WEBSITE USABILITY AND CONSUMER TRUST IN NIGERIA

By

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ABSTRACT

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This research tests the dependence of consumer trust in eCommerce in Nigeria on the ease of use of a website. The eCommerce terrain in Nigeria is expanding with many companies going online. The majority of new businesses expect that consumers transact readily on their not very popular websites. This study uses an unfamiliar web vendor in a new business area (an eBook store) to test the level of trust consumers have viz-a-viz the usability of the website.

The interpretation of trust in this study is in the consumer’s *intention to purchase* from the website and the testing questions have been built around this concept. This study initiates a series of usability tests to ascertain the ease-of-use of the website. Usability factors tested included “Get it” test to determine if at first glance, users understood what the website represented and then the “Task-based” tests to determine if users are able to locate information on the site and use the website with minimal frustration. Following the usability tests, a survey is conducted on the same website and statistical analysis of the results is carried out in an attempt to demonstrate a correlation between usability and trust based on the answers provided by respondents.

The results from this study show that usability does contribute significantly to trust, which is the intention of a Nigerian consumer to transact with a relatively unknown web vendor. With a relatively high correlation, a linear relationship was found to exist between the independent variable usability and the dependent variable trust: lower usability levels brought about lower trust levels and higher levels of usability led to higher levels of trust. Usability was found to explain about 36% of the variance in the dependent variable: trust.

DECLARATION

I hereby certify that this dissertation constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

I declare that the dissertation describes original work that has not previously been presented for the award of any other degree of any institution.

Signed,

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# Introduction

“A website breaks down borders and opens your business up to customers around the world 24 hours a day, 7 days a week.  Help customers find you whether they are down the road, across Nigeria or around the World” ([ngbo.com, n.d](#Ngbo2012)). The Get Nigerian Businesses Online initiative (powered by Google Nigeria) provides free domain names, business websites and web hosting services to Nigerian SMEs. The success of E-Commerce giants like Amazon, eBay and Yahoo is very well known and acknowledged worldwide. Like consumers all over the world, many Nigerians use these popular websites which were also at one time E-Commerce startups. It is the expectation of E-Commerce startups in Nigeria that their businesses turn out to be as successful and well known as the internationally acclaimed E-Commerce giants.

The Nigerian online business is attracted to the Internet because of the appeal of geographical barriers; location is of no consequence on the Internet. Another major attraction is the steadily increasing online population in the last decade. In 2000, the number of internet users in Nigeria was 200,000 flash forward to 2011 and this figure is now at 45,000,000 (Internet World Stats, 2012). Little wonder there is an influx of businesses on the web. In addition, set up costs involve simply designing and hosting a website – a service provided by numerous web design/hosting companies at rates as low as $50 annually. This figure appeals to startups as against a traditional brick-and-mortar which could feature rents starting at $1,000 exclusive of services charges.

These factors of reduced cost, global audience, and huge expectations of “instant success” are some the reasons for so many E-Commerce start-ups in Nigeria. However, E-Commerce in Nigeria has been met with failure attributed to bad business ideas, wrong business model, poor infrastructure, poor marketing and insecurity ([Popoola, 2011](#Popoola2011)). Previous studies also indicate that over 80% of Nigerian consumers do not carry out transactions on the internet ([Adeyeye, 2008](#Adeyeye2008)). In society, which is traditionally cash-prone, E-Commerce struggles to take root. It has often been cited that consumers’ lack of trust constitutes a major barrier to adopting E-Commerce. In addition several models of trust have been developed targeted at identifying and studying factors which consumers normally would use in assessing how trustworthy an online vendor is ([Cheskin, 1999](#Cheskin1999); [Egger, 2000](#Egger2000); [McKnight et al., 2002](#McKnight2002)).

This research studies some established trust building models and presents the additional factor of usability, to determine the extent to which the usability factor affects the online consumer in Nigeria and develops a reviewed model based on the results.

Scope

E-Commerce as is represented in this study refers to the online businesses reaching out to individual consumers, that is, Business-to-Consumer (B2C) E-Commerce. This is the sort of E-Commerce which most Nigerian consumers are likely to encounter, hence the focus on this particular aspect of E-Commerce. However findings from this study may apply in general across other areas of E-Commerce like Business-to-Business, Consumer-to-Consumer or Peer-to-Peer E-Commerce.

The measure of trust as is considered by this study is in determining the intention of the consumer to purchase. The extent of willingness to purchase from the website used for the usability test and surveys will be attributed to trust.

The website usability testing procedure was adapted from established techniques by usability proponents Nielson and Krug ([Nielson and Loranger, 2006](#Nielson2006); [Krug, 2006](#Krug2006)). These techniques were applied in determining the number of tests conducted, number of participants, the testing method, software used, testing venue and test questions. Survey questions have been culled from previous research on trust and usability ([Bedi and Banti, 2006](#Bedi2006); [Tullis and Stetson, 2004](#Tullis2004)) with minor modifications and a few new questions included by the researcher. It has been suggested that trust is directly proportional to usability for online consumers. Previous research and usability tests have been conducted mostly in the developed world. The research is targeted at establishing the extent to which website usability affects the average *Nigerian consumer* in online commerce. Therefore the usability tests have been carried out in Nigeria and the survey was carried out on a sample of the Nigerian population with access to the Internet.

Problem Statement

Despite the improvement in and increased access to the Internet as well as frenzied movement of many businesses in Nigeria to the web, E-Commerce in the country has not progressed as expected. Many online users are still very “*distrusting*” as regards doing business online. With severe transportation and traffic related issues in major cities in Nigeria and in particular Lagos, the convenience of doing business online cannot be over emphasized. However, despite the convenience offered, the average Nigerian still prefers to weather the storm and get to a traditional brick-and-mortar in order to transact business face-to-face. Do Nigerians generally have a huge distrust for the Internet/web infrastructure as a whole or is it possible that by applying usability techniques in a website, trust may be *significantly* improved?

Approach and Methodology

This study takes the approach of an action research which involves a controlled empirical testing of the website. This method has been selected above automated tests or formal tests because best results from website testing are achieved by real-life users. The usability test is concluded by a survey. Findings from the testing are co-opted into the re-designing of the website. This is followed by another test on the updated website. This cycle is carried out until the website attains usability standards but up to a maximum of three times.

The main survey is carried out on a sample population and focuses on components of usability and trust. The survey questions are structured on perceived trust and willingness to purchase based on ease of use and satisfaction with using the website.

Data which is obtained from this survey is subjected to statistical analysis. This is targeted at finding a correlation between usability and trust, thereby establishing to what extent usability affects trust. Figure 1 shows the different phases of this study.

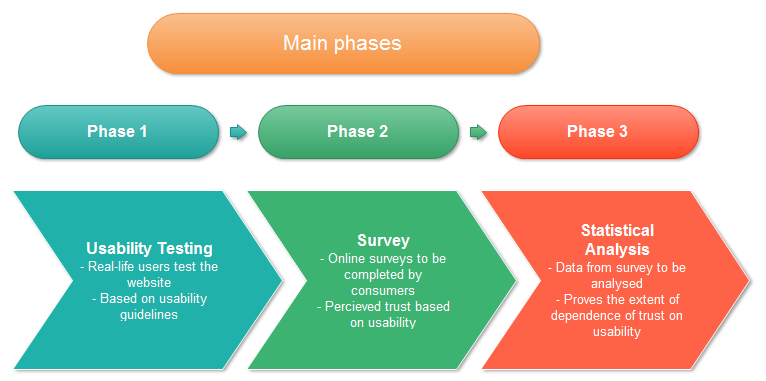


Figure 1: Approach used in the research

Outcome

The scholarly contributions of this study include a better understanding of the extent to which usability extends confidence in a website. Although Nigeria has been used in this study, results also apply in similar less developed economies such as this or generally in usability-trust studies at organizational or national levels. The report contains a detailed discussion on the impact of usability on E-Commerce in Nigeria as well as a report on what other factors could possibly supersede or support website usability as a factor for building trust in the average Nigerian consumer in E-Commerce.

A further outcome of this research is the development of a trust building model associated with the hypothesis:

“Usability positively impacts consumer trust in eCommerce in Nigeria”.

Document Structure

This document is organised into five chapters summarized as follows:

The next chapter, Chapter 2 *– Background and review of literature* provides a review of previous research work related to usability and trust in E-Commerce. It also provides an insight into the present state of E-Commerce in Nigeria. Chapter 3 – *Methodology and Research Design* presents the null hypothesis and alternate hypothesis to be proved. The chapter also details the design for the usability test and survey and provides details on the implementation of the usability test as well as the survey and data collection process. Next is Chapter 4 *– Results and Evaluation* discusses the sample data set and responses from users during usability tests as well as the results following the statistical analysis carried out on survey data. The last chapter, Chapter 5 *– Conclusions* summarizes the study, provides recommendations for improvement and identifies areas for future research.

# Background and review of literature

The background on website usability, trust and E-Commerce in Nigeria is presented here with reference to previous research in these areas of study. This review chapter aims to justify the contents of the remainder of this paper as well as show the ways in which the subject of usability and trust have impacted E-Commerce. Finally, this review concludes by highlighting limitations in previous studies which have given rise to this research work.

### Website Usability

Website usability refers to the extent which a user is able to quickly learn as well as use a website. It also centers on the efficiency of that process: the user being able to find what they are looking for and achieving this with minimal frustration ([Usability.gov, n.d](#UsabilityGov)). In the end, the user experience is the focus in usability studies. According to [Nielsen](#Nielson2006), up until 2005, more than 90% of websites were still poorly designed and designers continued to make the mistake of thinking that the focus should be on what they wanted on their websites and how the websites should look. The focus according to him should be what the customer thinks about the website ([2006](#Nielson2006)). He presents the following key components in his definition of usability: Learnability, efficiency, memorability, error recovery and satisfaction ([Nielsen, 2003](#Nielsen2003)).

User-centered website design has been further examined in many studies, resulting in the application of usability concepts to improve websites across various organizations. Research has shown usability techniques proposed by [Nielsen 2006](#Nielson2006) and [Krug 2006](#Krug2006), are still being widely studied for their applications to improve health-related websites ([Hincliffe and Mummery, 2008](#Hincliffe2008)), school and library websites (Hilyer, 2009, King et al., 2005); online news websites ([Al-Radaideh et al., 2011)](#AlRadaideh2011); government websites ([Youngblood and Mackiewicz, 2011](#Youngblood2011)) and several other variants of E-Commerce websites. Consideration has also been given to studies relating usability and consumer satisfaction pointing more to the conclusions that usability is a key aspect in human-computer interaction ([Belanche, Casalo and Guinaliu, 2012](#Belanche2011)).

### Keep It Simple, Stupid

KISS which is short for Keep it Simple, Stupid is a constant reminder for usability in engineering says Clarence Johnson, designer of SR-71 Blackbird the highest and fastest aircraft in the world ([Rich, n.d](#RichBN).). KISS principle has been applied in engineering and carried on into other aspects of software design including website applications and website design. This principle in website design is further encouraged by [Nielsen (1999)](#Nielson1999) where his goal was to promote simplicity as a new philosophy of web design. In particular, users need to navigate easily in order to be encouraged to stay on a website. Necessary questions which need to be addressed in a user-centered structure are: Where am I? Where have I been? And where can I go? The importance of a simple design and how designers can achieve it is the crux of the techniques proposed in his research and has since been adopted in the development of many websites from the late 90s till date. Research shows that websites with hostile interfaces continually lose potential customers. Keeping a visitor on a website for as long as possible is achieved by ensuring that the site is simple to navigate and that information is found easily [(Jacobs, 2010](#Jacobs2010)). This is imperative in usability.

Following [Nielsen’s](#Nielson1999) techniques in [1999](#Nielson1999), other extensive guidelines for web design have since been developed and published, aimed at improving the user experience. Guidelines have been developed using “research-based approaches that result in highly responsive and easy-to-use Web sites” by the US Department of Health and Health Services ([USDHSS, 2003](#USDeptOfHealth2003)). The Guidance on World Wide user interfaces was also been laid down by the standards organization ISO – to increase usability ([ISO 9241-151:2008](#ISO2008)). Although the varied guidelines in the interest of improved usability may not be uniform or comprehensive as [Bevan and Spinhof (2007)](#Bevan2007) point out, the goal is the same: which is to follow these guidelines to arrive at a usable system. Aside navigation and interaction, other aspects popularly covered by most usability guidelines include: media design and presentation (homepage page, headings and labels, layout) and content and functionality (search, writing content and content organization) ([Bevan, 2005](#Bevan2005)). Interest in website usability studies, developing and implementing developed guidelines and concepts worldwide has become the focus of many organizations in the Usability industry such as Usability Professionals Association and Usability.gov. Wide adoption of these techniques in website design is indeed clear indication that the importance of KISS as a factor in promoting usability in website design cannot be over-emphasized.

### Usability Evaluation Methods for a User-Centric Website

The general process involved in any user-centered website design is depicted in Figure 2 which is an international standard provided by ISO defining the human-centered design process ([ISO 9241-210](#ISO2010)). In order to effectively determine what method should be used to evaluate usability, it is necessary to identify what aspect of usability is being considered. For a user-centric website, the best description of usability would be that presented in [ISO 9126 PART 1](#ISO2001). It identifies four main characteristics of a system which is considered usable: it must be “understood, learned, operated and attractive to the user” [(ISO.org, 2001](#ISO2001)). Based on this, there are several evaluation methods which may be used to improve the usability of a website.

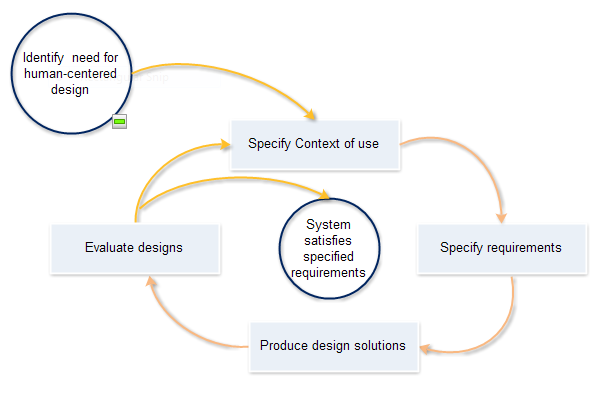
[](#UsabilityProfessionalsPix)

Figure 2: Human-centred design process ([Usability Professionals, 2004](#UsabilityProfessionalsPix))

Usability evaluation methods which have been explored in include focus groups, individual interviews, contextual interviews, use cases, surveys online and usability testing which are reviewed on [Usability.gov (n.d](#UsabilityGov).). Cognitive walkthrough and think aloud methods have been reviewed in [Khajouei, Hasman and Jaspers (2011)](#Khajouei2011). A broad classification of several techniques is provided by [Fernandez, Insfran and Abrahao (2011)](#Fernandez2011) under two headings: empirical and inspection methods. They describe empirical methods as those which would involve the end-users, while inspection methods involve designers or inspectors’ reviews using a set of guidelines like those described in section 2.1.1. above. Furthermore, the pros and cons for each of the methods are also provided. Empirical methods may appear to be more useful especially in websites because the end user who is the consumer, is involved in the evaluation but the disadvantage comes in that the website must be partially or fully developed in order for empirical evaluations to commence. The inspection method on the other hand accommodates evaluations on prototypes or mock ups. The inspection method is also considered to require fewer resources than in empirical methods. A summary of the findings in this study indicate that there is no single method which is suitable for all circumstances. The method to be used is dependent on what interface is being evaluated and for what purpose. It is also suggested that to achieve better results, methods may be combined.

### Website usability testing

Following the discussion of usability evaluation methods, it is pertinent to discuss the interface in question as well as the purpose of the evaluation in order to arrive at an appropriate usability evaluation method. In the evaluation of a website, usability is measuring the quality of users experience as they interact with the website: efficiency/ease of use, how easily it is learned, and the satisfaction of the user. The simplest usability method is considered to be the standard user testing and despite this simplicity, it provides insights and data which end up being beyond expectations [(nngroup.com, n.d.](#NielsenNorman)). [Krug (2000](#Krug2000)) analyses the use of focus groups versus usability testing. Whilst focus groups involve group of 5 to 8 people sitting together and giving their opinions about a design, usability test involves a single person being asked to perform tasks on the website or to figure out what the website is about. In order for critical issues in a website to be discovered and improvements made to the website. He presents several positive outcomes discovered in the course of conducting usability tests:

* A *great* site is achieved only from testing
* It is one hundred percent better to test one user than to test none
* Testing is continuous, it is not done once: test, fix and test again
* Test with people closest to the future users of the website

[Barnum (2010](#Barnum2010)) provides insight on developing a test plan. A test plan is typically dependent on how the usability test will be conducted. A standard test would involve presenting participants with tasks and collecting feedback based on their experiences while using the design to perform the tasks. Other methods could involve comparing two designs (possibly that of a competitor) to determine which is preferred or a benchmarking process of testing to find if the design meets up with some specified metrics. Based on the budget and time available for the testing, a test plan addresses the number of users to be tested, who should participate, who should administer the test, test environment, what to test (test plan), when to test, how many tests to conduct, incentive to participants, data collection and evaluation and presentation of results. ([Rubin and Chisnell, 2008](#Rubin2008)).

Usability testing could be carried out anywhere. “*These days you can do usability testing here, there and everywhere*” ([Barnum, 2010](#Barnum2010)). Possible test locations include a formal lab where specialized equipment like eye tracking and IVR systems have been set up, tests on the field which is at the participant’s location: home, office, mall or testing remotely which typically means the participant and the moderator are not in the same location. Choosing the best test location is tied to several factors: budget and schedule have been previously mentioned, other factors include the number of participants and their location, the product to be tested and the extent of interaction required with the participants ([Dumas and Loring, 2008](#Dumas2008)).

To determine number of participants, [Nielson (2012)](#Nielsen2012) maintains that five users is a sufficient number to be tested in a usability study. [Krug (2000)](#Krug2000) suggests that three to four users for each round of testing is ideal. Both usability proponents agree that for most cases, eight users are sufficient to detect serious problems in a design. They also suggest that several smaller tests are conducted instead of a single test with many participants. [Krug (2000)](#Krug2000) presents his findings on number of tests and number of users to test in Figure 3. 3a illustrates the outcome of a single test with 8 users. Of the 10 problems in the design, 5 are detected. Figure 3b illustrates two tests with 3 users in each test. The outcome is 3 errors are detected in the first test and an additional 6 errors detected in a second test. In this case, 9 out of 10 problems are discovered at the end of testing.

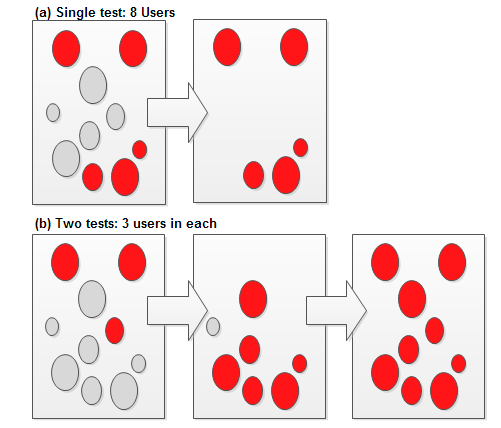


Figure 3: How many users per usability test ([Krug, 2000)](#Krug2000)

A few usability testing manuals with guidelines for Do-It-Yourself test administrators have been produced over the years. ([Dumas & Redish, 1999](#Dumas1999); [Dumas & Loring, 2008](#Dumas2008); [Rubin & Chisnell, 2008](#Rubin2008)) and although professional consultants might be considered as best suited to conducting usability tests, more and more self-administered usability studies are the norm especially because of time and budget. Test moderators typically have no formal training and many rely on years of experience performing usability tests. The particular circumstances of the research determine what choices are best suited to specific tests.

Trust

### The Meanings of Trust

*To rely on; To depend upon; To place confidence in or have faith in.* These are phrases which have been used to describe *Trust* in the Oxford English dictionary. A further definition from [Webster (1913](#Webster1913)) is that trust is an “*assured resting of the mind on the integrity, veracity, justice, friendship or sound principle of another person*; *confidence; reliance”.* Almost every facet of everyday life in society presents examples of this *reliance, dependence* or *confidence.* We count on power and water being available as we wake each day; we rely on our employers for our pay package at week or month end; we depend on the financial institutions to keep our funds and to release same to us when we need it; we trust our children into the hands of school teachers and care providers. These everyday definitions of trust make it a very gray area amongst scholars.

Studies involving trust concepts in theory, ethics and management ([Hosmer, 1995](#Hosmer1995)); schools ([Tschannen-Moran and Hoy, 2000](#TschannenMoran2000); [Borgonovi, 2012](#Borgonovi2012)), health care ([Musa et al. 2009](#Musa2009), [Elgar, 2010](#Elgar2010)); government and politics (Kelman, 2005); within organizations ([Zhang et al., 2008](#Zhang2008)) and several other areas have been explored. In these studies, different aspects of trust were addressed and diverse meanings were proffered on the subject. For example [Tschannen-Moran & Hoy (2000)](#TschannenMoran2000) explore trust in schools along the lines of willingness vulnerability, Benevolence, Honesty and Openness; [Elgar (2010)](#Elgar2010) explores trust in health care along the lines of Competence and Reliability; [Zhang et al. (2008)](#Zhang2008) consider trust a fundamental ingredient in any positive and productive social process and explore it along the lines of willingness, vulnerability and confidence.

Scholars continually agree on one point: that trust is a fundamental part of social existence but are unable to come to a consensus when it comes to the meaning of trust. ([Hosmer, 1995](#Hosmer1995)) maintains that ‘*there appears to be widespread agreement on the importance of trust in human conduct, but unfortunately there also appears to be equally widespread lack of agreement on a suitable definition of the concept’.* [Kee and Knox, 1970 cited in McKnight and Chervany, 1996](#McKnight1996) also agree that *‘little consensus has formed on what trust means’.* [Hosmer](#Hosmer1995) was however able to draw similarities from the diverse concepts of trust presented in nine previous studies and proposed this definition: ‘*Trust is the reliance by one person, group, or firm upon a voluntarily accepted duty on the part of another person, group, or firm to recognize and protect the rights and interests of all others engaged in a joint endeavor or economic exchange.’ (*[1995](#Hosmer1995)). Another definition encompassing personality traits: willingness, vulnerability and expectations is that trust is ‘*The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party’* ([Mayer, Davis and Schoorman, 1995 cited in Zhang et al. 2008:112](#Zhang2008))

Despite numerous studies on trust, making comparisons is somewhat tedious because of the varied concepts about trust presented in each of these studies. [McKnight & Chervany](#McKnight1996) attempt to relate *scientific* usage and *everyday* definitions of trust. They define trust using six constructs which *“(a) correspond closely to the meanings found in everyday usage of the word trust; (b) are literature-grounded, in that they reflect the more common and important types of trust (c) provide a manageable, cohesive way to understand and research trust*”. The six constructs are: “*Trusting Beliefs”* (which is based on “*a person’s cognitive beliefs about another person”*, the beliefs will in turn result in an intention to trust); “*Trusting Intention”* (“*the extent to which one party is willing to depend on another party”* despite the fact that “*negative consequences are possible”*); “*Trusting Behavior”* (intention to depend eventually leads to actual voluntary dependence of one party on another party); “*System Trust”* (the extent to which a person believes in existing structures in order to consider an endeavor will be successful in future); “*Dispositional Trust”* (developing confidence to the point of trusting *“across a broad spectrum of persons and situations”*) and “*Situational Decision to Trust”* (as the caption implies, such trust arises with specific situations and is not dependent on the persons involved) ([1996](#McKnight1996)). The six constructs may not be fully comprehensive definitions for trust but are representative of what many authors consider to be the most important forms of trust.

### Trust Building Models

‘*Rome was not built in a day but the empire fell in one’* ([Brown and Skinner, 2007](#BrownSkinner2007)). Forming and building trust is essential and yet difficult to achieve. Countless research has been dedicated to models targeted at building trust in various scenarios. Trust building in government, education, business, E-Commerce has been investigated by many scholars. For example, from the six constructs defined in the previous section, a trust building model was developed. Based on the relationship formed between Trusting Beliefs, Trusting Intention and Trusting Behavior; [McKnight, Cummings and Chervany](#McKnightCummings1996) posit that beliefs/attitudes lead to intentions*;* the intentions in turn become manifest in behavior ([1996](#McKnightCummings1996)).

The Brown-Skinner model is targeted at developing trust in at-risk students resulting in improved learning. The model comprises five steps: Listen; respect and validate; Problem-solve; Positive-regards and Hope which is the culmination of successfully achieving success in the four previous steps and consequently leading to trust ([Brown and Skinner, 2007](#BrownSkinner2007)). Another model for building trust is built around a person’s perceived risk of trusting in a given situation. The model encompasses the trustor (the person who is trusting), the trustee (the person who is to be trusted) and the role of risk in the situation. This trust building model showing the relationship between trust and risk is depicted in Fig. 4. The perceived risk of the trustor, impacts the decision to engage in the risk-taking relationship. A propensity to trust which is higher than the trustor’s perceived risk is a plus to the relationship while a perceived risk which is higher than the trustor’s propensity to trust is a detrimental to the relationship ([Mayer, Davis and Schoorman, 1995](#MayerDaviesSchoorman1995)).

Finally, an *initial trust* building model is presented in [Mcknight, Chourdhury and Kacmar](#McKnightChoudhuryKacmar2002) (2002). As depicted in Fig. 5, the authors posit that trust is made up of trusting beliefs and trusting intentions which in turn is influenced by “*structural assurance of the web, the perceived site quality and perceived reputation of the of the vendor*”. These make up the “*trust building levers”* in their model and results in three particular online behavioral outcomes which arise following successful trust building. These three outcomes of trust are that the “*trustor (a web user)”* would (1) “*follow vendor advice*” (2) “*share information with vendor*” and (3) “*purchase from the site*”.

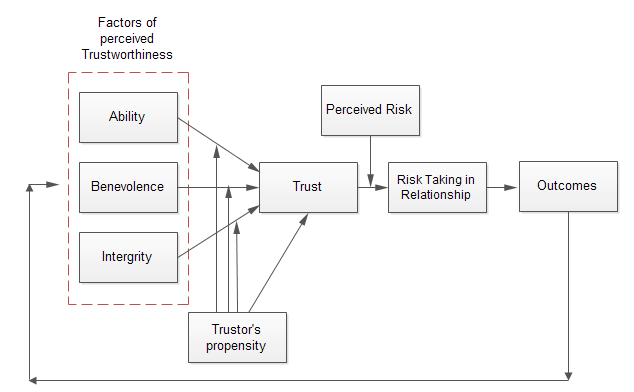


Figure 4: Proposed Model of Trust ([Mayer, Davis and Schoorman, 1995](#MayerDaviesSchoorman1995))

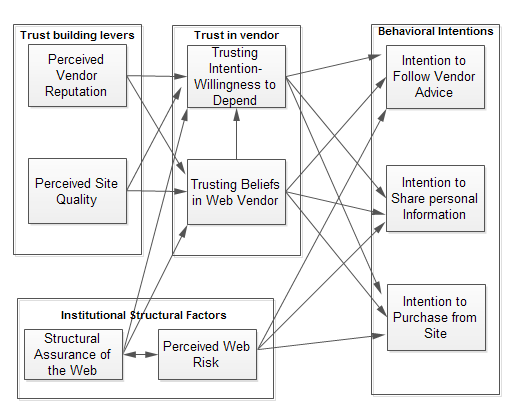


Figure 5: Trust Building Model ([Mcknight, Chourdhury and Kacmar](#McKnightChoudhuryKacmar2002), 2002)

### Measuring Trust

In trying to define and build trust, the question of how trust is then measured arises. The measurement of trust may involve the use of feedback from consumers as used in commerce to determine trust of the buyer in the seller. This method is applied in [Zhong, Xiong and Yao (2011)](#Zhongetal2011) where feedback data was analyzed using the Recency, Frequency, Monetary (RFM) Model created by [Hughes](#Zhongetal2011) ([2005 cited in Zhong et al., 2011:2330](#Zhongetal2011)) to measure customer value and loyalty. Based on previous empirical studies which show a relationship exists between customer value, customer loyalty and trust, this study measured trust by using feedbacks to compute the trust value.

In a number of studies and across disciplines, trust has typically been measured using surveys with questions specific to the domain in which the study is being carried out. [Tschannen-Moran and Hoy (2000)](#TschannenMoran2000) measured trust in schools focusing on students, parents and faculty. [Soh, Reid and King (2009)](#SohReidKing2009) measured the extent of trust in advertising using the survey method. Questions used in survey were of the form: *‘’I am willing to make important purchase-related decision based on ad-conveyed information’;* or *‘I am willing to recommend the product or service that I have seen in ads to my friends or family’* and so on.

Some popular surveys which have been used in trust measure studies include World Values Survey (WVS) which has been used in more than 500 research studies on trust. Surveys very much like WVS have been found to indeed capture accurately enough the *beliefs* part of trust ([Sapienza, Toldra and Zingales, 2007](#SapienzaToldraZingales2007)). Aside surveys, the authors also mention the use of several laboratory experiments towards trust measurement for example the lottery without losses, the social dilemma game and the trust game. The trust game used actual monetary rewards and involved a sender and a receiver. Basically the aim was to measure the extent to which the sender is willing to trust the receiver. Their study concludes that the trust game experiment is found to also be a good measure for trust because it captures the behavior of the sender in her *beliefs* and also in her preferences.

The use of experiments with actual monetary value attached to them has become popular in recent times because of the behavioral measures which the experiments capture, thereby making the measure of trust clearer. Typical examples of such behavioral measures used in trust games are of the form: ‘*The number of seconds a person would wait before falling backwards into the arms of a partner*’ or ‘*the willingness to disclose personal information to a stranger*’.

Each approach of course has its limitations. The survey approach despite being so widely used, has the limitation of being more tuned to attitudes and may not truly reflect the true state of mind of the person answering the questions making it harder to evaluate the answers provided to questions such as in the examples above. There have been complaints against the experimental trust games as well, the issue being that participants reactions might be more akin to “competitiveness” in the game as against being actually trustworthy ([Tschannen-Moran and Hoy, 2000](#TschannenMoran2000)). There is also the argument that the selected respondents in most cases are students. It has been argued that using students does not represent a good enough sample of the population. These shortcomings may be overcome by a combination of both the experiment and survey methods as implemented in the UK ([Ermisch et al., 2009)](#Ermishetal2009) and also in Germany and Netherland (Bellemare and Kroeger, 2007 cited in Ermish et al., 2009).

State of E-Commerce in Nigeria

The Nigerian economy is largely cash-based and reported to have more than 90% of cash in circulation. This is astronomical when compared with the 7% recorded in the developed world. The Nigerian populace have more *confidence* in physical transactions which occur in the traditional brick-and-mortar setting. By 2006, the amount of cash in circulation was still on the increase ([CBN Report, 2006 cited in Ayo et al., 2008](#Ayoetal2008)). Merchants prefer cash settlements and instant value for goods or services rendered. The number of factors influencing the poor adoption of ecommerce in Nigeria is vast. Lack of awareness has been a major factor with literacy levels being quite low but equally low per capita income keeps the internet out of the reach of a major percentage of the populace. It is reported that 51.1% of the population live on less than a dollar per day, making hunger and poverty levels quite high ([UNFPA.Org, 2010](#UNPFA2010)). Poor infrastructure has also been cited as a hindrance to E-Commerce in Nigeria with poor or no connectivity, access to the internet remains limited ([Adekunle and Tella, 2008](#AdekunleandTella2008)). The National Bureau of Statistics reports that ‘*95% of the population do not have access to either the PC or the interne*t’ ([NigerianStat.gov.ng, 2011](#NigerianBureauStatistics2011)). Aside internet access and availability, security issue is another factor which has been identified as having a negative influence in E-Commerce in Nigeria. In [2005](#CyberSource2005), a [Cybersource](#CyberSource2005) survey named Nigeria as riskiest country to conduct Ecommerce activities by a staggering 31%. The Advanced Fee Fraud (419) scams and electronic frauds in the country have given Nigeria a negative reputation and caused consumers to remain averse to E-Commerce.

In the midst of all this, winning customers’ trust becomes critical. E-Commerce adoption is seen as a strategic move by many Nigerian businesses but the result has not always been met with instant success as can be seen in the study of FirstAtlantic Bank ([Huang et al., 2003](#Huangetal2003)). FirstAtlantic had the first mover advantage in the E-Commerce domain and by the mid-2000s, with internet usage expanding exponentially in Nigeria, more banks were providing online, real-time services. The foundation of E-Commerce in Nigeria was somewhat established between 1999 and early to mid-2000s with the proliferation of electronic banking services but as a result of very underdeveloped internet infrastructure, it was not particularly as successful as anticipated ([Huang et al., 2003](#Huangetal2003)).

In recent years, the banking and telecommunications sectors especially have been responsible for the growth experienced in E-Commerce in Nigeria. By 2011, 63.9% of the Nigerian population had access to mobile phones ([NigerianStat.gov.ng, 2011)](#NigerianBureauStatistics2011). With the advent of GSM technology, people had increased access to the Internet through their cell phones. Access to the internet has improved “from the days of dial-up connections to the now existing broadband” internet connections giving more people access to the internet ([Akintola, Akinyede and Agbonifo, 2011](#Akintola2011)). Recent efforts by the Central Bank of Nigeria (CBN) to reduce circulation of cash by imposing a cash-less policy is beginning to see the influx of alternative payment options via POS, ATM and recently, the web. The cashless policy imposes cash handling charges on withdrawals and deposits in excess of NGN500,000 (approx. USD 3000). The pilot run was launched in Lagos on April 1, 2012. Availability of the alternative payment systems remains an issue with infrastructure to support the cash-less policy still far from being stable. The CBN’s expected outcome of the cash-less policy is the modernization of the country’s payment system and achieving the vision of placing Nigeria in the top 20 economies by 2020 ([Central Bank of Nigeria, 2012](#CBN2012)).

Most companies and businesses in Nigeria now have online presence but actual commerce activities of buying and selling online in Nigeria remains low ([Ayo et al., 2008](#Ayoetal2008)). The authors maintain that technology and infrastructure will cause significant improvement in E-Commerce especially if such technologies provide a *trusted* business environment and secure transactions. [Adesina & Ayo (2010)](#AdesinaAndAyo2010) analyse the acceptance of electronic banking and consequently E-Commerce in Nigeria. The authors measure four factors including perceived ease of use, usefulness, credibility and computer self-efficacy, maintaining that these do influence the customer attitude in E-Commerce. They conclude that there is a low level of trust in E-banking systems and consequently in E-Commerce. [Ayo (2006)](#Ayo2006) mentions availability, security, affordability and *trust* as motivational factors for Nigerian consumers.

Usability and Trust in E-Commerce

Research has established that the more a user *trusts* a website, the more likely it is for the user to use the website. That ‘*perceived usability has a direct and positive relationship on the degree of consumer trust and satisfaction*’ has also been confirmed ([Flavian, Guinaliu and Gurrea., 2006](#Flavian2006)). A trust-development lifecycle based on usability is depicted in Fig 6. The relationship between *usability* and *trust* and how usability is affected as trust is developed is presented in the figure.

That usability levels will increase with the user’s first view of the website if it is found to be appealing is represented in the figure by ‘*1st transaction based on reward attraction*’ ([Bedi and Banti, 2006](#Bedi2006)). This perceived website usability is crucial to the image of the business and therefore influences shopping behaviour of consumers ([Flavian, Guinaliu and Gurrea, 2006](#Flavian2006)). The consequence of a usable site is user satisfaction represented in the figure by the ‘*Evaluation on satisfaction* stage’. It has also been confirmed that ‘*usability is of critical importance in achieving the satisfaction of the user*’ (Kim and Eom, 2002 cited in [Flavian, Guinaliu, and Gurrea, 2006](#Flavian2006)). Users go online because they expect convenience. The interface of the website as well as the information provided to the consumer has a significant effect on how satisfied the user will be. Therefore to seamlessly search for a product or service and locate it; select payment option; make payment and so on; adds to consumer satisfaction ([Belanche, Casalo and Guinaliu, 2012](#Belanche2011)). Continuous user satisfaction results in repeated transactions. Increased familiarity with the website also fosters the self-confidence of the consumer; this in turn fosters greater trust in the website ([Flavian, Guinaliu and Gurrea, 2006](#Flavian2006)). Consequently trust which is continually developed grows to the point of achieving firm customer loyalty. On the other hand, a user who is dissatisfied will leave the website and this is represented by “*dropout due to distrust*” stage in the figure. Usability and trust therefore do go hand-in-hand in ([Bedi and Banti, 2006)](#Bedi2006).

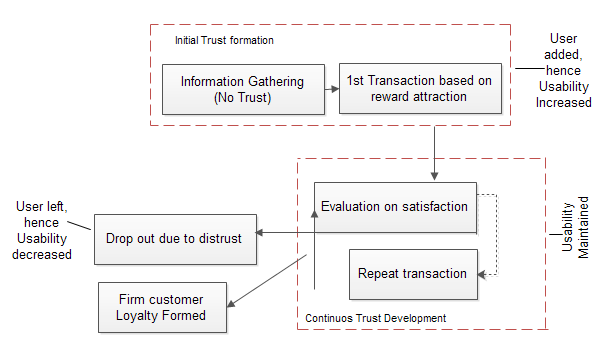


Figure 6: The e-commerce trust development lifecycle (Bedi & Banti, 2006)

This chapter provided an overview of usability techniques and measures, trust definitions and measures and previously studied effects of these two factors on E-Commerce. The next chapter presents the hypothesis, design and methods undertaken in the study. The usability techniques and survey implementation are also detailed.

# Methodology, Research Design and implementation

Working Hypothesis

This study is targeted at measuring to what extent website *usability* affects consumer *trust* in ecommerce in Nigeria. The slow growth of E-Commerce despite improved infrastructure and access to the internet makes it necessary to determine other factors which influence the consumer. The hypotheses developed based on this are represented by H0 and H1. They are stated below.

The [null hypothesis](http://www.experiment-resources.com/null-hypothesis.html), H0:

“Usability does not positively impact consumer trust in E-Commerce in Nigeria”.

The [alternative hypothesis](http://www.experiment-resources.com/research-hypothesis.html), H1:

“Usability positively impacts consumer trust in E-Commerce in Nigeria”.

Research Analysis

Following a thorough literature review process, it is the conclusion of many researches that usability does play a crucial role in trust development as seen in [Bedi and Banti, 2006](#Bedi2006), [Belanche, Casalo and Guinaliu, 2012](#Belanche2011), [Egger, 2000](#Egger2000), [Flavian, Guinaliu and Gurrea, 2006](#Flavian2006), [McKnight, Choudhury and Kacmar, 2002](#McKnightChoudhuryKacmar2002), [Vila and Kusta, 2010](#Vila2010).

Previous research has also been carried out in more developed economies with more advanced technological infrastructure. Generalizations were made from these studies and results are expected to apply under different conditions for example in a less technologically advanced and less developed economy as is obtained in Nigeria. There may be indications that race, nationality and other similar factors could very well change existing conclusions drawn from usability-trust studies [(Arif and Arif, 2011)](#Arif2011), as a result, further research targeted specifically at nationalities will add to the existing body of knowledge.

Usability evaluation methods in research have evolved from formal laboratory tests in the past to empirical methods in recent times [(Barnum, 2010](#Barnum2010)). ‘*Empirical evaluation methods can be grouped into user study and system inspection methods’* (Tsai, n.d.). In conducting surveys to determine usability, previous studies have favoured popular and frequently visited websites for example airline booking websites ([McKnight, Choudhury and Kacmar, 2002](#McKnightChoudhuryKacmar2002)) or developed prototype websites. In addition, researchers have recruited mostly students as survey respondents. These are factors which may influence results especially since the survey measures user preferences more than it truly measures usability (Nielsen, 1999 cited in Tsai, n.d.).

This research deals with consumer trust in Nigeria in its exploratory stages. Respondents (Nigerian consumers) to be surveyed, have had no prior experience with the website being tested. It also interprets trustto be an *intention to purchase* from the website and focuses on investigating website features as they contribute to the particular trust factor of *intent.* In analysing these studies, conclusions were drawn on the methods to be used in this study which will address the shortcomings of previous research. It is therefore expected that the hypothesis will be proven and in addition, other factors which affect consumer trust be discovered. The study will provide a better understanding of trust issues of the average Nigerian online consumer.

Design Considerations

The choices made in the design have attempted to eliminate limitations observed in previous research. Qualitative and quantitative methods have been adopted in this design. The qualitative method is employed in the usability testing phase where empirical testing involving real-life end-users is employed. The users are observed and recorded whilst using the website in their domain. This option was selected for the usability testing based on [Krug’s](#Krug2000) recommendations on keeping testing simple and at minimal cost. The users are tested by being asked to perform key tasks on the website and analysed on how easy it was to accomplish the tasks, if they understand what the website is about and if they can guess where to find things ([2000](#Krug2000)). Another alternative would have been a professional heuristic testing which would involve expert evaluators sitting to examine the website interface and ‘*judge its compliance with recognized usability principles’* ([Nielsen, 2005](#Nielson2005)). To keep within budget and time, the testing with real end-users was selected as the most suitable option in this study.

The quantitative method is applied at the survey phase where online survey questions are made available to the population via the website, SMS, Email and Facebook. The survey questions were adopted from usability and trust questions developed in [Flavian, Guinaliu and Gurrea (2006)](#Flavian2006), [Tullis and Stetson (2004)](#Tullis2004) and a few others were modified to suit the constructs being investigated. The “questions” were in the form of statements requiring a positive or negative response. A rating scale of 1 to 5: where 1 point represents strongly disagree and 5 points represents strongly agree was used.

A relevant and random sample of the Nigerian Internet population was the focus of the survey because this gave as much as possible a true representation of actual users of the website. The sample size for the survey was determined using the Creative Research Systems sample size calculator. The population of Internet users in Nigeria as at 2011 is said to be 45,000,000 ([Internet World Stats, 2012](#InternetWorldStat2012)). For a confidence level of 95% and with a margin of error of ±3.1, the sample size required was calculated to be 999. However, for a large population or unknown population size, probability allows overlooking the population size. Therefore a sample size of ‘*a sample of 500 people is equally useful in examining the opinions of a state of 15,000,000 as it would a city of 100,000’* ([Creative Research Systems, 2007](#CreativeResearchSystems2007)).

Method of the Study

A Nigerian E-Book store [www.LiteraryWorld.com.ng](http://www.LiteraryWorld.com.ng) was used for the usability testing and survey phases. After completing tasks on the website, the participant is presented with the online questionnaire. Following each usability test and mini survey, was a re-design of the website and another usability test up to a total of three cycles. The main survey came at the completion of all usability tests and re-design of the website to attain usability standards.

## Usability Testing Implementation

Adopting Krug (2000) usability testing technique, the usability tests were conducted in three stages and with 7-8 participants at each testing stage with each participant being tested separately. Informed consent was obtained from each participant prior to the test which gives the researcher permission to use the videos and data obtained for the purpose of the research. Demographic information was also obtained from participants. Each test was carried out at the participant’s location. Appendix A2 details the usability test questions structure. Mouse movements across the screen as the user navigated the website and *think-aloud* comments were captured using Camtasia screen recording software. An in-built webcam also captured the participant’s expressions as she uses the website. Figure 7 shows a screen shot of what this process looks like. The website is shown and the user’s face is captured at the bottom right of the screen.

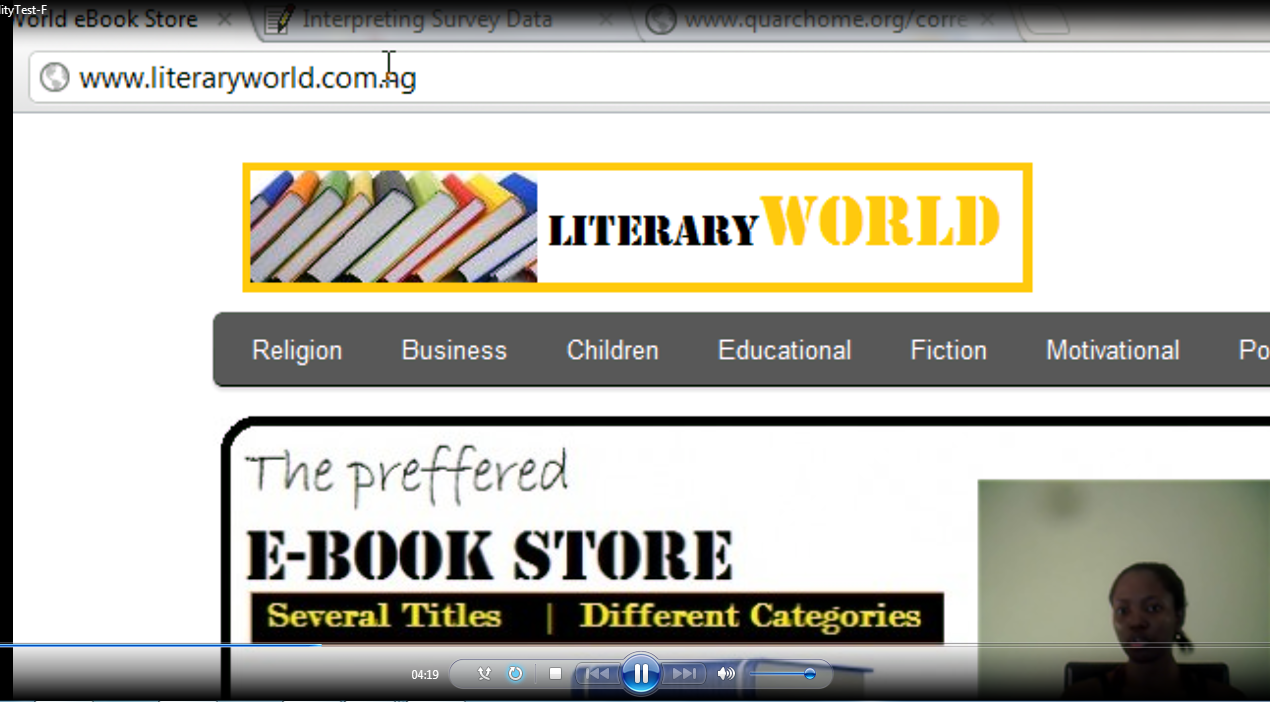


Figure 7: Sample page of Usability Screen Capture

The usability test began with a ‘*Get it’* test to determine if users understood what the website represented. This was followed by nine *‘Key tasks’* to search for information on the website and perform shopping and registration functions or make enquiries. The session ended with exit questions – this was to sample participants’ opinions about the website and also to obtain a summary of their experience during the test. A mini survey was then conducted at the conclusion of the usability test.

The initial usability test and subsequent survey revealed very low scores on the usability and trust measures. The “Get it” response was slow, averaging 20secs instead of the expected 4-5secs. It was also not very accurate across all participants with 100% referring to the website as “a website that sells books”. Although most key tasks were completed, the time taken to complete tasks was not encouraging. 100% of participants did not complete key task 8: *How will you contact Literary World with enquiries if you needed to?* In addition, on the average, total duration was above 30mins for most participants. At the conclusion of this stage a total of 15 errors/complaints were thrown up. Four of the complaints had to do with look and feel: color, layout, font and location of banners.

i Inability to determine what the website represented

ii Menu bar absent

iii Poor look and feel: layout, font, banner location and color scheme was jarring

iv No search facility

v Unable to view shopping cart

vi Unable to contact customer service

vii Excessive scrolling on the web page to get to the bottom of the page

viii General difficulty and frustration in finding information

ix Poor grouping of book categories

x Poor navigation especially in getting back to home page

xi Password reset/Lost password feature not available

The mini survey scores for the trust and usability measures at this stage were also poor with usability measure averaging 2.2 out of 5 and trust measure averaging 1.8 out of 5. Following the feedback from phase 1 testing, the LiteraryWorld.com.ng was modified to address all the issues raised before phase 2 testing commenced.

At the second phase, 7 users were tested separately and also participated in a mini survey. Improved response was observed for the “Get it” test. 80% of participants responded that the website was an e-book store within 5secs. In addition ALL key tasks were completed with minimal frustration on the part of participants. Only 3 complaints were raised at this stage.

i Shortcut to view shopping cart items

ii Modification to graphics to include electronic devices (iPad, etc)

iii Placing menu bar with categories on each page

The mini survey scores at this phase were very much improved averaging 3.8 and 4.0 for trust and usability respectively.

Again, LiteraryWorld.com.ng was modified to include these changes before a third and final usability test and mini survey was conducted with 8 participants. At this stage, very minor observations were made by participants’ mostly on layout and no issues were raised on content, search, navigation or functionality. A summary of the usability testing phase is shown below in Table 1. The entire usability testing phase and mini survey was concluded in April 2012 before the main survey commenced.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Usability Test** | **No of Participants** | **Duration** | **"GET IT" Test** | **Key Tasks** | **Trust Measure** | **Usability Measure** |
| STAGE1 | 7 | >30Mins | 20Secs | Incomplete | 1.8 | 2.2 |
| STAGE2 | 7 | <20Mins | 4-5secs | Complete | 4.0 | 4.2 |
| STAGE3 | 8 | 15mins | 4-5secs | Complete | 4.2 | 4.5 |

Table 1: Summary of Usability Testing stages

## Survey Implementation

A mini survey was conducted at the conclusion of individual usability tests and there was also the main nationwide survey at the end of the usability testing phase. The mini survey was a paper survey administered to participants of the usability tests. The main test survey was an online survey administered using Survey-Monkey. The link was provided on the “Take our Survey” tab on [www.LiteraryWorld.com.ng](http://www.LiteraryWorld.com.ng). The link was also provided via email invitations to email accounts of employees at banks, telecommunications, oil and gas and the public sector as well as under graduate and graduate students in Nigeria. Advertisements were placed on Social networking websites (Twitter and Facebook). A bulk SMS company was contracted to send SMS messages containing the Literary World website address to Nigerian cell phone numbers. In all invitations, a prize was offered to encourage more responses and the winner was determined by raffle draw.

Data Collection

In previous studies and in industry, usability has been quantified using various scales, for example, the Questionnaire for User Interface Satisfaction, Computer System Usability Questionnaire, System Usability Scale and WAMMI scale which has been widely used in usability measurements of websites like HP, Microsoft, Nokia and Yahoo. After an analysis of several questionnaires, it was found that the simplest questionnaires yielded the most reliable results across sample sizes ([Tullis and Stetson 2004](#Tullis2004)). The usability scale in this study is a multi-item Likert-type scale consisting of statements from the usability scales designed in [Flavian, Guinaliu and Gurrea (2006](#Flavian2006)) and [Tullis and Stetson (2004)](#Tullis2004) to arrive at ten items which represent a measure of usability.

The trust scale was determined following a similar approach. A combination of statements again from [Flavian, Guinaliu and Gurrea (2006](#Flavian2006)) and [Tullis and Stetson (2004](#Tullis2004)) were used to create a multi-item trust scale. Of the ten items on the trust scale, five were newly introduced by the researcher. These were constructed to suit the context of this study following findings in previous research about factors which has made Nigerians sceptical about E-Commerce and these were: willingness to provide personal details and payment card details necessary for making payment on a website ([Akintola, Akinyede and Agbonifo, 2011](#Akintola2011)).

The respondents provide answers to the items on the scale in terms of their level of agreement or disagreement with the statement. The responses are collated and summed: highest scores represent those who more in favour of the statement and lowest scores represent those in disagreement.

Data Measures

All items contained in the usability and the trust scales are positively worded. Each scale consists of ten items which were tested for convergence using Confirmatory Factor Approach (CFA) approach as implemented by [McKnight, Choudhury and Kacmar (2002](#McKnightChoudhuryKacmar2002)). They established convergent validity of constructs by measuring internal consistency reliability by calculating Cronbach alpha for each of the constructs – an alpha of 0.70 and above is acceptable and indicates internal consistency. In addition, the empirical distinctiveness of the constructs were measured by performing a discriminant validity test based on Fornell and Lacker technique which compared AVE and shared variance to determine discriminant validity ([Farrell, 2009 cited in Farrell and Rudd, 2009](#FarrellandRudd2009))*.*

The aim of this study is to provide a model supporting a linear relationship between usability and trust. The value of the correlation coefficient r is typically between -1 and +1 and values closer to -1 or +1 *indicate a stronger linear relationship between* the two constructs being measured. The study will further test how significant the value of *r* is in relation to this study. *r* is the estimated unknown population coefficient ρ and the significance of r helps determine if the linear relationship which is found in the sample data may also apply in the population.

The hypothesis is accepted or rejected by determining the p-value. A p-value with significance level (α) less than 0.05 leads to a rejection of the null hypothesis ([Illowsky and Dean, 2012](#IllowskyandDean2012)). This means that if α > p-value H0 is rejected as the sample provided significant results.

This chapter presented the hypothesis to be tested and approach to be used in the testing based on data collected at the usability testing phase and survey phase. The next chapter provides results obtained from the techniques applied, validation of the trust and usability constructs and the hypothesis testing results.

# Results and Evaluation

The statistical analysis performed on the data used in this study and results are detailed herein. The data was obtained from online survey questionnaires and is summarized in the first section, while the remaining sections of the chapter involve statistical analysis to draw the conclusions arrived at, test the hypothesis and provide a basis for discussions in the next chapter.

### Summarizing the respondents

The survey was answered by a total of 732 respondents. All the responses were used in the analysis. Table 2 shows the demographic information of the sample. A higher percentage of men (63.3%) than women (36.7%) participated in the survey. It also shows a higher percentage of expert users (71.1%) belong in the working class age group of 25 to 44 (85.3%) and majority of respondents are educated at the bachelors level (93.1%). Working class graduates are representative of a major percentage of the actual population participating in E-Commerce in Nigeria presently. [Adekunle and Tella, 2008](#AdekunleandTella2008) maintain that countries with higher functional literacy rates expect higher participation levels in E-Commerce thus making the percentages observed in this sample significant and equally representative of the population of E-Commerce participants in Nigeria.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Gender** |  |  | **Web Experience** | |
| Male | 63.30% |  | Intermediate | 28.9% |
| Female | 36.70% |  | Expert | 71.1% |
|  |  |  |  |  |
|  | **Population = 732** | | |  |
| **Age** |  |  | **Education** |  |
| 18-24 | 4.9% |  | High School | 4.9% |
| 25-34 | 45.1% |  | Bachelors | 46.7% |
| 35-44 | 40.2% |  | Post Graduate | 48.4% |
| 45-54 | 6.6% |  |  |  |
| 55 and older | 3.3% |  |  |  |

Table 2: Demographic information

The frequency of use of the internet is depicted in Figure 8. Over 90% of the population use the Internet daily and about 5% use the internet weekly. Most respondents use the internet for more than one activity with email at 95% being the most common. This is followed by research at 93% and news updates at 81%. 67% chat on the net while 51% shop online. The graph in Figure 9 shows the various percentages per use of the Internet.

Figure 8: Frequency of Internet Use

Figure 9: Activities on the Internet

### Summarizing the Variables

The variables being compared in this study are *usability* and *trust*. The survey consisted of 20 statements on two scales. One scale with 10 items measuring usability and the other also with 10 items measuring trust. User survey response distribution is shown in Figure 10 (usability) and in Figure 11 (trust). Visually, responses appear almost similarly distributed on both scales. Out of 732 respondents, 659 and 714 for trust and usability respectively selected 3 points and above in response to the statements in the survey. Both variables are normally distributed.

Figure 10: Response Distribution for Usability

Figure 11: Response Distribtion for Trust

The Respondents graded statements on a scale of 1 to 5 where 1 represented strong disagreement with the statement and 5 represented strong agreement. The questionnaire used in the survey is available in the Appendix A3.

Table 3 shows a summary of the descriptive statistics on the two variables.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Mean** | **Standard Deviation** | **Sample Variance** | **Minimum** | **Maximum** | **Sum** | **95% confidence level** |
| Usability | 4.1188525 | 0.617571959 | 0.381395125 | 1.5 | 5 | 3015 | 0.04481 |
| Trust | 3.6013661 | 0.801655805 | 0.64265203 | 1.6 | 5 | 2636.2 | 0.05817 |

Table 3: Summary Desciptive Statistics on Usability and Trust Variables

The data in table 3 further supports a normal distribution. In the normal curve for this data approximately 68% contains values which are within the mean ± 1 standard deviation, approximately 95% of the data are within the mean ± 2 standard deviations, and approximately 99% are within the mean ± 3 standard deviations.

Relating Usability and Trust

The statistical measure applied in this study to determine the relationship between the variables *usability* and *trust* is correlation.A bivariate plot of the data is shown in Figure 12. Usability has been assigned as the response (independent) variable and trust is the dependent variable. A straight line through the dots representing usability and trust data shows a positive slope. Visually, it is evident that the scores in both variables are quite well paired. That is, the lower scores on usability pair with the lower scores on trust whilst the higher scores on usability also pair with the higher scores on trust.

Figure 12: Bivirate Plot of Variables

Also evident is a relatively high coefficient of 0.597 establishing a *positive* and *linear* relationship between the two variables. An R2 of 0.36 represents the percentage of variance in the response (dependent) variable – trust which the usability (independent) variable explains. Thus, usability may be said to predict trust to a large extent.

Reliability and Construct Validity

Construct validity provides a means of validating the measures that have been used in this study. On the usability scale, 7 items had been previously validated and on the trust scale 3 items had been previously validated in [Flavian, Guinaliu and Gurrea (2006](#Flavian2006)). However, because of new items added on both scales, it became imperative to test how the 10 items in each scale still held together in providing a stable and reliable measure for usability and trust. The items on each scale are provided in Appendix A3. The scales were tested for reliability using the Cronbach alpha coefficient and for convergent and discriminatory validity using Exploratory Factor Analysis.

Survey response data from 15 respondents at the usability testing stages II and III was used in determining the Cronbach alpha. To ascertain reliability of the variables, the Cronbach alpha was calculated for each scale using PSPP statistical analysis software. The Cronbach alpha for usability scale was 0.77 which is above the recommended 0.7 reliability coefficient. Alpha for trust scale was calculated to be 0.7. Both scales therefore proved stable and reliable with high index of reliability an indication of internal consistency. Results are shown in Appendix B1.

### Convergent validity

To ascertain convergence of the constructs, a test and re-test approach was adopted. The survey following usability testing stage I served as the pre-test (control) sample. The construct was administered via survey to the sample and it resulted in low scores from all participants. Following a re-design of the website and subsequent usability testing at stages II and III, the construct was again administered to the sample. At face value, there were evidently much higher scores at stage II and stage II than at stage I. The t-statistic approach used in [McKnight, Choudhury and Kacmar (2002](#McKnightChoudhuryKacmar2002)) was then implemented setting the risk level to 0.05. The t-statistic for each item in both the usability and trust constructs was significant at 0.0001 < p < 0.001. In addition each item loading was *greater than twice its standard error.* From passing these two tests, convergent validity of the constructs was established. Appendix B1 details the t-statistic per item for each construct and Appendix B2 lists the item loadings.

### Discriminant Validity

Discriminant validity was also determined to further support the validity of each construct. As is observed in section 4.2, the inter-correlation between the two constructs was relatively high at 0.597 and *whenever there are high construct inter-correlations, there is need to assess discriminant validity, in order to have confidence in subsequent research findings* ([Farrell, 2009 cited in Farrell and Rudd, 2009](#FarrellandRudd2009)). Discriminant validity in this study was assessed using the [Fornell and Larcker, 1981 cited in Farrell and Rudd (2009)](#FarrellandRudd2009) technique which calculates the AVE (Average Variance Extracted) for trust (AVETRUST) and usability (AVEUSABILITY) constructs and then compares the values obtained with the shared variance (α2=0.3567) between the two constructs. For discriminant validity to be supported AVETRUST and AVEUSABILITY should be greater than α2=0.3567. Using PSPP, item loadings and error variances (standard error) which are required to compute AVE were obtained for trust and usability constructs. AVE for each construct was then computed in EXCEL. The table 7 in Appendix B2 shows the AVE for each construct and individual item loadings. AVETRUST (0.887) and AVEUSABILITY (0.863) were greater than α2 therefore supporting discriminant validity of the constructs.

Hypothesis testing

The [null hypothesis](http://www.experiment-resources.com/null-hypothesis.html), H0:

“Usability does not positively impact consumer trust in E-Commerce in Nigeria”.

The [alternative hypothesis](http://www.experiment-resources.com/research-hypothesis.html), H1:

“Usability positively impacts consumer trust in E-Commerce in Nigeria”.

The first test on the hypothesis involved the data at the usability testing stage. A test on paired samples was carried out on the pre-test and post-test population. This test is suited to small samples, two separate measurements are taken from the samples and the test is carried out on the calculated differences between the two samples. Also, the sample must come from a normal population ([Illowsky and Dean, 2012](#IllowskyandDean2012)).

The data used for this calculation was the differences between the scores in survey responses from Stage II and Stage I of usability testing. The average test scores and standard deviations between the *before* and *after* values on the scales: usability (2.64, 0.225) and trust (2.62, 0.183) proved to be consistent with a normal distribution. The paired t-test was determined for these values at a significance level of 0.05 (α=0.05). Both p-values were significant at p<0.01, α > p and therefore H0 was rejected.

In further support of these findings, a test on the significance of the correlation coefficient *r* in population was carried out. The sample in this case was the full survey response data of 732 participants. Again, at a significance level of 0.05 (α=0.05), the p-value was significant at p<0.0001. From this test as well, H0 is rejected.



Trust Model for E-Commerce in Nigeria

In order to evaluate the model fit, [Flavian, Guinaliu and Gurrea (2006](#Flavian2006)) approach was replicated. Due to the large sample size, Parsimony fit (χ²/df) was calculated instead of Chi-square (χ²), to determine the Goodness of Fit for the trust model. Because of the large sample size, χ² would be very much larger and could lead to wrong conclusions. The χ²/df value of 1.644 was significant at p>0.20 and therefore supports a good model fit. The root mean square error of approximation (RMSEA), and comparative fit index (CFI) were also calculated to be 0.037 and 0.94 respectively which are within the limits recommended in research. RMSEA value should be below 0.05 to effectively ascertain measurement of discrepancy in the population based on degree of freedom whilst comparative fit index (CFI) compares hypothesized model to a null one and should be above 0.90 ([Hu and Bentler, 1999](#HuandBentler2009)).

The model given by the linear relationship with *trust* as the dependent variable and *usability* as the independent variable which positively influences *trust* is thus determined to have a good fit with the sample data and is representative of a trust model for E-Commerce in Nigeria. Figure 13 below is representative of the trust model. The correlation coefficients are significant to level 0.05

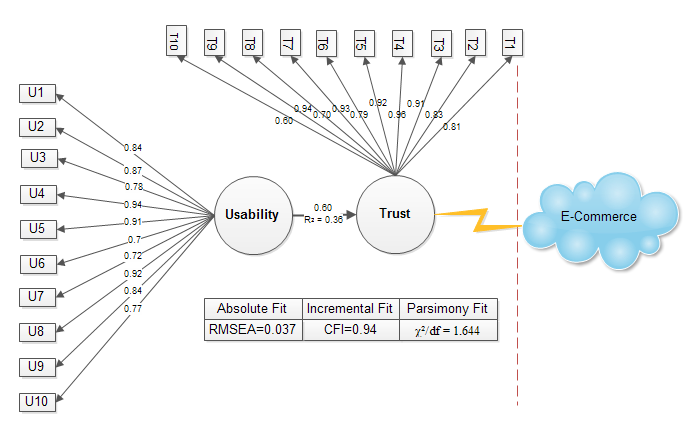


Figure 13: Structural Model of the relationship between usability and trust

This chapter detailed the results and presents the trust model for E-Commerce in Nigeria. The following chapter summarises findings and proposes some best practices. Some limitations and areas for future research are also provided.

# Conclusions and discussions

The results of this research are consistent with, and support, the findings of previous trust studies, which have shown that usability does have a positive and direct effect on trust of the consumer in E-Commerce (McKnight, Choudhury and Kacmar, 2002; Flavian, Guinaliu and Gurrea, 2006). It also suggests security issues, privacy issues and the fear of the general web environment as factors that may play a role in increasing trust levels. This chapter details a summary of this study by providing statistical proof of the hypothesis, conclusions arrived at, suggested best practices in industry, areas in which the research was limited and aspects for possible further research.



## Summary of the Findings

From the sample data, there is sufficient evidence to conclude that usability affects trust positively at a 5% level of significance. A visual analysis of the mini surveys conducted at the end of each usability testing stage, shows that a significant improvement in trust scores was obvious after applying usability techniques to the website (See Table 1, Section 3.5). The significance of this difference from one stage to another was further proved statistically using the t-test, on the difference between the paired samples and α at 0.05 was greater than p-values for both constructs, leading to a rejection of the null hypothesis.

The linear relationship between usability and trust based on the main survey data, is given by y= 0.7681x + 0.4469 which means the relationship is *positive*. With the coefficient of determination R2 calculated to be 0.357, it means that 36% of variance in trust may be attributed to usability. This creates a *strong* relationship between usability and trust. Finally, the very low critical value of t means that this relationship is very *significant.* The findings of this study are that website usability positively impacts consumer trust in E-Commerce.

## Conclusions

Statistics showed a convergence on all items on the trust scale, even though items 3, 4 and 5 accounted for the least scores from respondents. Although 51% of respondents shop online which is a significant figure, the *intention* to provide personal information or credit card information as well as *intention* to purchase from the website appeared relatively low even with improved usability. Therefore, the conclusion may be drawn that security and privacy issues may also have a positive or negative, as well as strong and significant relationship on trust in E-Commerce.

Item 7 in the trust scale also showed relatively low responses as well. The responses suggest that Nigerians still have negative perceptions about the web. As much as usability impacts E-Commerce positively in Nigeria, these factors also need to be considered for increased percentage of E-Commerce adoption.

### Best Practices

Usability testing of [www.LiteraryWorld.Com.ng](http://www.LiteraryWorld.Com.ng) resulted in an improved website which promoted positive responses from consumers interacting with the website for the first time. Without prior knowledge of the vendor, first impressions from look and feel of the website, as well as easy navigation and seamless content search inspired trust in the website. Several users commented on “transparency” and “openness” of the website as contributors to their confidence in the website.

The objective of the Nigerian business going online is to grow its client base by retaining existing customers and winning new customers. Based on this research, it is imperative that organizations in Nigeria need to re-strategize by focusing on achieving higher website usability levels by keeping designs simple and easy for the consumer to understand with the goal of promoting trust in their websites.

Furthermore, the measurement scales and model developed is essential to industry in instances where predicting or measuring consumer trust is required. A particular example could be in testing response to a new E-Commerce website.

## Limitations of the Research

While the proposed model extensively compared two variables (usability and trust) it could have measured the effects of other factors like privacy and security on consumer trust in E-Commerce to structure a more encompassing and detailed model for trust in E-Commerce in Nigeria. It is also evident that with usability accounting for 36% of the variance in trust, there are other variables which may influence these results.

A more *significant* relationship between the constructs was observed with the larger main survey population with lower critical value of t whilst a *stronger* relationship was observed with the smaller population in the mini survey/usability test population with a higher correlation coefficient. With a value of alpha α = 0.05, there existed the risk of rejecting the null hypothesis based on only a strong correlation calculated using a smaller sample (Type 1 error). Attention must be paid to both strong correlation and significance.

Future Activity

This research focused on usability which is just one of the many factors proposed to be related to trust. Although usability is responsible for about 36% of variance in trust, we cannot state categorically that usability *causes* trust. There is room for future research on other variables which may impact trust such as security, privacy, brand name, web infrastructure and so on. Also, the model should be extended to compute the outcomes from *trust* as represented by dotted lines linking trust to E-Commerce in the model shown in Fig 13. (Some of these outcomes could be how trust leads from *intention* to actual purchase, customer satisfaction and loyalty).

The actual behaviour and reaction of the respondents to E-Commerce may also be measured against intentions as was presented in this study. Trust in this study was limited to the *intention* of the respondents.

The study focuses on Nigeria alone as a developing nation, future research could compare populations for an insight into such effects as have been discussed across national boundaries.

A study that may compare websites, especially frequently used E-Commerce sites will also provide further insight into the factors influencing consumer trust in E-Commerce in Nigeria.

This study successfully extends previous usability studies by developing validated measurement scales for usability and trust. By examining the role of usability in influencing trust in E-Commerce in Nigeria, it extends [Flavian, Guinaliu and Gurrea, 2006](#Flavian2006) by studying a particular nationality (Nigeria) and extends [Adekunle and Tella, 2008](#AdekunleandTella2008); Bedi and Banti, 2006 by providing statistical proof of the usability factor’s effects on trust in E-Commerce. The development and validation of the trust and usability scales provides subsequent research with tested and proved measurement scales.

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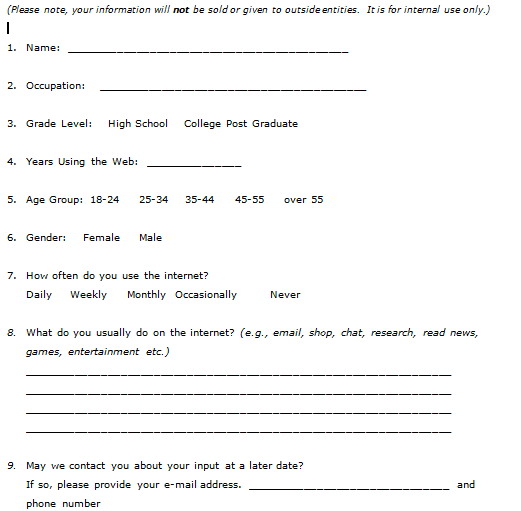
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APPENDICES

###### Usability testing and survey implementation

Demographic Information Questionnaire

The following questionnaire was administered to usability test participants at the end of the usability test and also administered online at the end of the survey to survey respondents.



Usability Test Structure



Table 4 Usability Test Outline

Usability and Trust measurement scales

Users graded the following statements on a scale of 1 to 5 after exposure to [www.LiteraryWorld.com.ng](http://www.LiteraryWorld.com.ng) E-Book store in Nigeria.

|  |  |
| --- | --- |
| **Scale for measuring Usability** |  |
| In this website everything is easy to understand | Flavian et al., 2006 |
| This website is easy to use even when using it for the first time | Flavian et al., 2006 |
| It is easy to ﬁnd the information I need from this website | Flavian et al., 2006 |
| The structure and contents of this website are easy to understand | Flavian et al., 2006 |
| The organisation of the contents of this site makes it easy for me to know where I am when navigating it | Flavian et al., 2006 |
| When I am navigating this site, I feel that I am in control of what I can do | Flavian et al., 2006 |
| Downloading pages from this website is quick | Flavian et al., 2006 |
| I found the website visually appealing | Tullis and Stetson, 2004 |
| I was able to complete my tasks in a reasonable amount of time | Tullis and Stetson, 2004 |
| Overall I think this website is easily learned | New |
|  |  |
| **Scale for measuring Trust** |  |
| I think that this is a legitimate website | New |
| I think that the information contained in this website is honest | Flavian et al., 2006 |
| I will be willing to provide my email and mobile number on this site | New |
| I will be willing to provide my credit/debit card details on this site | New |
| I am willing to make a purchase on this site | New |
| I can recommend this site to others | New |
| I belive this website will not knowingly defraud its customers | New |
| I think that this website would not do anything intentional that would prejudice the user | Flavian et al., 2006 |
| I think that this website has the necessary resources to successfully carry out its activities | Flavian et al., 2006 |
| Overall I think I trust this website | New |

Table 5: Usability and Trust Scales

###### Inferential Statistics Implementation

Cronbach Alpha results from PSPP

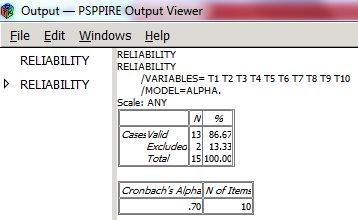
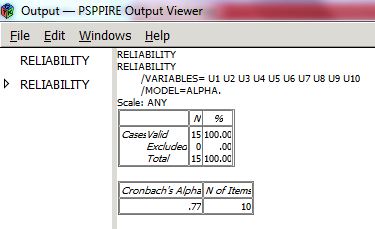


Figure 14: Cronbach alpha results from PSPP

Detailed below is the item listing for each construct with corresponding t-statistics which were all significant at 0.0001 < p < 0.001. AVE and Cronbach alpha are also listed.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Construct** |  | **Item** | **t-value** |
| **USABILITY** | 1. | In this website everything is easy to understand | 9.00 |
| (α = 0.77) | 2. | This website is easy to use even when using it for the first time | 6.33 |
|  | 3. | It is easy to ﬁnd the information I need from this website | 6.32 |
|  | 4. | The structure and contents of this website are easy to understand | 4.00 |
|  | 5. | The organisation of the contents of this site makes it easy for me to know where I am when navigating it | 6.00 |
|  | 6. | When I am navigating this site, I feel that I am in control of what I can do | 10.61 |
|  | 7. | Downloading pages from this website is quick | 10.61 |
|  | 8. | I found the website visually appealing | 6.71 |
|  | 9. | I was able to complete my tasks in a reasonable amount of time | 9.49 |
|  | 10. | Overall I think this website is easily learned | 10.61 |
|  |  | 0.0001 < P < 0.001 |  |
| **TRUST** | 1. | I think that this is a legitimate website | 4.81 |
| (α = 0.70) | 2. | I think that the information contained in this website is honest | 5.88 |
|  | 3. | I will be willing to provide my email and mobile number on this site | 4.81 |
|  | 4. | I will be willing to provide my credit/debit card details on this site | 9.80 |
|  | 5. | I am willing to make a purchase on this site | 5.72 |
|  | 6. | I can recommend this site to others | 6.71 |
|  | 7. | I belive this website will not knowingly defraud its customers | 11.00 |
|  | 8. | I think that this website would not do anything intentional that would prejudice the user | 14.00 |
|  | 9. | I think that this website has the necessary resources to successfully carry out its activities | 6.33 |
|  | 10. | Overall I think I trust this website | 10.61 |
|  |  |  |  |

Table 6: Internal Consistency and Convergent Validity results

Item loadings and AVE

|  |  |  |
| --- | --- | --- |
| *Construct* | *Items* | *Loadings* |
| USABILITY | USAB1 | 0.84 |
|  | USAB2 | 0.87 |
| AVE=0.863 | USAB3 | 0.78 |
|  | USAB4 | 0.94 |
|  | USAB5 | 0.91 |
|  | USAB6 | 0.7 |
|  | USAB7 | 0.72 |
|  | USAB8 | 0.92 |
|  | USAB9 | 0.84 |
|  | USAB10 | 0.77 |
|  | α2 = 0.357 |  |
| TRUST | TRUST1 | 0.81 |
|  | TRUST2 | 0.83 |
| AVE=0.887 | TRUST3 | 0.91 |
|  | TRUST4 | 0.96 |
|  | TRUST5 | 0.92 |
|  | TRUST6 | 0.79 |
|  | TRUST7 | 0.93 |
|  | TRUST8 | 0.7 |
|  | TRUST9 | 0.94 |
|  | TRUST10 | 0.6 |

Table 7: Item loadings and AVE figures in support of discriminant validity