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Factors influencing the adoption and intensity of use of AI chatbots for online purchasing in Nigeria

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Abstract

The study investigated factors influencing the adoption and intensity of the use of AI chatbots for online purchasing in Nigeria. A simple random technique was used to select three hundred and twenty respondents in the study area. Information was elicited on the socioeconomic characteristics and factors influencing the adoption and intensity of usage of AI chatbots with the aid of structured questionnaires. Data obtained were analysed using descriptive statistics and regression models. The descriptive statistics were mean, frequency count, standard deviation, and simple percentage. The result revealed an equal distribution of males (50%) and females (50%) in the study area. It was also revealed that the majority (22.5%) of the respondents were between the age of 21-25. Also, the majority (48.93%) of the respondents had completed their first degree and were employed. The result also showed that the majority of the respondents were non-users of online purchasing mediums. From the regression analysis, it was concluded that socio-demographic factors such as age (5%) and years of education (5%) significantly influence the adoption of AI chatbots for online purchases, furthermore, web-based factors like online literacy (5%) and data usage (5%) significantly affect the intensity of AI chatbot use. Perception of risk (1%) and convenience (1%) were significant risk factors influencing the respondents' adoption of AI. The study recommended that educational institutions incorporate digital literacy programs into their curriculum to empower people. Efforts should be made to make data packages more affordable for Nigerians which could improve accessibility to AI chatbots, thereby promoting their intensive use for online purchases.

Keywords: Adoption; intensity; Chatbots; Online; Purchasing; Artificial Intelligence

1. Introduction

According to Khan *et al*. (2018) and Maher *et al*. (2020), chatbots are "artificial intelligence (AI) software that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, mobile apps, or through the telephone." The creation and application of chatbots have increased significantly in Africa, and data and service providers are starting to widely adopt them as a way to meet the needs and desires of their growing clientele (Mogaji *et al*., 2021). The scenario illustrates how more companies in Africa are using AI to power their goods and services; this development is partly due to the continent's boom in data and data gathering and processing capabilities.

The amount of Internet enterprises are rapidly changing due to technology in business (Bhatt, 2014; Oke *et al*., 2023; Saheed et.al, 2022). Due to its potential to facilitate transactions between parties and offer an infinite market capability

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structure, the Internet is making a significant contribution to this revolutionary process (Delafrooz *et al*., 2010). Electronic trades and transactions have brought about a variety of corporate transformations (Liang and Lai, 2001), considering that shopping was primarily done offline before the advent of the Internet. The body of research suggests that Internet technology can promote online buying, especially when it comes to speedier transactions and price comparisons across a variety of options (Ha, 2020). Businesses are becoming more and more prevalent in online marketplaces in Nigeria. (Cuneyt and Gautam, 2004). Several offers are made to clients by online stores such as Dealday, Konga, and Jumia (Philips Consulting Ltd, 2016).

Consumer attitude is critical in affecting how and when to use new technology, especially the use of AI chatbox in purchasing (Venkatesh, 2003, Oke and Ramachandran, 2022). The attitude of an individual comprises beliefs, feelings and behavioural intentions which can manifest in a willingness to make purchases (Bhatt, 2014; Raji, 2020 &et.al Raji et.al. 2024). Concerning Nigeria, there is poor consumer knowledge of online benefits (Pulse Mix, 2021), concern about the quality of offers (Elbeltagi, 2009), need for touch and feel, and product descriptions that are inaccurately done on retailers' websites (Philips Consulting Ltd, 2016; Oke and Ramachandran, 2022). There is no doubt that the barriers have prevented AI chatbot users from achieving a world of efficient and secure transactions, as unsolved security and privacy factors have affected the development and growth of the technology. Other factors affect the adoption and intensity of the use of AI chatbots in Nigeria, hence the need for this study. The objectives of the study were to: describe the socioeconomic characteristics of respondents; evaluate the level of adoption and intensity of usage of AI chatbots; and investigate the factors influencing adoption and intensity of usage of AI chatbots in the study area.

2. Literature Review

2.1. Digital Transformation in Africa

Africa has experienced a range of digital transformation initiatives, including automated sales processing in manufacturing, the use of artificial intelligence (AI) by the government to provide citizen services, the disruption of eCommerce in retail, the integration of patient records in healthcare, and more (Walker, 2020). However, the transformation of financial services has taken the lead in the continent (Ndemo and Weiss, 2017). The origins of the digital revolution can be traced to the introduction of mobile banking by a few telecommunications companies, including Safaricom in Kenya, a subsidiary of the British group Vodafone. This was accomplished through the use of a system called the MPesa system, which quickly surpassed traditional banking methods.

Except for South Africa and the Maghreb region, the average banking rate throughout African countries was between 5 and 15%, making Africa one of the continents with the poorest banking systems. Telecommunication companies have offered a variety of mobile banking services by leveraging their proximity to customers and the availability of mobile terminals, whether they are popular smartphones or common basic phones with features that allow the use of the Unstructured Supplementary Service Data (USSD) protocol (Wayne, et al., 2020).

Digital transformation in Africa has been greatly aided by the rise in mobile phone subscribers and internet users (Ndemo and Weiss, 2017; Nageri, 2013). According to Mhlungu et al. (2019), the successful integration of digital transformation projects will be shaped by aspects such as customer-centricity, governance, innovation, and resource attainment. Walker (2020) posited that the fundamental pillars of digital transformation in Africa are the relevance of the solution, affordability of the transformation, security, and accessibility, particularly concerning the internet.

2.2. Chatbots for Digital Transformation

A chatbot is a humanoid representation of an individual, a group of individuals, or an organisation that can be programmed to respond to and attend to organisational customers' requests in a variety of ways, including written, spoken, or a combination of both (Hatwar et al., 2016). The term "chatbot" originates from the popular term "ROBOT," which denotes a device that can perform human-like tasks, one of which is conversing (Patil and Kulkarni, 2019). They are easier to use in different parts of the world and by different social classes since they are made to adapt to different languages that their users may employ.

Chatbots play a significant function, always ready to offer assistance and support customers, given that the degree to which the client finds it easy to access an appropriate person and/or facility is seen as a critical customer experience quality (Lemke, et al., 2011). According to Alleycat (2017), they are characterized as a powerful, never-sleeping, and affordable means of giving consumers fundamental support. This emphasises the opportunities for change it presents in Africa.

According to Methew (2016), chatbots may respond to customers more quickly in real-time and personalize their experiences by understanding the patterns of their interactions, which gives the impression that the customer is receiving individual attention. Additionally, through customer support interactions, chatbots can gather data about their preferences and make necessary adjustments (Alleycat, 2017). Customers interact with chatbots for healthcare, such as Babylon and Your.MD, by providing details about their symptoms. The chatbot can then detect the issue, offer pertinent and reliable health information, and suggest the best course of action.

Consumers can interact with Amazon's Echo in retail spaces. Within the hospitality industry, Taco Bell also developed Tacobot, an AI-driven ordering platform that lets users customize their meals and place orders by interacting with the chatbot. These demonstrate the significant impact chatbots have on creating an emotional connection between customers and service providers. Similar to how having access to this chatbot brings many unbanked and financially excluded people closer to the bank, there are opportunities to integrate seamless opportunities to improve customers' experiences through interaction when combined with advancements in machine parsing and understanding spoken or typed requests (Quoc, 2016).

2.3. Brief History of Online Shopping in Nigeria

Online purchasing was first credited to an English businessman named Mr. Michael Adrich in 1979, or roughly 45 years ago. It was really basic at the time. He started the "Redifon's Office revolution" in 1980 by introducing a system that made it possible for "business transactions to be completed electronically in real-time and for customers, agents, distributors, suppliers, and service companies to be connected online to the corporate system." In 1980, the innovator employed Videotex technology and enhanced his design to provide better output. On the other hand, Tim Berness-Lee's 1990 World Wide Web server and browser were available for purchase in 1991. 1994 saw the launch of several significant inventions, such as NetMarket, Internet commerce networks, and online banking. NetMarket was the first safe online retail transaction, and it was followed in 1995 by Amazon.com, eBay, and Alibaba, which introduced their websites, Taobao and Tmall, in 2003 and 2008, respectively.

In Nigeria, the introduction and launching of the Mobile Telephony System (an Internet-driven system) in 2001 laid the foundation for the rapid development of the industry (www.businessinfo.com.ncc). One area which has gained prominence today is the Online shopping system. It has now come up as an alternative to the traditional shopping system. Its presence has created a platform for comparison. Online shopping can be done within and outside Nigeria at one's convenience.

2.4. Overview of Online Purchases in Nigeria

Online shopping is the act of purchasing by a customer using an online retailer or a website that is used for online shopping (Gabriel et al., 2016). A business activity conducted over the Internet is what is known as online shopping (Chaffey et al., 2006 referenced in Olasanmi, 2019). Online retailers provide several benefits over brick-and-mortar stores, such as time savings, convenience, a wide selection of goods, and user-friendly websites (Raji, et.al, 2024). Without physically visiting the businesses, customers can buy anything at any time from anywhere in the world. Consumers benefit from comfort and convenience since they can submit a purchase order online at any time with lower transaction costs (Omotayo and Omotope, 2018; Sareen & Jain, 2014; Zhou et al., 2007).

According to Ventures Africa (2015), Nigeria is the country in Africa with the highest rate of e-commerce. The study's results also confirm Nigeria's position as the top online shopper, with an 89 per cent rate compared to 70 per cent for South Africa and 60 per cent for Kenya. Even though the rate of change in the virtual realm is slow, it is evident that Nigerians are choosing the traditional approach over online shopping due to several barriers that prevent them from doing so. Online vendors who entice customers to visit their websites and encourage them to look for products, compare prices and make a purchase have become more prevalent in Nigeria (Ayo et al., 2007; Gabriel et al., 2016; Omotayo and Omotope, 2018). Based on prior research, Nigeria's internet sales bring in over 1 billion naira a month, with over 500 purchases placed daily. According to Olasanmi (2019), a marketer's ability to consistently deliver quality, value, and satisfaction is what currently determines a client's loyalty.

2.5. Theoretical Framework

Theoretical frameworks underpinning this study technological acceptance model (TAM) by Davis (1989) and the theory of planned behaviour (TPB) by Ajzen (1991) Both theories are classical theories used by researchers to explain human behaviour towards the adoption of information technologies (Liebana-Cabanillas et al., 2017a, b). TAM is considered more robust and influential because of its various uses in different technological contexts (Davis, 1989). Studies on online shopping have often used the constructs of TAM and TPB to predict user behaviour (Ha, 2020).

3. Research Methodology

3.1. Method of Data Collection

This research employed a correlational research design. The respondents for this study include two hundred, and six hundred (206) students who were selected through a process of stratified random sampling from Universities from Lagos and Oyo States.

3.2. Area of Study

The study was conducted in the South-West of Nigeria, with a focus on Lagos and Oyo states due to the number of businesses, and the abundance of young people that are eager for production.

3.3. Source of data and method of data collection:

The study made use of primary data sourced with the use of a well-structured questionnaire. They were administered both manually, using paper and pen, and via the use of Google Forms for ease and maximum reach. The questionnaire consists of two segments, Section A – Socio-economic characteristics, and Section B – consumer behaviour and AI chatbot use.

3.4. Sample technique and size

A simple random technique was used to collect data used for the study. A total of 320 respondents were sampled and their responses were analysed with the use of MS Excel and IBM SPSS 25.

3.5. Data analytical technique

Descriptive statistics such as percentages, mean and frequencies were employed to determine the socio-economic characteristics of the sampled respondents. Inferential statistics was also used.

4. Results and Discussion

Table 1 revealed the socioeconomic characteristics of respondents. It was revealed that there was an equal distribution of respondents in the study area. Most of the respondents were between the age range of 21-25. The majority (36.25%) of the respondents were employed. The average income made was 69,750.42. The majority of the respondents had their first degree. The majority of respondents were in the age range of 21-35, with the mean age being 29.5. The majority of the respondents were employed, followed by students, self-employed individuals, and the unemployed. The mean income of the respondents is ₦69,750.42, with a standard deviation of ₦15,245.50. The majority of the respondents had completed their first-degree education, followed by postgraduate and university (1st degree completed). The mean online shopping frequency is 2.41 times, with a standard deviation of 1.16. This indicates that, on average, respondents engage in online shopping a few times a month.

Table 1 Socio-economic characteristics of Respondents

Variable	Frequency	Percentage
Gender		
Female	160	50.0
Male	160	50.0
Total	320	100.0
Age		
≤20	60	18.75
21 – 25	72	22.5
26 – 30	52	16.25
31 – 35	68	21.25

36 – 40	34	10.62
41 – 45	22	6.88
46 – 50	12	3.75
Total	320	100
Mean	29.5	
SD	10.63	
Primary occupation		
Student	89	27.81
Employed	116	36.25
Self-employed	68	21.25
Unemployed	47	14.69
Total	320	100
Annual average income		
≤20000.00	40	12.5
20001.00 - 40000.00	82	25.5
40001.00 - 60000.00	97	30.3
60001.00 - 80000.00	30	9.5
80001.00 - 100000.00	25	7.7
≥100001.00	46	14.5
Total	320	100
Mean	69,750.42	
Std. Dev.	15,245.50	
Educational level		
Vocational	5	1.71
Primary	6	1.97
Secondary	18	5.63
Undergraduate	64	19.97
University (1st degree completed)	157	48.93
Postgraduate	70	21.79
Total	320	100

Users of online purchasing medium	156	48.75
Non-users of online purchasing medium	164	51.25
	320	100

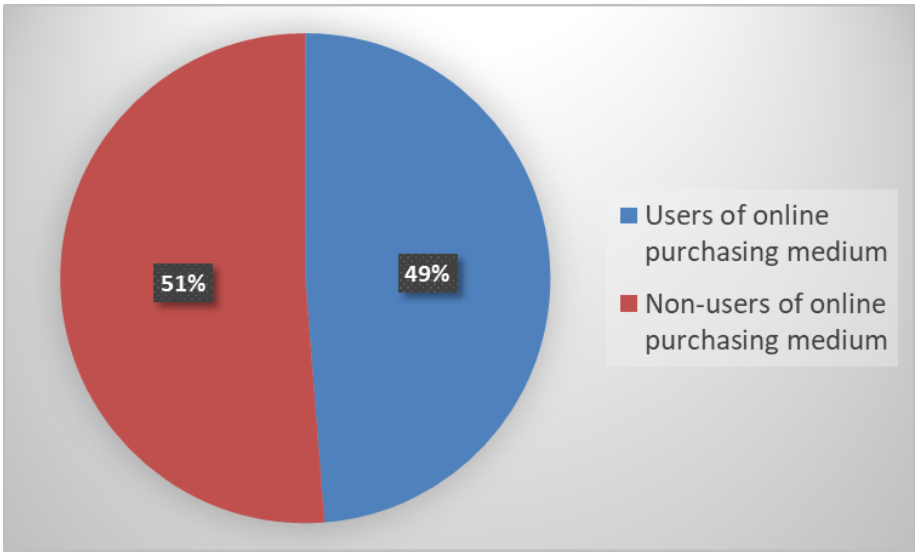

Figure 1 Online purchasing medium typology

Table 3 shows the summary statistics for various variables used in estimating the decisions to adopt and the intensity of adoption of AI chatbots for online purchases among respondents. The result revealed that the mean value of sex of respondents was 0.50 which suggested an equal representation of males and females in the study area. The average age of respondents was 29.5 years, with a standard deviation of 10.63. On average, respondents had 4.44 years of formal education. The mean income of respondents was ₦69,750.42 with a standard deviation of ₦15,245.50. Respondents had an average of 7.2 online purchasing experiences per month, with a standard deviation of 2.06. On average, 71% of respondents perceive financial risk in online purchases. The mean value of 0.69 indicates that a majority of respondents perceive product risk in online purchases. The result also revealed that the majority (81%) of the respondents perceived online shopping as convenient. It was also revealed that 33% of respondents have online literacy. The average number of years on the internet is 9.9, indicating a relatively experienced user base. On average, 92% of respondents own browsing devices. Also, respondents spend an average of ₦1,150 on data monthly. Most (41%) of the respondents perceived their information to be secure online

Table 2 Summary statistics of variables used in the estimation of the decisions to adopt and intensity of adoption of the use of AI Chatbots for online purchase

Variables	**Description**	**Mean**	**SD**
Socio-demographic			
SEX	Sex of Respondents (1 = Male, 0 otherwise)	0.50	0.50
AGE	Age of respondents in years	29.5	10.63
YEAREDU	Number of years of formal education		4.44
MONTHINCOME	Monthly income (₦)	69,750.42	15,245.50
EXPERIENCE	Online purchasing experience (number/monthly)	7.2	2.06
Risk factors			
PERCFINRISK	Perception of financial risk (1 if financial risk is perceived, 0 otherwise)	0.71	0.61
PERCPRODRISK	Perception of product risk (1 if product risk is perceived, 0 otherwise)	0.69	0.51
PERCCONV	Perception of convenience (1 if convenience is perceived, 0 otherwise)	0.81	0.42
Web-based factors			

ONLINELIT	Online literacy (1 if had online literacy, O otherwise)	0.33	0.18
YRINTERNET	Year on internet	9.9	4.11
DEVICOWNSHIP	Ownership of browsing device (1 if owned, 0 otherwise)	0.92	0.55
DATAAMT	Amount spent on data monthly (₦)	1,150	470
Privacy factors			
MYINFOSEC	My information online (1 if secrecy is perceived, 0 otherwise)	0.41	0.33
MYINFOMIS	My information online (1 if misuse is perceived, 0 otherwise)	0.55	0.51
Dependent variable variables			
Adoption of AI chatbots	1 = adoption, 0 = no adoption		
Intensity of adoption (level)	Number of use of AI chatbots per month	2	1.71

₦ is the Nigerian currency

Table 4 shows the results of a probit regression analysis for determining the factors influencing the adoption of AI chatbots for online purchases in Nigeria. Age (5%) and years of education (5%) were significant socio-demographic factors influencing the adoption of AI chatbots. Perception of financial risks (5%), product risks (1%) and conveniences (5%) were significant risk factors influencing the adoption of AI chatbots for online purchases in Nigeria. Online Literacy (5%) was a significant web-based factor influencing the adoption of AI chatbots for online purchases in Nigeria. Monthly amount, years of internet, amount of data, and perception of Information Security were not significant factors influencing the adoption of AI chatbots

Table 2 Probit estimate for determinants of the decision to adopt AI Chatbots for online purchase in Nigeria

Explanatory variables	**Coefficient**	**P-value**	**Marginal effect**
Socio-demographic			
AGE	-0.002**(0.001)	0.023	0.013
YEAREDU	0.005**(0.002)	0.021	0.018
EXPERIENCE	0.002(0.014)	0.865	0.002
OFFINCOME	0.182(0.131)	0.170	0.333
Risk factors			
PERCFINRISK	-0.042**(0.012)	0.001	0.311
PERCPRODRISK	-0.244***(0.054)	0.000	0.218
PERCCONV	0.008**(0.004)	0.032	0.112
Web-based factors			
ONLINELIT	0.034**(0.011)	0.002	0.133
YRINTERNET	0.613(0.714)	0.213	0.222
DEVICOWNSHIP	0.333(0.314)	00.181	0.111
DATAAMT	0.413(0.231)	0.116	0.313
Privacy concern factors			
MYINFOSEC	0.013(0.030)	0.671	0.001
MYINFOMIS	-0.112**(0.054)	0.036	0.014
CONSTANT	1.608***(0.200)	0.000	-

LOG-LIKELIHOOD FUNCTION	-121.39		
CHI-SQUARE	174.88		
SIGMA	0.156 (0.016)		
NUMBER OF OBSERVATIONS	320		

**Significant at 5%, ***Significant at 1%

Table 5 shows the results of a truncated regression analysis for determining the factors influencing the intensity (level) of the use of AI chatbots for online purchases in Nigeria. The result revealed that years of formal education (5%) were socio-demographic factors influencing the intensity of the use of AI chatbots for online purchases. Online purchasing experience and monthly income were not significant socio-demographic factors influencing the intensity of the use of AI chatbots for online purchases. Online literacy (5%) and the amount of data used (5%) were significant web-based factors affecting the intensity of AI chatbots for online purchases. Perception of financial risk (1%) and perception of convenience (1%) were significant risk factors influencing the intensity of AI chatbots.

Table 3 Truncated regression estimates for intensity (level) of use of AI Chatbots for online purchase

Explanatory variables	**Coefficient**	**P-value**	**Marginal effect**
Socio-demographic			
AGE	-0.055(0.042)	0.030	0.044
YEAREDU	0.271**(0.112)	0.004	0.029
EXPERIENCE	0.248(0.560)	0.060	0.005
OFFINCOME	0.815(0.295)	0.380	0.003
Risk factors			
PERCFINRISK	-0.361***(0.030)	0.000	0.005
PERCPRODRISK	0.529(0.178)	0.482	0.082
PERCCONV	0.182***(0.030)	0.000	0.005
Web-based factors			
ONLINELIT	0.139**(0.125)	0.016	0.030
YRINTERNET	0.294(0.262)	0.577	0.002
DEVICOWNSHIP	0.052(0.107)	0.631	0.071
DATAAMT	0.193**(0.041)	0.032	0.041
Privacy concern factors			
MYINFOSEC	-0.126(0.107)	0.631	0.031
MYINFOMIS	-0.225***(0.062)	0.000	0.068
CONSTANT	-0.816(3.253)	0.808	-
LOG-LIKELIHOOD FUNCTION	-108.46		
NUMBER OF OBSERVATIONS	320		

**Significant at 5%, ***Significant at 1%

5. Conclusion

This study concluded that there are significant factors influencing the adoption of AI chatbots for online purchases and the intensity of their use in Nigeria. Specifically, socio-demographic factors such as age and years of formal education significantly impact both adoption and usage intensity. Perception of financial risks and conveniences were significant

risk factors influencing the adoption of AI chatbots. Furthermore, web-based factors like online literacy and the amount of data used also play crucial roles in determining the intensity of AI chatbot use.

Recommendation

The study recommended that educational institutions incorporate digital literacy programs into their curriculum to empower youths with the necessary skills to navigate and utilize AI-powered technologies effectively. Concerned stakeholders should concentrate on addressing perceived financial and product risks associated with online purchases to instil consumer confidence and promote the widespread adoption of AI chatbots. User interface design should prioritize simplicity and convenience to facilitate easy adoption in Nigeria. Efforts should be made to make data packages more affordable for people, which could improve accessibility to AI chatbots, thereby promoting their intensive use for online purchases. Also, robust measures must be put in place to protect user privacy and data security is essential to build trust and encourage sustained engagement with AI chatbots.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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