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Factors Affecting the Adoption of E-commerce: A Study in Nigeria

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Abstract: Commerce, the negotiated exchange of goods and services has been in tradition for thousands of years, but due to the invention of internet, web technologies and other electronic devices, led to e-commerce. The purpose of this study is to know the factors affecting the adoption of e-commerce in Nigeria. A questionnaire was designed for managers of business institutions, users and non users of e-commerce in Nigeria to investigate their use of e-commerce and to know what factors are restricting people from using e-commerce in Nigeria. Participant were predominantly male and majority of the respondent were between 20-49 years of age, most have good educational background of at least BSC\HND level and majority of them have heard about it but it is unfortunate that only few people have adopted it. Based on these findings, result shows that some of the factors affecting the adoption of e-commerce in Nigeria are establishing cost, accessibility, privacy and confidentiality, data security, network reliability, credit card threat, authenticity, citizen's income and education to mention few. Factor analysis was used to test which of the factors has the greatest effect i.e., the main factor affecting the adoption of e-commerce in Nigeria and the result of the study shows that the major problems facing e-commerce in Nigeria are the issues of security and citizen's income and therefore the implementation of sophisticated security measures could make a difference and change Nigerian's mentality about e-commerce.

Key words: Nigeria, e-commerce, security, citizens income, electronic data interchange, credit card, internet

INTRODUCTION

Over thousands of years that people have been engaging in commerce with one another, they have adopted the tools and technologies that are available. For example the advent of sailing ships in ancient time open new awareness of trade to buyers and sellers (Gary, 2003). For decades, developed countries like Britain, USA and Brazil etc. have been using various e-commerce tools to conduct various types of business transactions. Banks have used EFTs (Electronic Funds Transfer) to move customer's money around the world and businesses are using EDI (Electronic Data Interchange) to place order and send invoices and also internet facilities have been used by business managers or staff and customers which created a good platform for them to communicate.

In terms of international and global comparison, internet usage in Nigeria is still relatively low and therefore e-commerce is still in the rudimentary stage. Study has shown that there is an increasing awareness of the benefit and potential opportunities arising from e-commerce, but there are limitations to its adoption in Nigeria. Some of factors that have hitherto hampered the adoption of e-commerce are many among which are

establishing cost, accessibility, data security, network reliability, privacy and confidentiality, threat, authenticity of products, citizen's income and education (Pom and Swatman, 1998; Vadapalli and Ramamurthy, 1998). While these negative factors still remain, recent study shows that e-commerce is slowly but surely taking off gradually in Nigeria and the most obvious area of progress is in one branch banking system and payment system where both single and multipurpose smart cards are generally been introduced into Nigeria banks. The initial advances have been made in e-banking and payment is actually an expositive step in that it could be the major boost to the adoption of e-commerce service generally among Nigerians in that the lack of ready access to remote payment mechanism has been one of the major factor hindering the development of e-commerce in Nigeria (Olatidoye, 2004). With these in mind, these study was undertaken to know and test which factors are the major factors affecting e-commerce in Nigeria.

According to the definition of Olatidoye (2004), E-commerce is the paperless exchange of business information using Electronic Data Interchange, electronic mail, computer bulletin board, FAX, Electronic Fund Transfer and similar technologies. The information

technology industries viewed e-commerce as an electronic business application aimed at commercial transaction. It also means the conduct of business commercial communication and management through electronic data interchange and automated data connection system and according to earlier study, whether companies are doing business over the internet or not, security is a serious issue (Grant, 2001), customers engaging in e-commerce need to feel confident that their transaction are secure from prying eyes and safe from alteration, some information are critical to transaction while others may not e.g., if a customer wants to make a purchase online or by phone, a credit card number and expiration date must be provided. Even if the customers trust the company with private information, he may not be confident in your ability to guard that information (Claudia *et al.*, 2001; Jarvenpaa and Todd, 1997).

Before e-commerce came into Nigeria, the method of transaction used is known as traditional commerce which has its origin before recorded history when our ancestor first decided to specialize their everyday activities, instead of all family units to do all jobs to make their living, they developed skills in only one of these area and traded for other needs e.g., a farmer can exchange farm product with a tool making family and so on. Eventually, this bartering method gave ways to the use of currency, making transaction easier to settle. E-commerce therefore is an extension of traditional commerce which is the facilitation of commercial transaction electronically done using EDI to send commercial document like purchase order or invoice. Later it came to include activities more precisely termed web commerce i.e., the purchase of goods and services over the World Wide Web through secure server, a special server protocol, which encrypt confidential ordering data for customer protection. Presently in Nigeria, traditional commerce is still the main method of transaction, only few people are using e-commerce. An important function of e-commerce is the handling of payment over the internet. Most e-commerce involves the exchange of some form of money for goods and services. Implementation of payment system for e-commerce is still evolving in Nigeria thus the number of proposal and implementation of payment system currently compete for dominant. Regardless of the format, e-commerce is far cheaper than the mailing of paper checks. Today, four basic ways to pay for purchase that dominate both traditional and electronic business to consumers commerce are cash, checks, credit cards, debits cards, but in Nigeria today, cash and checks are the main ways used to pay for purchase but credit card is by far the most popular form of consumer electronic payment online in the developed nation. Recent survey found that more than 80% of worldwide internet consumers purchases are paid for with credit cards and this has very

limited use in Nigeria. Payment card transaction follows these general steps once the merchant receives consumer payment card information.

- The merchant authenticate the payment card to ensure it is valid and not stolen
- The merchant check the payment card issuer to ensure that credit or fund are available and put a hold on the credit line or the fund needed to cover the charge.
- Settlement occur usually few days after the purchase which means that funds travel between banks through the automated clearing house system into the merchant account. Other means of payment system are electronic cash, electronic wallet and stored value card etc.

Research variables

Accessibility: In the context of e-commerce, accessibility can be defined as the extent to which the needed technology for e-commerce are available for individual to use. Also how easy and often citizens of Nigeria have access to all the technology needed for e-commerce like internet, credit cards etc.

Cost of implementation: Among the factors that have been suggested to be influencing adoption decision is the cost of implementation. These can be defined as the total amount that will cost business organizations. Many organizations in Nigeria believes that the cost of implementing e-commerce is too high and that the money can be used for another purpose that will be more effective and profitable than the benefits that can be derived from e-commerce.

Privacy and confidentiality: Many people in Nigeria are afraid to divulge their personal information based on an assessment of risk and also the ease with which consumers personal information, their browsing and transaction habits can be captured online and the potential opportunities for misusing this information may raise the degree of privacy (Leo, 2004) risk to unacceptable level. Therefore it can be defined as the extent to which consumers believes that electronic commerce will not compromise his or her privacy.

Security: This is can be defined as the extent to which consumers believe that his or her payment online is free from unauthorized access, use, alteration and destruction. Although there is a close relationship between security and privacy, there are still some differences, Leo (2004) showed the difference as while privacy is related to what companies consciously decide to do with consumers' data, security is concern with any inadvertent compromise

of consumers data to a third party (e.g., hackers and identity theft) and also from survey conducted for Cyber Source Corps (Nasdaq:CYBS) Nigeria was chosen as the country posing the highest risk of online fraud (31%). So from these, many Nigerians believe that their credit card information is not secure on internet.

Income: This can be defined as the amount of money available to individual or household after payment of all compulsory taxes.

Network reliability: This can be defined as the ability of company to rely on the transfer of its confidential and critical data over the internet, these can be caused due to the existence of outdated web server or application that were not carefully installed initially (Soliman and Janz, 2004). Nigerian being a developing country still suffer good communication network. There are few Internet Service Provider and even those that provide internet services provide bad services to the extent that most internet users waste most of their time browsing through the internet without signals.

Authenticity: This is the ability of the quality of goods and services displayed to be meet the way it is displayed i.e. consumers should get the exalt quality displayed on the internet. Many organization and business setup in Nigeria will just provide an attractive website, producing low quality product and given low quality service but displaying high quality goods and services so as to attract more consumers.

MATERIALS AND METHODS

Survey instrument and sampling procedure: The data used for this study was gathered from the questionnaire designed and a random sample has been taken from various commercial centers in the entire six geo-political zones that Nigeria is divided into (Appendix). Participants were mainly adults who reside in big cities and the commercial centers in these geo political zones like Lagos, Port Harcourt and Kano etc. each with a population of over two million. From each zone, a proportional random sampling was performed to identify about 200 potential respondents making 1200 potential respondents from all the six zones. These 1200 respondents were later split to users and non users of e-commerce, this was done to know the reasons why all the non users have not been using it and to know the problems those people using e-commerce are facing and also to know their precept if there is any advantage of e-commerce compared to traditional commerce. Finally, of these 1200 potential

respondents, only 300 respondents were targeted for collecting the data for this study. The questionnaires were first pre tested among convenience colleagues, students and general public to comment on the relevance and wordings of the questionnaire items, length of survey and time taken to complete the questions and it was also reviewed carefully by professionals with extensive international experience. The comment and suggestion of these professionals regarding the clarity, validity and consistency of the question were incorporated into the survey instrument, some of the questionnaire items were dropped, its layout was modified and the wordings of some of the questionnaire were changed to improve its quality. Three hundred questionnaire were finally distributed and the total of 130 responses were received which show a response rate of 43.3% and out of these 130 received, 25 were found incomplete and useless, 15 did not return their questionnaire at all. Therefore the total of 90 useable questionnaires was received.

Respondent profile: Among the respondents that their questionnaires were found useful, 61 (67.8%) were male and 29 (32.2%) were female and majority of them 84 (93.8%) were between the age 20-49 and only 6 (6.2%) were over 50 years and above. Also concerning their educational background 52 (56.3%) have a bachelors degree or Higher National Diploma and about 7.7% had completed postgraduate degree showing that respondent were well educated. For clarity, frequency distribution of respondents on demographics issues is presented in the Table 1.

Also most of the respondents are member of business/cooperate organizations; only few are students, member of government organization and examination bodies. Result also showed that 70% of the respondents have heard about e-commerce before but only 32% have been using it for about 2 years or more.

Table 1: Frequency distribution for respondent's demographics

	No. of respondents	Percentage (%)
Sex		
Male	61	67.80
Female	29	32.20
Age		
Under age	0	0.00
20-29	20	22.20
30-39	32	35.60
40-49	32	35.60
50 and above	6	6.60
Educational background		
Primary	0	0.00
Secondary	5	5.60
OND	8	8.90
BSC/HND	70	77.80
Others	7	7.77
Total	90	100.00

RESULTS

The variables used in the study i.e., cost of implementation, privacy and confidentiality, data security, citizen’s income, network reliability and authenticity of goods displayed were measured on a 5 point likert scale anchored by 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), 5 (strongly agree). In order to access convergent and discriminate validities. The research variables were subjected to the Principal component analysis (a correlation matrix approach) using orthogonal rotation specifically varimax rotation. Also the KMO and Bartlet of sphericity was also used to test if the sample is adequate and the value of KMO in this analysis was 0.629 which confirms the appropriateness of proceedings with the analysis i.e., sample is adequate.

Table 2 shows the correlation matrix of all the variables and it shows that all the variables correlate fairly well and none of the correlation coefficient is particularly large, therefore there is no need to eliminate any variable at this point. Also it can be noticed from the table that privacy and confidentiality has the highest positive relationship and also the highest inverse relationship exist in row 4 and 5 and column 4 and 5 which are between data security and citizen’s income. The determinant was used to test for multicollinearity and since it is greater than 0.00001, multicollinearity is not a problem for these data. Table 3 shows all the factors extractable from analysis along with their eigenvalues, the percentage of variance

attributed to each factors and also shows the cumulative variance of the factors and the previous factors. In the final part of the table, the eigenvalues of the factors after rotation are displayed and thus has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the two factors is equalized. Before rotation, factor 1 accounted for considerably more variance than the other (27.790% compared to 21.101%). However after extraction, it accounts for only 25.624% of variance compared to 23.265%, respectively. Table 4 shows the component matrix before rotation and all the loadings less than 0.6 are suppressed in the output so there are blank spaces for many of the loadings less than 0.6. It can be observed from the table that cost of implementation, citizen’s income and privacy and confidentiality load on factor 1 and only data security load on factor 2. Table 5 is the table of the factor loading for each variable into each factor. It contains the same information as the unrotated component matrix in Table 4 except that it is calculated after rotation. According to Nunnally recommendation, all the primary factors loading should be greater than 0.5, but for this test, all factors loading were greater than 0.7 which demonstrates a good match between each factor and related variables. Also the variables are listed in the order of size of the factor loadings. From this table, it can now be observed that cost of implementation and accessibility load on factor 1 while data security and citizen’s income are loading on factor 2.

Table 2: Correlation matrix result

	Accessibility	Cost of implementation	Privacy and confidentiality	Data security	Citizen’s income	Network reliability	Authenticity of goods and service displayed
Accessibility	1.000						
Cost of implementation	0.299	1.000					
Privacy and confidentiality	-0.153	-0.382	1.000				
Data security	-0.220	0.084	0.124	1.000			
Citizen’s income	-0.350	-0.067	0.398	-0.439	1.000		
Network reliability	0.173	0.236	0.022	-0.076	0.157	1.000	
Authenticity of goods and services displayed	0.094	0.254	0.024	0.268	-0.1444	0.207	1.000

Table 3: Total variance of the component

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	1.945	27.790	27.790	1.945	27.790	27.790	1.794	25.624	25.624
2	1.477	21.101	48.892	1.477	21.101	48.892	1.629	23.268	48.892
3	1.314	18.765	67.657						
4	0.888	12.692	80.349						
5	0.653	9.331	89.680						
6	0.584	8.343	98.023						
7	0.138	1.977	100.000						

Table 4: Component matrix^a

	Component	
	1	2
Cost of implementation	0.678	
Citizen's income	-0.673	
Privacy and confidentiality		
Accessibility		
Authenticity of goods and services displayed		
Data security		-0.804
Net work reliability		

Extraction method: Principal component analysis, a. 2 components extracted

Table 5: Rotated component matrix^a

	Component	
	1	2
Cost of implementation	0.735	
Accessibility	0.701	
Privacy and confidentiality		
Net work reliability		
Data security		-0.813
Citizen's income		0.813
Authenticity of goods and services displayed		

Extraction method: Principal component analysis, Rotation method: Varimax with kaiser normalization, a. Rotation components in 3 iterations

DISCUSSION

From all the variables, only four variables were found to be factors affecting the adoption of e-commerce in Nigeria and these factors are the cost of implementation, accessibility, data security and citizen's income. From Table 5, these variables have high factor loadings on factor 1 and factor 2 and possibly when the cost of implementation is high, then it will affect its accessibility by the people in the country because few company will be able to afford its implementation and thereby there will be little resources for many people who are interested in e-commerce to share. Also, from the table, data security and citizen's income have the highest factor loadings among all the variables which signify that among all the factors, these two are the most significant. It can also be said that citizen's income is the main determinant to high loadings of accessibility. The major factor affecting the adoption of e-commerce has been the perception of poor security associated with payment method and online business transactors in Nigeria are still worry about transmitting their credit card information over the internet and the innovation of payment technologies and process which should have improve the security of data and payment method is impossible due to their cost and thereby making security problem a unique one in Nigeria. Unless online merchant introduces some countermeasures that will eliminate data and credit card threat and convince people about the existence of high security standard, people altitude and adoption of e-commerce will seems difficult or impossible in Nigeria. Also the result shows that the level of income of Nigerians is low and this therefore makes many people to have the intention that

traditional commerce is preferable to e commerce and this will definitely influence the accessibility of e-commerce technology like internet, credit cards and others, they prefer using their money to buy easily accessible and secure product than wasting it in cyber cafes prone to hackers and other threats. It is therefore of high importance for Nigerian government to check the standard of living and find a means of improving the level of income of citizens so that e-commerce can be adopted fully in Nigeria.

CONCLUSIONS

Out of many factors that has were tested to be influencing the adoption of e-commerce in Nigeria i.e., influencing the willingness of people to use this method of transaction, four factors have been discovered to be the more significant factors. However, the study also stressed that factors such as data security and citizen's income are the most significant factors affecting the adoption of e-commerce in Nigeria. The study also shows that authenticity of goods and services displayed on internet, privacy and confidentiality and network reliability are of little or no concern to people and it is also in support of prior research that security is the major factor influencing e-commerce in many developing countries (Balenger *et al.*, 2002). This study provides practitioners and researchers with a new set of factors that are perceived to be affecting e-commerce adoption in Nigeria.

Limitation of study: Investigating e-commerce adoption in Nigeria is relatively new and there is also limitation in the area of sampling and non response bias, some of the organizations visited for assistance declined to give the required information and those that did fail to keep appointment, some did not even return the questionnaire given to them. Some of the respondent do not know much about e-commerce and thereby filled the questionnaire the way it pleases them

Contribution: This study provides new insight of new factors affecting e-commerce adoption in Nigeria citizen's income and Nigeria being a developing country, many people still live in poverty and therefore for e-commerce users to increase in Nigeria, the bad economic situation must be checked by the government and concerning the issues of security, organizations must invent sophisticated security measures so that credit card and social security numbers cannot be accessed by the hackers. Also organization must organize an open lecture on television and radio stations to assure people that they are free of privacy and security threat.

Appendix

E-commerce is the buying, selling, marketing and servicing of goods and services using electronic means. It is also a paperless exchange of business information using electronic data interchange, electronic mail, electronic fund transfer and other similar technologies.

Instruction: Kindly fill this questionnaire. Your answers will assist in determining the future of E-commerce in Nigeria. Tick as appropriate (In some cases, you can tick more than one if considered necessary).

SECTION A Demographics question

1. Sex
(a) Male (b) Female
2. Age
(a) 15-19 years (b) 20-29 years
(c) 30-39 years (d) 40-50 years
(e) 50 years and above
3. Educational Background
(a) Primary (b) Secondary
(c) OND (d) B.Sc./HND
(e) Others please specify _____
4. For the purpose of this study, I am primarily
(a) A student
(b) Member of business/corporate/non profit organization
(c) Member of government organization
(d) Member of educational set up

Section B Related questions

5. Have you heard about E-commerce before?
Yes No
6. For how long have you heard E-commerce? _____
7. Have you use E-Commerce before
Yes No
If your answer to question seven is Yes, kindly answer the following question
8. For how long have you been using it? _____
9. How would you rate the use of E-commerce in Nigeria?
(a) 10% (b) 25% (c) 40% (d) 50% (e) 51% and
Above
10. Would you prefer E-commerce to traditional commerce?
NOTE: Traditional commerce is face to face transaction
(a) Very well (b) Partially (c) Not at all
11. What type of people do you think use E-commerce around you?
(a) Rich (b) Average (c) Poor (d) Educated
12. What type of organization do you think use E-commerce around you?
A. Financial institution
B. Production company
C. Educational sector
D. Others
Please specify _____
13. In your view, what do you think are the key benefit associated with E-commerce.?
A. Increase sales and decrease cost
B. Increase purchasing opportunity for the buyer
C. Increase the speed and accuracy with which business can obtain information
D. Facilitate new type of competition
E. Enable organization to educate customers and prospect
F. Increase the speed and accuracy with which business can obtain information.
14. What do you think would be the main challenges to implementing E-commerce in your area?
A. Lack of security equipment to deal with threat of credit card
B. Low personal income of citizens
C. True and cost of implementation
D. Low computer literacy level
E. Outdated business practices and business mentality of some business organization.

Appendix: Continued

15. I would characterized myself regarding E-commerce most closely as
A. I do not use E-commerce technology (such as E-mail, internet credit card etc.) very much
B. I use e-commerce technologies for my own personal use
C. I use it only when transacting internationally
D. I use it for both National and international transaction
16. The likelihood that I will practice E-commerce in future is?
A. Definitely not B. Probably not
C. Probably Yes D. Definitely Yes
17. What share of transaction in your organization is done electronically?
(a) None (b) 1-5% (c) 5-20%
(d) 20-40% (e) 40-50% (f) 50% and above
18. What will determine your use of e-commerce in the next few yrs?
(a) Cost effectiveness
(b) Resolution of internet service provider relate problem
(c) Improved credit card security improvement
(d) Don't know
(e) Others Pleas specify _____

Section C Scale items for the factors

Think about your most recent experience as a person desiring to practice or that has been practicing e-commerce and rate the following question according to how strong you agree or disagree to the questions. We want to know your perception of e-commerce. Please do not answer based on how you personally feel about the issues.

1. The technology needed in e-commerce is not available to me
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree
2. Cost of implementing e-commerce is not a problem in Nigeria
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree
3. I am not afraid of privacy and confidentiality issue
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree
4. I am not concern about security in e-commerce environment.
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree
5. Rate of using E-commerce is not affected by citizen's income
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree
6. The internet is considered to be a reliable communication medium to transact business
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree
7. I am not concern with the authenticity of goods and services displayed on internet
(a) Strongly disagree (b) Disagree (c) Neutral (d) Agree (e) Strongly agree

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