	R-squared	=	0.6347	
				Adj R-squared	=	0.6279	
				Root MSE	=	.45431	
Paaimb	Coef.	Std. Err.	T	P>/E/	[95% Conf.	Interval]	Decision
trimop	.0976395	.0303051	3.22	0.001	.0380192	.1572599	H_1 accepted
trimin	.1559782	.0283769	5.50	0.000	.1001513	.2118051	H_2 accepted
trimdc	.1922595	.0397422	4.84	0.000	.1140733	.2704457	H_3 accepted
trimis	.1159621	.0343589	3.38	0.001	.0483666	.1835576	H_4 accepted
intell	-.2315926	.0515891	-4.49	0.000	-.3330857	-.1300994	H_5 accepted
antpsm	.6347918	.0484562	13.10	0.000	.5394623	.7301214	H_6 accepted
cons	.2141244	.2214685	0.97	0.334	-.2215785	.6498273	

Source: Author's desk table, 2023.

Table 10: Bartlett's Test**Analysis of Variance**

Source	SS	df	MS	F	Prob > F
Between groups	48.3827535	4	12.0956884	29.31	0.0000
Within groups	134.105125	325	.412631155		
Total	182.487879	329	.554674404		

Bartlett's test for equal variance: chi2(4) = 42.5907 prob>chi2 = 0.000
.pca trimop trimin trimdc trimis intell antpsm paaimb

According to the variance inflation factor test, the mean VIF value is $1.45 < 10$. Thus, the reference value is larger, hence this result indicates the non-existence of multicollinearity, and none of the variables is omitted from the model. Due to the result from a test for the Ramsey regression equation specification error test, the result is 0.6570 and this probability value confirms the model has omitted none of the variables.

Table 11: Post Regression Test**Heteroskedasticity**

Breusch-Pagan/Cook-Weisburg test for Heteroskedasticity

Ho: Constant Variance

Variables: Fitted values of 'paaimb'

Chi2(1) = 93.53

Prob>Chi(2) = 0.0000

Ramsey RESET test using powers of the fitted values of 'paaimb'

Ho: Model has no omitted variables

F (3,320) = 0.54

Prob>F = 0.6570

Variable	VIF	1/VIF
trimdc	1.60	0.625668
trimop	1.49	0.669468
antpsm	1.47	0.678467
intell	1.44	0.695420
trimis	1.40	0.716150
trimin	1.29	0.773448
Mean VIF	1.45	

Source: Researcher's calculation using STATA ver. 13.0

Discussion

Artificial Intelligence has become prominent in our daily lives and is also a national concern in all sectors. But banking seems to be a spotlight where insight is mostly

paramount with advancement in technology since it is crucial to customers, organizations, and significantly in online banking, associated fraudulent activities in transactions.

To gain insight, we investigated whether customers were ready to embrace Artificial Intelligence via online/mobile banking transactions. To this end, we analyzed the direct effects of technology readiness indexed, intelligence, and anthropomorphism influenced customer's decision to use analytical Artificial Intelligence to manage online banking transactions. This is the first study to test the effects of technology readiness, intelligence, and anthropomorphism on customer preference for analytical Artificial Intelligence which has been identified as a research gap (Meng, Elliott, and Hall, 2009, Nagy and Hajdu, 2021; Rinjany, 2020).

Been novel, technological discomfort that is the lack of control of technologies experienced by some customers had a positive effect on perceived acceptance of the use of Artificial Intelligence in online/mobile banking transactions. However, the result is probably interesting being that technological discomfort was originally proposed as a Technology readiness-indexed factor that inhibited perceived acceptance (Parasuraman and Colby, 2015). Indeed, discomfort negates perceived acceptance. Artificial Intelligence systems are based on automation, thus the user does not need to deal with the demanding and often problematic tasks of understanding and operating the technology, a task that must be undertaken when using other systems, analytical Artificial Intelligence carries out the task for its users (Belanche et al, 2020). Paradoxically, Artificial Intelligence systems may be embraced by customers who suffer discomfort due to automation processes. These findings provide a provoking insight into Artificial Intelligence usage literature. Additionally, a theoretical contribution of the present study is the finding that technological discomfort, previously regarded as a key barrier to technology acceptance, might act as a driver of comfort (Flavin et al, 2021).

In turn, insecurity concerns reduced customer perceived acceptance of Artificial Intelligence usage in online/mobile banking. Customers whose identity is known may avoid using Artificial Intelligence based financial services. However, this finding is in line with recent research that has indicated there is a need to explore customer's feel of service Artificial Intelligence (Mende et al, 2019). However, as a novel important finding, technological insecurity had a positive effect on perceived acceptance of Artificial Intelligence usage in online/mobile banking services. This is exciting because technological insecurity was originally proposed as a technology readiness-indexed factor that inhibited adoption (Parasuraman, 2000). Indeed, insecurity has also been shown to reduce the perceived acceptance of Artificial Intelligence in online transactions (Shah et al, 2023). Banks' directives on Artificial Intelligence during financial transactions motivate customers. Moreover, Artificial Intelligence financial transactions are automated, and most banks are normally tied to particular personnel to monitor the activities of divided customers. Accounts to ensure safety, since the government of Nigeria has come out with a legal framework to safeguard financial transactions have also

encouraged the customers to continue to use online transactions. The token gateway to online transactions established by banks has further strengthened and safeguarded online transactions (Business Times, 2021). Therefore, contrary to the received opinion, Artificial Intelligence's perceived acceptance in online transactions in banks may be particularly embraced by customers who may have suffered particular issues of technological insecurity because regulatory agencies have been established, and the legal framework has safeguarded the customers. These findings provide a thought-provoking insight especially for regulatory agencies in charge of financial transactions and monitoring of cash movement and Artificial Intelligence adoption, as customers feel secure in financial transactions. The present study finds that technological insecurity previously regarded as a key barrier to technology adoption, now acts as a driver of acceptance even with globalization. Furthermore, this finding questions some service-dominant logic, there is no face-to-face interaction while using Artificial Intelligence for online financial transactions which may lead to lesser customers' perceived acceptance (Shah et al, 2023). In this context, however, customer need to play an active role in alert transactions in their mobile phone to acknowledge such transactions. Additionally, Napitupula et al (2018) in their research show a positive relationship between insecurity and perceived acceptance of online/mobile banking transaction, where SMEs uses ATMs as a means of transfer of payment and other transactions. Also, Synamfithriaric et al, 2020 indicate in their research, the acceptance of e-commerce transactions in Kuningan regency.

The innovativeness dimension of technology readiness positively affects customer's perceived acceptance of Artificial Intelligence in online/mobile banking transactions (Prodanova et al, 2021, Elliott et al, 2012, Hong et al, 2017, Qasem, 2021, Patel et al, 2023). Innovative and updated customers are more engaged in online transactions.

The optimistic aspect of technology readiness is vital to bring desired customers engaging in online transactions through Artificial Intelligence. Optimism is positively linked to perceived acceptance using Artificial Intelligence in online transactions (Godoe and Johansen, 2012, Kaplan and Haenlein, 2020, Aslam et al, 2019, Flavin et al, 2021, Mohan et al, 2023). Artificial Intelligence social features advance customer's quality of life, as social agents.

Additionally, the results show that intelligence and anthropomorphism positive usage of Artificial Intelligence applications in online/mobile banking transactions (Moussawi et al, 2020, 2022, Lin et al, 2023, Lee and Chen, 2022) This promotes consistent perception, expectation, and practical utility in a human-friendly manner, Moussawi et al, (2021).

Conclusion

After conducting the current research effect of technology readiness indexed dimension, including intelligence and anthropomorphism issues on customer perceived acceptance of mobile banking/online transactions in developing nations, especially, Nigeria was investigated and modelled using an Artificial intelligence-based approach. These predictive results indicate that technology readiness indexed, intelligence, and anthropomorphism positively on customers' perceived acceptance of online/mobile banking transactions applications in Nigeria. Furthermore, the result of the Artificial intelligence-based approach tests showed that the proposed research model can be accepted and used to determine customer's perceived acceptance of online/mobile banking transaction applications in contrast to the original technology readiness indexed model, optimism, and Innovativeness where motivator, insecurity, and discomfort are inhibitors. However, the research study showed the contrary. Regarding, inhibitors, where customers exhibited a positive perception toward Artificial Intelligence in online/mobile banking transactions. Nevertheless, these novel findings are crucial to Artificial Intelligence literature and a bond of concern to many researchers. But with this insight and deeper understanding, the status quo has changed for the better; because covid-19 pandemic and the new normal have significantly impacted online transactions in both banking and other financial transaction modes. All other variables such as optimism, innovativeness, intelligence, and anthropomorphism have exhibited a positive link toward online/mobile banking transactions.

This study has several implications, online transactions have facilitated ground-breaking contributions to banking, and the application of Artificial Intelligence development. Nevertheless, its usage needs improvement to captivate the customer's attention, this would enhance customers to be calculative in error detection thereby improving the reliability and enhancing experience in online usage.

In future research directions are concerned, it would be advisable to extend this study in developed nations to compare the results presented here with the new findings.

Contribution to Knowledge

The insight of the present study reveals a paradigm synergy between insecurity and discomfort as motivational variables in the technology readiness index. The interconnection is evident and their investigation is still very limited in the academic literature.

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