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# Evaluation of Nigeria Universities Websites Quality: A Comparative Analysis

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# Evaluation of Nigeria Universities Websites Quality: A Comparative Analysis

## Abstract

*The use and continuous use of the website in the developed countries universities are predominant, and the developing countries universities are heightening their effort in the aspect of education technology. The reason why one university website is better than the other concerning quality and accessibility is the focus of this study and this prompt evaluation of 141 Universities in Nigeria across the Federal, State, and the Private ownership. We opted for a hybrid approach to cover the gap in the previous studies. WebQual and SITEQUAL as a framework is adopted based on the web analytical tools. The study contributes theoretically by combining two website quality theories to explain the inhibitors, improvement, quality and future updates of Nigeria Universities websites based on ease of use, processing speed, aesthetic design, interactive responsiveness, entertainment, trust and usefulness and come up with a new WebFUQII model. The contributes to methodology by using web diagnostic hybrid tools that gives more explanatory power. The study also gives managerial implications and guides future direction.*

**Keywords:** University, Nigeria, Website, Evaluation, website quality, web diagnostic tools.

## Introduction

University education is the peak of the educational learning process and it is a critical part of human development nationally and internationally. It is a base of high-level skills acquisition and necessary credentials for the labour market. Universities empowers and releases workforce that is suitable for economic development. The education sector is booming in Nigeria most especially when the Federal Government licensed the public to establish private universities to create room for competition regarding academic standards and education infrastructure facilities that necessitate qualitative education for Nigerians and foreigners. Presently, there are 153 Universities in Nigeria which imply 40 Federal Universities, 44 State Universities and 69 Private Universities (NUC, 2017). It was surprising that private universities institutionalised in 1999 have outnumbered the federal and state universities strength for 18 years in a row. Education technology, remarkably the application of information communication and technology (ICT) to education is changing the educational learning patterns to the teachers and the students, and it is a landmark of advancement in a developing country such as Nigeria. Technology is fuelling learning management systems (LMS), innovative approaches to theory and practice of education and impacting the academic community with tools to communicate knowledge, network and collaborate globally.

One of the turning points in Nigeria educational systems is the adoption of worldwide web (www), and a website is a type of classroom, a type of an office that brings people of the same interest together for knowledge sharing and administration (Rao & Hosein 2017). Nowadays a website is playing the role of a public relation for the tertiary institution and the first point of contact to the web visitor either nationally or internationally when they are searching to know more about an institution (Andalib & Danaee 2013). The website is bridging the gap of invisibility and communication continually in the educational system and creating more attention for the laggards of this technology. The use and continuous use of the website in the developed countries universities are predominant, and the developing countries universities are heightening their effort

in the aspect of education technology. According to Webometrics worldwide ranking, Harvard University is the number one and the best website globally, University of Cape Town top the rank in Africa while the University of Ibadan ranked as number one website in Nigeria and then featured as 1366 globally and 19 in Africa universities websites ranking. Webometrics based their ranking on university presence, impact, openness, and excellence. The positioning of each university based on different criteria of ranking was not stable except the Harvard University that maintains its status quo in ranking criteria of presence, impact, openness and excellence as number one globally.

In this epoch of technological progression, the quest for internet connectivity is on the increase, and both the university teachers and the students are leveraging the opportunity to impact knowledge and learn effectively. A student can easily use learning management system easily via the website. They can check their time table, bus schedule, access course materials, check their result, register for course and examination, print materials, access valuable information, socialise through social media like Facebook, Twitter, Google+ and many other customised features based on the need and the policy of each institution. The teachers also were not left out of the game as they teach, instruct and evaluates the students continuous assessment and of recent evaluates the students thesis via the web. The website is now a focal point for all the university stakeholders and a viable point of contact (Astani 2013). University website is promoting the educational activities beyond its immediate vicinity, thus becoming an instrument of promotion and advertisement. Each university showcases their strength and expertise through their website for the worldwide to view. They also promote their breakthrough in research, innovation, and development through the same channel of the website. The concept of tertiary institutions websites is becoming popular in Nigeria, but regrettably, some institutions are yet to benefit from the multitasking function of education websites. Some university websites are of low quality and difficult to access, some are aesthetical but with poor content, while others are poor in download and upload time. Despite these weaknesses in some Nigeria universities websites, some universities are working hard to measure up to the international standard.

As website evaluation is gaining ground in popularity and acceptability, some researchers have examined the critical issues of website quality. For example, Tsao et al. (2016) looked at the efficacy of online shopping website while Choudrie, Ghinea & Weerakkody 2004, Ataloglou, & Economides 2009, Jeysankar, & Babu 2009, Chou et al. 2014, Kaur & Dani 2014, Abdallah & Jaleel 2015, Silvestre et al. 2015), evaluates e-government websites, European ministries' websites, Tamil Universities websites, natural disaster management websites, Indian banking websites, framework of electronic marketing, hand fellowship websites. These studies span education, government, banking, environmental and medical sectors. The quest for accessible, informative, aesthetic and cutting-edge university website distinguished this cogitation from the extant studies. The reason why one university website is better than the other concerning quality and accessibility is the focus of this study and this prompt evaluation of 140 Universities in Nigeria across the Federal, State, and the Private ownership. We conduct the study with the following objectives: (1) to examine the justifying criteria of university website quality (2) to examine the inhibitors of university website quality (3) to determine possible ways of improving university website quality and (4) to consider how remediation of a university website influence future update. This study is divided into six parts. First, we introduce the necessity of websites evaluation in Nigerian context, second, we reviewed and synthesized extant studies and look at the state-of-the-art of global universities evaluation, third, we discussed the methodology for our study, fourth,

we discussed study sample and data analysis, fifth we presented our result. Lastly, we discussed theoretical and managerial implication and excogitated future study direction.

## **Theoretical Framework**

It is worthwhile to evaluate the distinguishing attribute of website. According to Biscoglio, (2007) to accomplish this undertaking requires implicitly or explicitly, a quality model. There have been many approaches to quality models for websites evaluation which individualized different characteristics and often refer to few concepts, as usability, content, navigability, management and relationality. Frameworks such as WebQUAL, SERVQUAL, SITEQUAL to effectively measure the quality of websites has been used in previous studies. WebQUAL, being a measure of website quality, originally consisted of 12 dimensions were reduced to five constructs which are ease of use, entertainment, trust, responsive time and usefulness (Loiacono et al, 2002). SITEQUAL is a measure of website quality which identifies four key components, including ease of use, processing speed, aesthetic design and interactive responsiveness (Yoo and Donthu, 2001). SERVQUAL is a multi-dimensional research instrument, designed to capture consumer expectations and perceptions of a service along the five dimensions that are believed to represent service quality.

Other theoretical frameworks include Website Quality Features model developed by Zhang and Dran, (2001) for evaluating Website quality from a user satisfaction perspective which was based on Kano's Model, that is, basic, performance and exciting levels. Censis, (2001) in the pentagon of the quality model, within studies on the Public Administration Websites Evaluation and through the method ARPA (Analysis of the Public Administrations Nets) draw the values of five thematic indices that express analytically the characteristics of every Website and of it they measure the value in terms of qualitative correspondence. They include accessibility, usability, institutional characterization, administrative, transparency, availability of the services. Signore (2005) proposed the Comprehensive Model for Websites Quality to identify same user perceived characteristics, relate them to the internal code features to determine possible points of weakness and to proceed with focused user tests. The Websites quality model provides 5 dimensions or measurement criteria which can objectively be estimated, measured and help to connect the external quality and the internal quality. The dimensions are correctness, presentation, content, navigation and interaction. Minerva, (2003) in its Quality Principles for Cultural Websites model expressed transparency, effectiveness, maintenance and update, accessibility, user-centered, responsive and multi-lingual, interoperable, managed and preserved as criteria for website quality evaluation.

It is evident from the above that different models and frameworks are developed to measure website quality based on the characteristics intended to be measured. This study combines WebQual and SiteQual as a framework to evaluate Nigerian universities website. The combination of constructs combining the frameworks results into ease of use, processing speed, aesthetic design and interactive responsiveness, entertainment, trust and usefulness. Most of the studies that adopted the frameworks evaluate the website as perceived by the site user such as (Stuart and Richard, 2000; Parasuraman, Zeithaml and Malhotra, 2005). WebQual and SiteQual as a framework is adopted in this study based on the web analytical tools. The study do not dwell on the quality of the website as perceived by the site users, the type of quality we are interested in a Website essentially is effectiveness of Nigerian Universities websites based on Search Engine

Optimization (SEO) and different web characteristics using analytical tool (WooRank, GTmetrix, CheckMyColours, LinkPolularity, WOT and the Cybermetrics analytics tool). This is done with the intention to evince the inhibitors of the universities website quality which will suggest the improvement of the websites, lead to a creation of quality website and further inform a future update as evidence in Fig1.

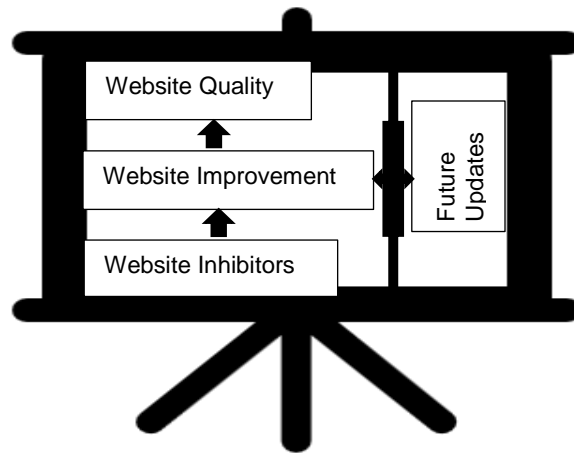


Figure. 1: Conceptual Framework

## Literature Review

NO	Author (years)	Question addressed	Methodology	Findings
1	Gi-Zen Liu, Zih-Hui Liu & Gwo-Jen Hwang (2011)	Developing multi-dimensional evaluation criteria for English learning websites with university students and professors	Quantitative and qualitative	Fifty-eight evaluation criteria were refined and finalized. For teachers to evaluate websites so that the most appropriate ones can be incorporated into English courses. For website managers to evaluate the quality of their sites and for users.
2	J. Freitas SANTOS & Bahareh BID (2016)	Cultural Adaptation of Websites: A Comparative Study of Portuguese and Dutch Websites	use content analysis to investigate cultural values depicted on Portuguese and Dutch websites.	The findings suggest that Dutch websites scored higher than Portuguese websites on depiction of features and there is no statistical significance between Dutch and Portuguese websites on National symbols and pictures" category.
3	Ahmad Albhaishi ,Heider A. Wahsheh, Tami Alghamdi (2014)	Evaluating Web Ranking Metrics for Saudi Universities	Case Study experiment	In the experiments we found that King Saud University Website missed the following Web ranking metrics, and need to consider them to improve the World Rank position.
4	Evelyn Pauwels, Elke Van Hoof, Caroline Charlier, Lilian Lechner and Ilse De Bourdeaudhuij (2012)	Design and process evaluation of an informative website tailored to breast cancer survivors' and intimate partners' post-treatment care needs	Quantitative and qualitative assessments of survivors' and partners' care needs and preferences.	The website reached only about half of survivors and partners, yet was mostly well-received.
5	Chang Liua, & Kirk P. Arnett	Exploring the factors associated with Web site success in the context of electronic commerce	Webmasters from Fortune 1000 companies were used as the target group for a survey.	Web site success in the context of EC is related to four major factors: quality of information and service, system use, playfulness, and system design quality.

6	Monideepa Tarafdar & Jie Zhang (2005-2006)	Analysis of Critical website characteristics: A Cross-Category Study of Successful Websites	Quantitative method	Findings indicate that there are six critical characteristics of website and relative importance of these characteristics varies across categories.
7	Zhengui (JACK) Jiang, Weiquan Wang, Bernard C.Y. Tan, And JIE Yu (2016)	The Determinants and Impacts of Aesthetics in Users' First Interaction with Websites	Survey conducted on ten websites to validate the entire structural model	The results confirmed that perceived quality of the five design elements are indeed influential on users' perceived aesthetics; they have also shown that perceived aesthetics of a website has a significant impact on users' perception of its utility
8	Shewan Yoo, Jongdae Jin (2004)	Evaluation Of The Home Page Of The Top 100 University Websites	12 evaluation criteria (i.e., critical features of an ideal home page) are selected through literature reviews on the website	The critical features of an ideal home page are used relatively frequently but in less degree. But not a single university's website satisfies all 12 evaluation criteria.
9	Jifeng Luo , Sulin Ba, Han Zhang Jifeng Luo , Sulin Ba & Han Zhang (2012)	The Effectiveness Of Online Shopping Characteristics And Well-Designed Websites On Satisfaction	Field study using data collected from archival sources.	The study indicates that customer service can mitigate the negative impact of being less visible.
10	Arvinder Kaur & Diksha Dani (2014)	Banking websites in India: an accessibility evaluation	Automatic accessibility evaluation TAW was used. TAW is a tool for the analysis of web sites, based on the W3C—Web Content	The results of the evaluation indicate that the situation of website accessibility of Indian banking websites is not very satisfactory in terms of number of errors reported by the automatic tools.
11	Isidro F. Aguillo, Begoña Granadino, José L. Ortega, and José A. Prieto	Scientific Research Activity and Communication Measured With Cybermetrics Indicators	Cybermetric indicators for describing and ranking university activities as shown in their Web sites, a large set of 9,330 institutions worldwide was compiled and analyzed.	Results show that cybermetric measures could be useful for reflecting the contribution of technologically oriented institutions, increasing the visibility of developing countries, and improving the rankings based on Science Citation Index (SCI) data with known biases.
12	P.D.D Dominic & Handaru Jati, (2010)	Evaluation Method of Malaysian University Website: Quality Website Using Hybrid Method	Malaysian university website were evaluated based on many criteria of website quality, consists of Linear Weightage Model, Analytical Hierarchy Process, Fuzzy Analytical Hierarchy Process, and one new hybrid model.	Result of this study confirmed that the website presence of Malaysian university websites is neglecting performance effort required. This suggests that web developer responsible for Malaysian university websites should follow and encourage the use of recognized guidelines when designing website.
13	MRS. SUNITA S. PADMANAVAR, DR. MILIND J. JOSHI (2011)	Survey Analysis On The Web: Similarities And Differences In University Website Information	Content analysis.	Result shows that the national and international universities are offering same number of contents for their website designing and there are nearly equal features in selecting universities websites.
14	Soud M. Almahamid, Amjad F. Tweiqat and Mousa S. Almanaseer (2016)	University website quality characteristics and success: lecturers' perspective	Survey method	Results revealed that perceived usefulness and perceived ease of use are key determinant of behavioural intention.. Unexpectedly, there was no link between information quality, professed usefulness, and perceived ease of use.
15	Utpal M. Dholakia & Lopo L. Rego (1998)	What makes commercial Web pages popular?: An empirical investigation of Web page effectiveness	Two different methods were used to obtain hit-rates of the commercial pages. For 31 home pages in the sample, hit-counters were present along with a specification of the date from which counting began. In these cases, it was possible to compute daily hit-rates.	Index pages are indicators of the extensiveness of a company's Web site. A company with a well-developed and complex Web site generally has an index page as their home page, linked to other pages within the site. A significant number of commercial sites on the Web are small and limited in scope, presenting their message up-front instead of encouraging navigation through the site. A significant number of sites in the sample consisted of a single Web page or two to four interlinked pages.
16.	Vijay M. KUMBHAR (2012)	Conceptualization of e-Services Quality And E-Satisfaction: A Review Of Literature	Required prior research work was selected using judgmental method and chosen some mostly cited research work using internet and those research papers and articles as well as	According to this review author found that, System availability, e-fulfilment, efficiency, cost-effectiveness, responsiveness, assurance, convenience and contact, perceived value and brand reputation are most important service

			some research these were referred in this investigation.	quality dimensions which can be used to assess service quality of e-service and customers' satisfaction in e-service settings.
17	Nihal Menzi-Cetin, Ecenaz Alemdag, Hakan Tu 'zu 'n & Merve Yildiz (2015)	Evaluation of a university website's usability for visually impaired students	Qualitative and quantitative methods were used to collect data.	Students mostly used the university website to keep up with announcements and rarely used it to search for course schedules, the academic calendar and transcripts. In the usability test, participants needed the longest time to find the academic calendar page and the final exam dates.
18	Sehwan Yoo, Evgeny Mun (2006)	Investigation Into The Home Page Of The Top 100 Liberal Arts College Websites	Critical features of an ideal home page are selected through literature reviews on the website design	The critical features of an ideal home page are used relatively frequently but in less degree. But not a single college's website satisfies all twenty evaluation criteria.
19	Ping Zhang & Gisela M. von Dran (2000)	Satisfiers and Dissatisfiers: A Two-Factor Model for Website Design and Evaluation	Quantitative method	Focus groups revealed that many subjects had difficulties understanding the concept of hygiene and motivator factors when they were presented in writing as part of the instructions for the questionnaire. Some subjects had difficulties making the transition from work environment to the Web environment.
20	Eleftherios Papachristos and Nikolaos Avouris (2011)	The Application of Preference Mapping in Aesthetic Website Evaluation	Preference mapping	It was argued that this technique is particularly suited for website design evaluation especially for alternative prototype comparisons. The application of this method to an actual dataset resulted in a better understanding of participant preferences that could not be reached through simple comparison of average ratings.
21	Sanne Elling1, Leo Lentz and Menno de Jong (2007)	Website Evaluation Questionnaire: Development of a Research-Based Tool for Evaluating Informational Websites	online questionnaire.	This article presents a generic Website Evaluation Questionnaire (WEQ) for the evaluation of informational websites.
22	Jian Ma (2016)	Principal Component Analysis Method-Based Research on Agricultural Science and Technology Website Evaluation	Principal component analysis method.	Using principal component analysis to analysis, based on ranking results comparison with Alexa ranking, giving agricultural science and technology websites analysis and evaluation. Through this type of evaluation, can play an important promote role to agricultural science and technology websites healthy development and agricultural Information Development.
23	Kazimierz Choroś (2011)	Further Tests with Click, Block, and Heat Maps Applied to Website Evaluations	Many techniques are used for the evaluation of the websites. One of the new methods is based on the analysis of click, block, and heat maps mainly leading to the detection of these parts of the website which are not used or where the user is intuitively expecting a link to the next part of the site visited.	The results obtained from the tests performed for two different websites using click, block, and heat map techniques helps to draw some interesting conclusions on user behavior. Also discussed is to what extent the observations and correlations detected for one website, with the population of dominant visitors relatively well predictable can be applied to another website with unknown visitors.
24	Namrata Rao & Anesa Hosein (2017)	The limits of Higher Education Institutions' websites as sources of learning and teaching information for prospective students: a survey of professional staff	Interviews with quality assurance and marketing personnel	The interview data revealed that factors which influenced the quality of website L&T information were 'individual/personal' related to the individual's own approach and/or were 'institutional', influenced by the concerned HEI's approach to information provision.
25	Marzie Astani (2013)	A Decade of Changes in University Website Design	Survey method	Findings show that the universities have succeeded in presenting a high range of information that is relevant and applicable to their website. However, they need to

				improve on updating their information and presenting it in a layout that will make it easier for users to locate the information of interest
26	Salam Abdallah and Bushra Jaleel (2014)	Website Development of an Assessment Tool and Evaluation Framework of E-Marketing Appeal:	The paper adopts a hybrid approach to website assessment which involves studying both information system elements and dimensions of e-marketing to define and measure the concept of web appeal.	The model provides a systematic criteria for comparing websites, and offers valuable insights into how website attributes can be used to achieve desired performance in terms of attracting, engaging, and retaining customers, as well as competing with rival stores.
27	Nan Yu & Jun Kong (2016)	User experience with web browsing on small screens: Experimental investigations of mobile-page interface design and homepage design for news websites	Experimental studies to examine how users evaluated interface designs that are widely used on mobile news websites	It was found that the designs for mobile news pages and the structures for website homepages can have a significant impact on perceived ease of use, reading time, and the overall reading experience
28	Sukhpuneet Kaur Kulwant Kaur & Parminder Kaur, (2016)	An Empirical Performance Evaluation of Universities Website	four automated website testing tools of Pingdom, GTMetrix, Website Grader and Site Speed Checker tool are used.	The paper evaluated the university websites of Punjab using four automated tools and gives the comparative results of various factors using these tools.
29	Wayne Usher & James Skinner (2010)	Categorizing health websites: E-knowledge, e-business and e-professional	Literature review	The theoretical article has presented three types of health websites (e-knowledge, e-professional and e-business). It has been indicated that health websites can be placed into one, or a combination of, three types of categories.
30	Samuel C. Avemaria Utulu & Omolara Bolarinwa (2012)	Contents and Architecture of Nigerian Universities' Websites	Manual website examination and website architecture analysis based on the Watson Addy web to carry out architecture analysis of the websites in the following areas: language syntax, style, spelling accuracy, down speed, file types and search engine compatibility using meta tag availability.	The findings exposed salient weaknesses like wrong domain name adoption, errors in syntax, poor style, spelling mis-takes and non-availability of meta tags in the websites. In addition, the websites did not contain most of the official and everyday information expected to be in a university website. Based on the outcome of the study, Nigerian universities' websites can be generally categorized as having meager content and defective architecture.
31	Abdulmohsen Abanumy, Ali Al-Badi and Pam Mayhew (2005)	e-Government Website Accessibility: In-Depth Evaluation of Saudi Arabia and Oman	Survey and commercial online tools, that is, Bobby (Watchfire, 2002) and Multiweb, LYNX and W3C validation test tools were used.	The in-depth evaluation process showed that the government websites in these two GCC countries (Saudi Arabia and Oman) still need considerable efforts to become accessible websites at all.
32	Darren Mundy and Bandi Musa (2010)	Towards a Framework for eGovernment Development in Nigeria	Content analysis and survey	The content analysis demonstrated significant shortcomings with existing state government websites in Nigeria. The analysis of citizen requirements found that amongst those user groups targeted there was a high level of expectation in relation to the provision of eGovernment services and also found that the Nigerian citizens surveyed were more engaged with the benefits that eGovernment could bring to their nation.
33	Jason Silvestre, Javier Z. Guzman, Joseph M. Abbatematteo, Benjamin Chang & L. Scott Levin (2015)	Evaluation of content and accessibility of hand fellowship websites	Manual examination of contents available and accessible	Most hand surgery fellowships lack readily accessible and comprehensive websites. The paucity of online content suggests HFWS are underutilized as educational resources and future opportunity may exist to optimize these tools.
34	Ahmad Albhaisi, Heider A. Wahsheh, Tami Alghamdi (2014)	Evaluating Web Ranking Metrics for Saudi Universities	WooRank's analytics tool was used to analyze different Websites features	The paper highlighted the missing metrics for every Website and made recommendations. It further highlights many valuable Web ranking metrics, which were used to improve the ranking scores for the universities Websites.



35	Jyoti Choudrie, Gheorghita Ghinea & Vishanth Weerakkody	Evaluating Global E-Government Sites: A View using Web Diagnostic Tools	common set of performance metrics and Web diagnostic engines are used and they are <i>WebXact</i> , <i>Netmechanic</i> , <i>W3C's HTML validator</i> & <i>vizcheck</i>	Results show that not only are there wide variations in the spectrum of information and services provided by these portals, but that significant work still needs to be undertaken in order to make the portals examples of 'best practice' e-Government services.
36	P.D.D Dominic, Handaru Jati (2010)	Evaluation Method of Malaysian University Website: Quality Website Using Hybrid Method	The study used a number of widely available web diagnostic tools online. Available website performance tool and webpage speed analyzer online service were used.	The result of this study confirmed most of Malaysian University websites are neglecting the performance and quality criteria. By applying Hybrid model between Fuzzy Analytical Hierarchy Process, and Linear Weightage Model. approach for website evaluation has resulted in significant acceleration of implementation, raised the overall effectiveness with respect to the underlying methodology and ultimately enabled more efficient and significantly equal or better procedure compared with other methods.
37	Chen-Huei Chou, Fatemeh Mariam Zahedi and Huimin Zhao (2014)	Ontology-based evaluation of natural disaster Management websites: a multistakeholder Perspective	Expert rating and survey	The results indicate a lack of readiness in most of these websites.
38	Anwarul Islam and Keita Tsuji (2011)	Evaluation of Usage of University Websites in Bangladesh	Two online automated tools, namely, html toolbox and web page analyser were used along with a questionnaire directed towards users of these websites.	The study showed that users are not satisfied by overall usability level of these websites and few of them are satisfied with the available features. However, there are some weaknesses in some aspects of the design, interface, and performances.
39	Maxim Bakaev, Tamara Mamysheva & Martin Gaedke (2016)	Current Trends in Automating Usability Evaluation of Websites. Can You Manage What You Can't Measure?	Literature review	It was noted that certain persisting ambiguities in usability conceptualization for quantitative measurement and a certain gap between its more unprejudiced dimensions (effectiveness and efficiency) and fairly subjective aspect of user satisfaction.
40	Zahra Andalib and Habibollah Danaee (2013)	A study on measuring the quality of university website	Quantitative method	The results demonstrate that three components of trust, efficiency and achievement play essential role on customer loyalty.
41	Jian Ma (2016)	Principal Component Analysis Method-Based Research on Agricultural Science and Technology Website Evaluation	objective data and artificial ratings, using principal component analysis method.	The author used the model to evaluate 18 agricultural science and technology websites, and proposed some suggestions on development of agricultural science and technology websites based on the evaluation result which would act as reference to agricultural science and technology website construction.
42	Celinus Kiyea & Aminat Bolatito Yusuf (2014)	Usability Evaluation of Some Selected Nigerian Universities' Websites	Use of automated tools such as web page analyzer and HTML toolbox for data collection.	The results showed that some of universities' websites adhered to the laid down threshold values of these attributes while some are still very much lacking.
43	Daniel Belanche, LuisV.Casalo', MiguelGuinal'u (2012)	Website usability, consumer satisfaction and the intention to use a website: The moderating effect of perceived risk	Survey method	Results show that website usability affects satisfaction which in turn affects intention to use. Contrary to expected, usability does not directly affect intention to use but has an indirect effect through consumer satisfaction.
44	F. O. Oliha (2014)	Web Portal Usability Among Nigerian University Students: A Case Study Of University Of Benin, Nigeria	Survey Method	It revealed that the informative features and usefulness of the web portal system has not encouraged students usability behaviour due to inefficiencies to effectively and satisfactorily achieve a range of specified or completed tasks irrespective of their competencies in basic computer and in basic computer and internet capabilities

## Methodology

Based on the literature reviewed, it became apparent that there is no singular methodology that is enough to evaluate website quality due its complexity (Yoo, & Jin, 2004, Choudrie, Ghinea, & Weerakkody 2004, Aguillo, Granadino, Ortega, & Prieto 2006, Hong 2007, Holmberg & Thelwall 2008, Dominic & Jati 2010, Liu, Liu & Hwang 2011, Albhaishi, Wahsheh & Alghamdi 2014, Menzi-Çetin, Alemdağ, Tüzün, & Yıldız 2015, Abdallah & Jaleel 2015). Due to this limitation, we opted for a hybrid approach to cover the gap in the previous studies. The hybrid technique helps to use mixed methodologies for this study in order to have access to comprehensive insight which single- mode approach lack. This adopted methodology combined the benefits of speed and cost containment. We integrate computational, analytics and manual methods with open-source software and website diagnostic tools (Lewis, Zamith & Hermida 2013, Tavana, Momeni, Rezaeiniya, Mirhedayatian & Rezaeiniya, 2013). We present the taxonomy of our research methodology in eight stages: (1) We gathered the names and the websites of the federal, state and private universities from the National Universities Commission being the highest university advisory body in Nigeria and for their distinguished services for the past 55 years. We attempt to open each website and discovered that some universities domain names are not operational. For us not to miss out any university we decided to place all the universities under observation for a month by trying to launch the domain name intermittently assuming the gap of server downtime and the University updating time.

In stage 2, we included functional websites and excluded non-functional websites which totals 141 university websites including 40 federal, 39 state and 62 private universities and proceed to the data extraction with WooRank Clients manually. We choose this diagnostic tool because it is an analytics tool that is suitable for web ranking metrics analysis (Albhaishi, Wahsheh & Alghamdi 2014). (3) In this stage, we used WooRank analytics to analyze the university websites Hypertext Markup Language (HTML) with criteria of passed, to improve and error. We also checked whether the websites are mobile compliant, the usability level, the technologies used, backlinks and the presence of social media. In the end, we checked the overall ranking of the university websites in percentage. The websites ranking with other metrics facilitate comparison between federal, state and private universities in Nigeria. (4) We validate the HTML, XHTML, CSS stylesheets and broken links with World Wide Web Consortium (W3C) Markup Validator. (5) We used GTmetrix website diagnostic tool to analyze the websites speed and CheckMyColours tool for checking the universities foreground and background colour quality and effectiveness. (6) We used open source LinkPopularity web tool to test the visibility of the university websites on different search engines and ascertain their popularity. We checked the trustworthiness of the websites with WOT browser extension tool. This free web tool is based on user's experience and machine learning, and 140 Million users have patronized it.

We used Webometrics, the Cybermetrics analytics tool to rank the world universities and focus on the best university in the world, Africa and Nigeria. The insight from this ranking also helps in university websites comparison among Nigeria university where we validated survey instrument from Finland universities. Email survey were finally administered and Google form survey template were used. We made enquiry from the help desk of the responsible office for the website design and maintenance in Finland and sent an email to the office in charge by making our research intention known to them. After we had received a positive response to our first mail, we then

develop concise and clear questions These questions are related to the university website design, duration of a website redesign, the frequency of website update, in-house or outsource webmaster, centralised or decentralised update, annual budget allocated to the website design, maintenance and website security related questions. We ethically avoid ambiguous and controversial questions and rigorously follow-up our initial contact with new mail. After we had received a response from our respondent's, we sent them an email of appreciation. We spell check the respondents text and endeavour to retain the original meaning. We repeated the same procedure to administer our survey to the Nigerian universities to validate the other techniques we have used. We compiled e-mail addresses from the Nigerian university websites that we selected for the study purposely so that we can check the efficiency of the universities emails.

## **Data Analysis and Result**

The data extracted from Nigeria Universities websites was classified into three in a tabular form. The result of Federal, State and Private websites analyses is displayed in tables (*appendixes available on request*) and it shows the variation on coding, design interface, aesthetic, popularity and usability. The markup and web languages was examined and evaluated based on nine criteria of improve, error, pass, not found, very high, slow, medium and not available. The front side of website which is made up of HTML and CSS is as important as back end which comprise of database administration. The second table captures the mobile compatibility of the website and the usability with assessment criteria of very good, good, fair, poor, average, very slow, slow, not regular and not available. Table three explores technology such as analytics, security with Secured Socket Layer (SSL), backlinks that is very important for website visibility and social media with evaluation criteria of good, bad, fair, poor, high, medium low and very low. All the universities in the three phases in Nigeria had a common domain name that ends with a suffix edu.ng with a few exceptions that ends with .org, .com, .net, edu.net and gov.ng. The inconsistencies of the domain names may be due to university choice and non-availability of the desired domain name from the registrant. In Nigeria, the suffix of "edu" as a short form of education is very paramount in universities domain names with the country "ng" domain name but in Finland it is the name of the university or the name of the city with the country domain name that is functional.

Surprisingly, in ranking a private university top the rank with 83.3% seconded with another private university with 70.1% with Woorank audit platform. The best Federal university website score 66.7% while the State university website contend with 66%. Many universities websites across the three educational phases are below average and need urgent search engine, technology and social media optimization. Some of the HTML codes used are broken and outdated. The tables reveal inconsistent functioning of SSL, low speed, irregular use of social media, faulty analytics and weak meta description that is very important for search engine optimization. HTML Validator also reveals fatal error and warning messages such as wrong use of text alternative, violation of nesting rules, obsolete font element and Cascading Style Sheet (CSS) are rarely used in some of the websites validated. GTmatrix showcase the best Federal university in Nigeria fully loaded time as 470ms, State 4.2s, Private 2.4s with total size page of 23.7KB, 1.8MB and 15.8MB. The requests are 4, 37 and 26. The interpretation and application of the stated speed may be difficult because it all depend on the size of the HTML, CSS and JavaScript files used for the website.

We checked the foreground and background colours of the universities websites across the three tiers of institutions with CheckMyColours diagnostic tool. We decided to test the best university website from each of the three phases. The diagnostic tool highlighted the affected nodes with sample text. The website text with colour error is not visible for reading. The colour diagnostic tool displayed the luminosity contrast ratio, brightness difference and colour difference. The study starts with the best federal university, follow by state university and private university websites. Out of 552 elements tested, there was 218 failures on luminosity contrast ratio, 110 failures of brightness failure and 499 failures on colour difference. Subsequently, 322 elements tested for the state university website and there were 33 failures on luminosity contrast ratio, 36 failures of brightness and 111 failures on colour difference. For the private university, 223 elements were tested with 101 luminosity contrast ratio failures, 101 brightness and 101 colour difference failures. The state university website tested seems to have a better colour match than other universities but this result cannot be generalised because it is case by case issue.

The study chooses universities from the three levels of institutions randomly for Uniform Resource Locator (URLs) analysis for popularity through Link Popularity platform. The analysis was based on Google, Bing and Yahoo search engines. The website visibility tool we employed is good for benchmarking and we compare the three levels of university websites. The best federal, state and private university websites are more popular in Google, Bing more than Yahoo search engines. The three universities are not visible in Yahoo search engine at all. This result shows that the universities examined are optimised in Google and Bing but the user of the websites will be disadvantaged while searching for related information regarding the universities on Yahoo search engines. Trust and confidence to use a website is very important and we endeavour to check the trustworthiness of Nigeria universities websites at random with Web of Trust (WOT) tool and we discovered that academic community rating of the university websites is rare in Nigeria. Only few universities had 'good' and 'excellent' rating for trustworthiness based on the scale of 'I don't trust' as the lowest rating and 'I trust' as the highest rating. Some of the Nigerian universities websites still need feedback from their users and community rating may be one of the channel to achieve this goal.

## **Discussion and Implication**

In this study, we aggregate different web diagnostic tools to evaluate and compare the quality of Nigerian universities website. The result of the study project both theoretical, methodical and managerial implications. Due to the importance of university website, the extant studies have widely studied the limitation, culture, ranking, impact, design and process of websites in different sectors and left some gaps behind for this study to fill. For instance, this study used hybrid methodology to examine the complexity of website in the developing country context which is different from the study of Sehwan et al. (2004) that studied only the home page of top 100 university websites. This study reiterates Web Qual and Site Qual to glean a new meaning by diagnosing the inhibitors of Nigerian universities websites, detect the way of improvement and postulate ideas for future updates. The result of this study is more robust when compared with the studies of Sukhpuneet and Parminder, (2016). They used 4 automated tools in their study while this study employed 6 automated tools. Samuel and Omolara, (2012) studied 50 Nigerian Universities and dwell on their content and weak architecture while this study examined 141 federal, state and private Nigeria Universities and diagnosed the inhibitors of the websites and examined the technology, social media and security in addition to the content and the general design. The study contributes theoretically by combining two website quality theories to explain

the inhibitors, improvement, quality and future updates of Nigeria Universities websites based on ease of use, processing speed, aesthetic design, interactive responsiveness, entertainment, trust and usefulness and come up with a new WebFUQII (Future Update, Quality, Inhibitors and Improvement) model. The work also contributes to methodology by using web diagnostic hybrid tools that gives more explanatory power. This study also makes managerial implications in four ways. First, university websites have gone beyond ordinary entertainment tool but it is now a money machine for the academic community as it contained payment portal for the universities. The universities web developer should pay strict attention to the security issue of the universities websites in order to optimize the use of their websites to the maximum. Second, the Nigeria universities webmaster should endeavor to update the websites regularly to bridge the gap of dead codes, malwares and other vulnerable attack from the online terrorist. Third, Nigeria universities management should allocate meaningful budget for the development and continuous maintenance of their websites as the investment has short term return on investment (ROI). Lastly, there should be regular search engine optimization for Nigeria universities websites as this will increase their visibility and relevance nationally and globally.

### **6.1 Limitation and Future Research Direction**

This study addresses the inhibitors, improvements, quality and future updates of Nigeria universities websites as a response to static condition of Nigeria universities. The work used email survey conducted in Finland to validate the survey design to collect data from Nigeria Universities management to validate their responsiveness mode while only two of the universities responded. Despite the impact of this study in Nigerian universities context, there are some factors that limit the study. First, collecting data with Google form from the Nigeria universities to complement the diagnostic tools used was a herculean task as almost all the universities contacted refused to respond to the survey. Second, server down time and maintenance time prolonged this study unnecessary as we give enough time to extract online data. Third, the study only focused on federal, state and private universities but other tertiary institutions like polytechnics and Nigeria College of Education (NCE) was not included in this study. The future study can work on these limitations and use this model to study polytechnics, NCE and technical colleges website quality in Nigeria.

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